"Dissemination of Education for Knowledge, Science and Culture"
- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

Post-Graduate Department of Physics and IQAC,

Raje Ramrao Mahavidyalaya, Jath,

Dist: Sangli, Maharashtra, India

Abstract Proceeding of Sixth International Conference on Advances in Materials Science (Online) (ICAMS – 2021)

23rd – 24th April 2021

Dr. Sanjay S. Latthe
Convenor

Dr. A. K. Bhosale
Co-Convenor

Mr. Rajaram S. Sutar
Organizing Secretary

Mr. Akshay R. Jundle
Treasurer

Dr. Shivaji R. Kulal
IQAC, Coordinator

Dr. Suresh S. Patil
I/C Principal

Shikshanmaharshi Dr. Bapuji Salunkhe

Sansthamata Shrimati Sushiladevi Salunkhe

Prin. Abhaykumar Salunkhe
Chairman, Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prin. Mrs. Shubhangi Gawade
Secretary, Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prof. (Dr.) D. T. Shirke
Vice – Chancellor
Shivaji University, Kolhapur

Prof. (Dr.) P. S. Patil
Pro – Vice – Chancellor
Shivaji University, Kolhapur

Prin. (Dr.) Y. A. Bhosale
Joint Secretary (Administration)
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prin. (Dr.) R. V. Shejwal
Joint Secretary (Finance)
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prof. (Dr.) Suresh S. Patil
I/C Principal
Raje Ramrao Mahavidyalaya, Jath

Message from Chairman,

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prin. Abhaykumar Salunkhe

Message

I am very glad to hear that the Post-Graduate Department of Physics, Raje Ramrao Mahavidyalaya, Jath has organized the Sixth International Conference on Advances in Materials Science (Online) (ICAMS – 2021) during 23 – 24 April 2021. Now a days, Materials Science is a booming field of research. Majority of the well-known and popular research in 20th century has been emerged from Materials Science research. Various materials with varying particle sizes from macro to nano size can be prepared and utilized for various industrial applications.

The conference proposes to cover a wide range of themes which are emerging branches of this important subject. It is a matter of pride that the scientists from Japan, South Korea, China, Qatar and India have agreed to participate and share their ideas in the ICAMS – 2021. It is a matter of pride to the college as well as Shri Swami Vivekanand Shikshan Sanstha, Kolhapur. I am sure that the theme of conference will provide a meaningful platform to the researchers and all the participants to exchange their experiences and ideas. The guidance given by eminent researchers will be intellectual treat to the delegates.

I wish an Online International Conference, ICAMS – 2021 a huge success.

Prin. Abhaykumar Salunkhe,
Chairman
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Message from Secretary,

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prin. Mrs. Shubhangi Gawade

॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥ - शिक्षणमहर्षी डॉ. बापूजी साळुंखे

Estd. June 1955 Reg.No. K.E.95

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

2130, 'E' Ward, Tarabai Park, Kolhapur - 416003 (Maharashtra State)
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Shikshanmaharashi Late Dr. Bapuji Salunkhe B.A.B.T.D.Lit. Promoter-Founder	Hon's. Chandrakant (Dada) Patil MLA President	Prin. Abhaykumar Salunkhe M.A. Chairman	Prin.Sou. Shubhangi M. Gawade M.Sc.B.Ed. Secretary

Outward No. : Date :

Message

I am very happy to know that the Post-Graduate Department of Physics, Raje Ramrao Mahavidyalaya, Jath has organized the consecutive Sixth International Conference on Advances in Materials Science (Online) (ICAMS-2021) during 23rd – 24th April 2021. I appreciate the endeavour of the college to shoulder the responsibility of organizing an International Conference. The presence of scientists from Japan, China, South Korea, Qatar and India is an excellent opportunity to the delegates participating in this Online International Conference (ICAMS – 2021).

I hope, the meaningful discussions will take place on the theme and the discussions will be beneficial to the delegates. The conference will serve as a platform for young researchers, faculty members and resource persons for exchanging latest information in Materials Science.

I wish the International Conference a grand success. Best luck to organizers.

Prin. Mrs. Shubhangi Gawade,
Secretary,
Shri Swami Vivekanand Shikshan Sanshta, Kolhapur

Message from Vice – Chancellor,

Shivaji University, Kolhapur

Prof. (Dr.) D. T. Shirke

प्रा. (डॉ.) डी. टी.. शिर्के
एम.एस्सी., पीएच्.डी.
कुलगुरू
Prof. (Dr.) D..T..Shirke
M.Sc.,Ph.D.
Vice-Chancellor

Estd. 1962
NAAC 'A++' Grade
शिवाजी विद्यापीठ,
विद्यानगर, कोल्हापूर – ४१६ ००४.
SHIVAJI UNIVERSITY,
Vidyanagar, Kolhapur - 416 004.

दूरध्वनी : कार्यालय – (०२३१) २६०९०६०
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MESSAGE

I am very happy to know that Raje Ramrao Mahavidyalaya, Jath, Dist. Sangli is organizing Sixth International Conference on "Advances in Materials Science" (ICAMS-2021) during 23rd - 24th April, 2021 through online mode.

I congratulate the organizers for organizing the conference on this important topic. I am sure that this conference will provide a platform for students, faculty, researchers and experts to share the knowledge and experiences of innovative techniques and there will be meaningful conversations and thought-provoking lectures from invited speakers. I am confident that the deliberations will be very fruitful and participants will richly benefit from it.

I wish the International Conference (ICAMS-2021) a grand success.

22 APR 2021

(D.T. Shirke)
Vice-Chancellor

Message from Joint Secretary (Administration),
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur
Prin. (Dr.) Y. A. Bhosale

I am very glad to receive a news of organization of Sixth International Conference on Advances in Materials Science (Online) (ICAMS-2021) during 23 – 24 April 2021 by Post-Graduate Department of Physics, Raje Ramrao College, Jath.

For consecutive two days, scientists, industrialists, and students with different backgrounds and expertise convene to synergistically advance the field of materials science by presenting their latest research, attending stimulating lectures and having lively discussions during breaks and events. I am confident that Online ICAMS-2021 will encourage these activities in the best possible manner. I appreciate the efforts put on by the organizing committee members.

Grand success to Online Sixth ICAMS-2021.

Prin. Dr. Y. A. Bhosale
Joint Secretary (Administration)
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Message from Joint Secretary (Finance),

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prin. (Dr.) R. V. Shejwal


"ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार" - शिक्षणमहर्षी डॉ. बापूजी साळुंखे
श्री स्वामी विवेकानंद शिक्षण संस्था, कोल्हापूरचे
लाल बहादूर शास्त्री कॉलेज
ऑफ आर्टस्, सायन्स अॅण्ड कॉमर्स, सातारा
स्थापना : जून १९६७
१७, मल्हार पेठ, सातारा - ४१५००१ (महाराष्ट्र) फोन : ०२१६२/२३७९८६, फॅक्स :२३८०५०
email - lbs_satara@yahoo.in ▪ www.lbscollegesatara.edu.in
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▪ Professional Tax R.C.No.27245111910P
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▪ अध्यक्ष : मा.ना.चंद्रकांत(दादा) पाटील
महसूल व सार्वजनिक बांधकाम मंत्री, महाराष्ट्र राज्य
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▪ प्राचार्य : डॉ. राजेंद्र व्ही. शेजवळ
संदर्भ क्र. एलबीएससी /
दिनांक

Message for ICAMS – 2021

I am very happy to know that Post – Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli is organizing the Sixth International Conference on Advances in Materials Science (Online) (ICAMS-2021) during 23 – 24 April 2021. I am also happy to know that the research papers on the theme of the conference will be published in the Macromolecular Symposia (Wiley Publications).

I congratulate the Principal and all his colleagues for organizing the consecutive Sixth International Conference on this very important topic. I am sure that the main theme and sub themes will be widely discussed and the participants will have meaningful interaction and exchange of information during the course of the Online International Conference (ICAMS – 2021).

I wish the Online International Conference (ICAMS – 2021) a magnificent success.

Rshejwal

Prin. Dr. R.V. Shejwal
Joint Secretary (Finance)
Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

From the Desk of Principal, Raje Ramrao Mahavidyalaya, Jath

Prof. (Dr.) Suresh S. Patil

It is matter of great pleasure to welcome and thank you all for gathering in Sixth International Conference on Advances in Materials Science (Online) (ICAMS-2021) organized by Post-Graduate Department of Physics, Raje Ramrao College, Jath. It is very much heartening to see the overwhelming response received for the conference from the research community for its continuous sixth edition. The scientists and researchers from various countries (Japan, China, South Korea, India and Qatar) are participating in online ICAMS-2021. A good number of distinguished professors and researchers have also agreed to deliver keynote addresses/invited talks in the conference. Young scholars participating in the conference will immensely benefit from these. Present conference will be dedicated to discuss on newer technologies in materials science and will also try to provide a platform to young researcher for their futuristic academic achievements. I am confident that this conference will provide a concrete platform which will encourage and support scholars, researchers and faculty to carry and accomplish their research goals.

I could see the amount of efforts put in by the faculty in organizing this conference in this institute with minimal infrastructure of its own. The technical program committee chair and team did an excellent job in ensuring acceptance of quality works as part of the conference. The conference received 244 abstracts which will be published in the form of online proceedings and 185 full length research papers which shall be published after peer review in Macromolecular Symposia. We hope that you find the online ICAMS-2021 proceeding rewarding.

Once again welcome to online ICAMS-2021.

From the Desk of Convenor, Online ICAMS - 2021

Dr. Sanjay S. Latthe

Heartily welcome to online ICAMS-2021. Post-Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli has organized the Sixth International Conference on Advances in Materials Science (Online) (ICAMS-2020) during 23rd – 24th April 2021. This conference aims to provide an opportunity for scientists, researchers and faculty around the world to exchange state-of-the-art research and identify research needs and opportunities in all aspects of Materials Science. The primary objective of this conference is to create opportunities for the next generation researchers to develop their professional skills.

In past, 05 consecutive International Conferences on Advances in Materials Science were successfully organized by us. The online ICAMS-2021 will cover a wide range of current research topics related to Materials Science. It is believed that breakthroughs in Materials Science will change every aspects of human life in diverse areas as, electronic devices, energy, biomedicine, sensing, environment, security and many.

An online ICAMS-2021 will include keynote address, invited talks and contributed oral presentations by the participants from China, Japan, South Korea, Qatar, and India. Conference will provide an opportunities for young researchers to actively engage in research discussions, novel research ideas, and safety issues in nanotechnology. We have received 244 abstracts and 97 participants are delivering Oral Presentations. There will be 06 best oral presentation awards for research scholars. We have received around 185 full length research papers and shall be considered for publication after rigorous peer review process in Macromolecular Symposia (Wiley Publications).

I feel fortunate enough for having a strong support from Dr. Suresh S. Patil, I/C Principal, Raje Ramrao College, Jath and Dr. A. K. Bhosale, Department of Physics of the college. Both of them gave me full liberty to carry out the things smoothly.

Enjoy ICAMS-2021.

From the Desk of Co – Convenor, Online ICAMS - 2021

Dr. A. K. Bhosale

After the grand success of past five International Conferences on Advances in Materials Science, we welcome you back for the Sixth International Conference on Advances in Materials Science (Online) (ICAMS – 2021) organized by Post-Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli, Maharashtra, India.

ICAMS-2021 is the best platform for all the researchers working in the field of Materials Science to bring up their research work and present. Widely acclaimed speakers from Japan, China, South Korea, Qatar and different parts of India will be gathering in online ICAMS – 2021. This conference will provide an opportunities to meet and associate with the present and potential researchers to investigate more on Materials Science. The scope of the conference and topics covered in it encompass a wide variety of topics in Materials Science. The technical session will consist of key note talks, invited talks, and oral presentations. The research papers received for ICAMS-2020 shall be considered for publication in the Macromolecular Symposia (Wiley Publications).

Thanks to all the participants to share your expertise knowledge with global platform of Materials Science Community.

Enjoy the online conference.

Technical Sessions of ICAMS – 2021

Day & Date	Time	Programme (By Indian Time)
Friday, 23rd April 2021		**Day 01**
		Inaugural Function
	10.00 to 10.30 AM	**Hon'ble Prof. Chang-Sik Ha** *Chief Guest* Pusan National University, Busan, South Korea
		Hon'ble Prin. Shubhangi Gavade *President of the function* Secretary, Shri Swami Vivekanand Shikshan Sanstha, Kolhapur, Maharashtra, India
		Hon'ble Prin. Dr. R. V. Shejwal *Auspicious Presence* Joint Secretary (Finance), Shri Swami Vivekanand Shikshan Sanstha, Kolhapur, Maharashtra, India
		Hon'ble Prof. (Dr.) Suresh S. Patil *I/C Principal* Raje Ramrao Mahavidyalaya, Jath, Maharashtra, India
		Dr. Sanjay S. Latthe *Convenor of ICAMS – 2021* Raje Ramrao Mahavidyalaya, Jath, Maharashtra, India
	10.30 to 11.00 AM	**Key Note Address** Resource Person: Prof. Chang-Sik Ha Topic: "*Colorless and Transparent Polyimides*" Dept. of Polymer Science and Engineering, Pusan National University, Busan, South Korea
	11.00 to 11.30 AM	**Invited Talk – 01** Resource Person: Prof. Guang-Wu Zhang Topic: "*The Cleavage and Functionalization of C≡C Bond of Ynones*" Department of Orthopedics, Peking University Shougang Hospital,

		Beijing, China
	11.30 to 12.00 PM	**Invited Talk – 02** Resource Person: Dr. Deepalekshmi Ponnamma Topic: "*Fibers and Media Filters for Effective Separation of Oil/Water Mixtures*" Center for Advanced Materials, Building H10, Zone 6, Qatar University, Doha, Qatar
	12.00 to 12.30 PM	**Invited Talk – 03** Resource Person: Dr. Saravanan Nagappan Topic: "*Antifogging and Antibacterial Amphiphilic Coating from Organic−Inorganic Hybrids*" Dept. of Polymer Science and Engineering, Pusan National University, Busan, South Korea
	12.30 to 05.30 PM	**Oral Presentation (OP 01 – OP 55)**
Saturday, 24th April 2021	**Day 02**	
	10.00 to 10.30 AM	**Invited Talk – 04** Resource Person: Prof. Kazuya Nakata Topic: "*Photocatalysis for Bio-related Applications*" Division of Sciences for Biological System, Institute of Agriculture, Tokyo University of Agriculture and Technology, Tokyo, Japan
	10.30 to 11.00 AM	**Invited Talk – 05** Resource Person: Dr. Sung Soo Park Topic: "*Functionalized Mesoporous Organosilica Films as Potential Photo Sensors*" Dept. of Polymer Science and Engineering, Pusan National University, Busan, South Korea
	11.00 to 11.30 AM	**Invited Talk – 06** Resource Person: Dr. S. B. Sadale Topic: "*Gas Phase Photocatalysis: Towards Realization of Photocatalytic Applications*" Department of Technology, Shivaji University, Kolhapur – 416 004, Maharashtra, India.

	11.30 to 12.00 PM	**Invited Talk – 07** Resource Person: Dr. Rupesh S. Devan Topic: "*Hetero - architectured Materials for Displays and Energy Storage Electrodes*" Dept. of Metallurgy Engineering & Materials Science, Indian Institute of Technology (IIT) Indore, India
	12.00 to 04.00 PM	**Oral Presentation (OP 56 – OP 96)**
	04.00 to 04.30 PM	**Valedictory Function**
		Hon'ble Prin. Dr. Yuvraj A. Bhosale *Chief Guest* Joint Secretary (Administration), Shri Swami Vivekanand Shikshan Sanstha, Kolhapur, Maharashtra, India.
		Hon'ble Prin. Dr. M. S. Hujare *President of the function* Principal, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon, Maharashtra, India.
		Hon'ble Prof. (Dr.) Suresh S. Patil *I/C Principal* Raje Ramrao Mahavidyalaya, Jath, Maharashtra, India
		Dr. S. R. Kulal *Vote of Thanks* IQAC Coordinator, Raje Ramrao Mahavidyalaya, Jath, Maharashtra, India.

Day	**Zoom Meeting Link**
Friday 23 April 2021	Join Zoom Meeting https://zoom.com.cn/j/81708288440?pwd=MWhESng2U3BlaDZrenB4S295WjdwZz09 Meeting ID: 817 0828 8440, Passcode: 557039
Saturday 24 April 2021	Join Zoom Meeting https://zoom.com.cn/j/84037621800?pwd=bEltUnM0Q1pVc1o0ZzZrTTZSTmQrdz09 Meeting ID: 840 3762 1800, Passcode: 107697

Technical Session of ICAMS – 2021

Invited Talk (IT – 01 to IT – 08)

Abstracts for Oral Presentation (OP – 01 to OP – 96)

	CRYSTALS BY GEL METHOD			
26	PMMA based	Swapnali D. Patil, Pradip P. Gaikwad, Sanjay S. Latthe	OP – 26	90
27	Synthesis and PL study of Superhydrophobic Nanofiber Membranes prepared by Electrospinning Method for efficient Oil-Water Separation Application Sr3(VO4)2:Eu3+ phosphor for W-LED application	N.D. Kherde, P.A. Nagpure, W.S. Barde, S.K. Omanwar	OP – 27	91
28	Morphology, Characterization and Gas Sensor Properties of Sr Doped WO3 Thin Film Nanostructures	Dr. Vinayak Adimule, Dr. Debdas Bhowmik, Mr. Adarsha H.J	OP – 28	92
29	Octadecyltrichlorosilane modified Superhydrophobic Stainless Steel Mesh for Oil-Water Separation	Rajaram S. Sutar, Narayan P. Kulkarni, Appasaheb K. Bhosale, and Sanjay S. Latthe	OP – 29	93
30	EFFECT OF SUBSTRATE THICKNESS ON THE ELECTRO-WETTING PHENOMENON	R.S.Bhalerao, N. B. Bhagat, K.M.Alti	OP – 30	94
31	Comparative studies on Supercapacitive Properties of Reduced Graphene Oxide Quantum Sheets deposited on Various Substrates.	Nidhi Tiwari, Snehal Kadam, Shrinivas Kulkarni	OP – 31	95
32	Synthesis and Photoluminescence of KBaPO4: Ce3+ phosphors	Damodhar. B. Zade, Sachin H. Dhawankar, Vishal .R.Panse, Nitesh D Punyapreddiwar	OP – 32	96
33	EFFECT ON Structural and MAGNETIC PROPERTIES OF Co-Zr Substituted ALUMINIUM Strontium hexaferrites	U. B. Hatwar, M. N. Giriya, K. G. Rewatkar	OP – 33	97

	HENONE SEMICARBAZONE (HICAPSC)			
42	Mini Review: Comparative Study between Microwave Sintered and Conventionally Sintered Spinel Ferrites.	Ketankumar Gayakvad, Deepesh More, Jyoti Devkar and K.K.Patankar	OP – 42	107
43	Biogenic synthesis and characterization of ZnO nanoparticles from Aloe Barbadensis Miller leaf extract	Vijayakumar D. Jangannanavar, Mallikarjun K. Patil, Lakkanna S. Chougala, Sanjeev R. Inamdar, Kotresh M. Goudar	OP – 43	108
44	Electrodeposited Nanoleaves (NLs) like Mn3O4 thin film for electrochemical supercapacitor study	P. M. Kharade, J. V. Thombare, S.S. Dhasade, P.B.Abhange, D.J. Salunkhe	OP – 44	109
45	HIGHLY ORIENTED GROWTH OF INN THIN FILMS ON QUARTZ SUBSTRATE AT RELATIVELY LOW TEMPERATURE USING PLASMA ASSISTED PLD	Sandip Hinge, Shraddha Pasodi and Dr. Suhas Jejurikar	OP – 45	110
46	Synthesis and Characterization of CuO-SnO2 nanocomposite for CO gas sensing application	Swapnali B. Dhage, Yuvraj S. Malghe, Vithoba L. Patil, Pramod S. Patil	OP – 46	111
47	FACILE SYNTHESIS AND ELECTROCHEMICAL INVESTIGATION OF UNDOPED AND MN DOPED ZNO ELECTRODES FOR THE ENERGY STORAGE APPLICATION	P. D. More, A. S. Salunkhe, Y. H. Navale, V. B. Patil	OP – 47	112
48	Catalytic Role of Acidic Ionic Liquid for the Synthesis of Biscoumarin Derivatives at Room	Nilophar Majjid Shaikh, Anand Dilip Sawant , Vinayak	OP – 48	113

	Temperature	Adimule		
49	Removal of heavy metal chromium using industry sludge as an adsorbent by adsorption studies	S. S. Kerur, Manjunath S. Hanagadakar, Ratnamala G.M.	OP – 49	114
50	Comparative antimicrobial activity of bimettalic nanoparticles and monomettalic nanoparticles	Vaishali Patil, Heena Ingale, Shweta Shete, Vidya Kalyankar, Sharada Gadale and Shobha Waghmode	OP – 50	115
51	Nickel Doped Sodium A Zeolite thick films: An efficient ethanol sensor	Malikarjun D. Wakde, Vijaykiran N. Narwade, Rajendra S. Khairnar, Kashinath A. Bogle, Megha P. Mahabole	OP – 51	116
52	Fe-ZnO nanoparticles for photo-catalytic degradation of Methyl Orange	Umesh. B. Hunagund	OP – 52	117
53	"EFFECT OF NITROGEN DOPING ON STRUCTURAL AND OPTICAL PROPERTIES OF TIO2 NANOPARTICLES"	Sandip B. Deshmukh, Kalyani H. Deshmukh, Maheshkumar L. Mane, Dhananjay V. Mane	OP – 53	118
54	SYNTHESIS, CHARACTERIZATION AND PYRIDINE STUDY TO DETERMINE LEWIS ACIDITY OF MIXED METAL OXIDE $Zn_{0.5}Cu_{0.5}Al_2O_4$	U. D. Kadam, S. M. Arde, P. R. Salokhe, R. S. Pandav	OP – 54	119
55	STRENGTH PROPERTIES OF ALKALI ACTIVATED SLAG CONCRETE CURED AT AMBIENT TEMPERATURE	Veeresh.Karikatti and M.V.Chitawadagi	OP – 55	120
56	INFLUENCE OF DIVERSE PARAMETERS ON KNOEVENAGEL CONDENSATION REACTION	Dr. Manish Deshpande, Dr. Girish Pande, Dr. Kavita Kendre	OP – 56	121

	(KCR) USING A CATALYST DERIVED FROM COAL WASTE: A GREEN STUDY			
57	Study of zirconia xerogels and aerogels prepared using various catalysts	Uzma K.H. Bangi, Tayyab Ali, Hyung-Ho Park	OP – 57	123
58	Electrical and Dielectric studies of the Cd doped Co-Ni ferrites synthesized by solid state reaction method	Akshay B. Kulkarni, Rakesh Vishwaroop, S. R. Manohara, Shridhar N. Mathad	OP – 58	124
59	ELECTRICAL AND OPTICAL PROPERTIES OF CdTe THIN FILMS BY CLOSED SPACE SUBLIMATION TECHNIQUE	J. V. Dhanvij	OP – 59	125
60	INVESTIGATING THE COMPLEX OPTICAL PROPERTIES OF THIOPHENE/INDOLE COPOLYMERS AS AN OPTOELECTRONIC MATERIALS	N. S. Wadatkar, S. A. Waghuley	OP – 60	126
61	Bio-smart material in self-healing of concrete	Santosh A Kadapure, Umesh B Deshannavar	OP – 61	127
62	SYNTHESIS, CHARACTERIZATION AND GAS SENSING STUDY OF NiO THICK FILM SENSOR TOWARDS ETHANOL, ACETONE, NH3 AND CO_2	Sachin Bangale	OP – 62	128
63	GROWTH OF ZnO NANOWIRES AND NANOTETRAPODS FOR GAS SENSING APPLICATIONS	Vijay S. Raykar	OP – 63	129
64	FACILE SYNTHESIS AND CHARACTERIZATION OF INDIUM DOPED CdSe THIN	V. S. Raut, C. D. Lokhande, H. D. Shelke, Dr. L. D.	OP – 64	130

	FILMS FOR PHOTOELECTROCHEMICAL SOLAR CELL	Kadam G. R. Patil, N.J. Kamble, V. V. Killedar		
65	The Performance of Post-paired EDFA based optical fiber networks with high Extinction ratio	Dr.Ved Nath Jha	OP – 65	131
66	Elaboration and Characterization of Nanocomposite In2O3:MoO3 Binary Oxides Thin Films Prepared by Spray Pyrolysis Method for CO Gas Sensor	N.B.Kothawade	OP – 66	132
67	Y3+ Composition Influenced Micro Strain, Porosity and Hopping Length Properties of Ni1-x Cdx Yy Fe2-y O4 Nanoferrites	R. B. Bhise	OP – 67	133
68	D. C. Conductivity of Mesoporous Material Synthesized From An Industrial-Waste: A Green Study	Dr. Manish Deshpande, Mr. Mukund Joshi	OP – 68	134
69	An Efficient and Eco friendly Photocatalytic Synthesis and Characterization of N-Heterocyclic compounds	Kumaraswamy Gullapelli, Ravichandar Maroju	OP – 69	136
70	Silver Nanoparticle Surface Plasmon Resonance (SPR) based Optical Fiber Probe for Soil Ammonium Ion Sensing	Revati Potdar, Pravin More	OP – 70	137
71	AC Conductivity and Magneto electric properties of $(Y)Li_{0.5}Ni_{0.5}Zn_{0.05}Fe_2O_4 + (1-Y)Ba_{0.5}Sr_{0.5}TiO_3$ Magneto electric composites	Maruthi.N.S and Shaila Umesh Durgasimi	OP – 71	139
72	Studies on complex optical behavior of MgO nanoparticles on	Bharati Basavaraj, Ramabai ,Vijayakumar.	OP – 72	140

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91	Studies on growth and characterization of spray deposited NiO thin films	Maruti B. Kumbhar, Swapnil S. Undalkar, Abhijit A. Yadav	OP – 91	161
92	Impact of praseodymium (Pr3+) ion on the structural and magnetic properties of Co-Ni ferrite synthesized by sol-gel auto-combustion route	D.V. Phugate , Rameshwar B. Borade, S.B. Kadam, R.H. Kadam, Sagar E. Shirsath, A. B. Kadam	OP – 92	162
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83	Magnetically Retrievable Fe-doped TiO_2 Nanoparticles for Photo-induced Toxic Dye Removal Applications	Saurabh B. Somvanshi, Sandeep B. Somvanshi, Prashant B. Kharat, Nanasaheb D. Thorat	PA – 83	252

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125	SYNTHESIS AND CHARACTERISATION OF MANGANESE FERRITE NANOPARTICLES	Rajeshwari T, and Hanumantagouda B	PA – 125	295
126	Characterization of Yttrium Substituted Ni-Zn Ferrites Prepared by Co-precipitation Method	K. R. Shinde, T. J. Shinde	PA – 126	296

127	Preparation and Optical characterization of PMMA thin films for photonic applications of newly synthesized Chalcone doped derivative (C1)	Raveendra Melavanki, Kalpana Sharma, Raviraj Kusanur, Rajashekhar K M, Vikas M Shelar and Diksha singh	PA – 127	297
128	EVOLUTION OF SUPERCAPACITIVE CuO NANOSTRUCTURES BY ROOM TEMPERATURE SURFACE OXIDATION OF Cu FOIL:EFFECT OF IMMERSION TIME	Rohan Pawale, Suhasini Yadav, Balaji Salokhe, Suraj More, S. B. Patil, J. H. Kim, K. V. Gurav	PA – 128	299
129	UV- excited blue emitting Ba3Gd1-x(BO3)3 : X Ce3+ [0.01 ≤ X ≤ 0.06] phosphor	Sanjay P. Hargunani, Vishal R. Panse, Ravindra M. Chavhan, Rajkumar P. Sonekar	PA – 129	300
130	TIO_2 NANOTUBE-HYDROXYAPATITE NANO-COMPOSITE AS METHANOL SENSOR	Sabah Taha, Sumayya Begum, Vijaykiran N. Narwade, Devidas I. Halge, Jagdish W. Dadge, Megha P. Mahabole, Rajendra S. Khairnar, Kashinath A. Bogle	PA – 130	301
131	SYNTHESIS AND CHARACTERIZATION OF NI7S6 FILMS BY USING ELECTRODEPOSITION TECHNIQUE	Satish V. Gaikwad	PA – 131	302
132	THERMOELECTRIC INVESTIGATIONS ON WS2 THIN FILMS PREPARED BY VAN DER WAAL'S RHEOTAXY PROCESS	Shruti D. Khanna, Shivaji B. Sadale	PA – 132	303
133	Fabrication and Analysis of Electrochemical Performance of MnO_2 Supercapacitor	S.G. Pawar, A. S. Salunkhe, C.V. Chanmal, R.N. Muik, I.A. Dhole, V.B. Patil	PA – 133	304

141	SYNTHESIS AND CHARACTERIZATION OF NOVEL POLYESTERS FROM BISPHENOL CONTAINING ETHER-AMIDE LINKAGE	S.S. Deokar and N.N. Maldar	PA-141	312
142	Structural, morphological and optical investigation of Ag-doped TiO_2/rGO nanocomposite synthesized by ex-situ route	Deepak Kumbhar, Sarita Kumbhar, Vilas Killedar, Rekha Nalawade, Avinash Nalawade, Govind Salunke, Krikshna Rangar	PA- 142	313
143	Enhanced Characteristics of Ammonia Sensing at Ambient Temperature by Plasma Polymerized Thiophene	Baliram Nadekar, Pravin More, Ajinkya Trimukhe, Rajendra Deshmukh	PA- 143	314
144	SUPERCAPACITIVE BEHAVIOR OF MANGANESE DIOXIDE (MNO_2) THIN-FILM PREPARED BY ELECTRODEPOSITION TECHNIQUE AND CHARACTERIZATION	P N Jadhav and K V Sukhatankar	PA- 144	316
145	Hybrids of Fluconazole: Synthesis and antimicrobial activity	Nandkumar Ajinath Borade, Seema Rajendra Saple, Nitin D. Gaikwad	PA - 145	317
146	Synthesis of CdS thin films by green chemical dip method for sunlight driven photodegradation of Rhodamine-B dye water pollutants	V.J. Sawant, D.A. Lavate, A.S. Khomane	PA- 146	318
147	Biogenic capped Selenium nanoparticles in lemon extract exhibit antioxidant and anticancer potential along with	S. V. Nipane, V. J. Sawant	PA- 147	319

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149	Structural, optical and elastic properties of Fe_{3}-x Er x O_{4} nanoparticles	Richa Jain	PA- 149	321
150	Capacitive study of Ru Doped Copper Hydroxide electrodes prepared by electrodeposition via different non-aqueous media.	T.S. Ghadge, A.L. Jadhav, S.V. Kamble, B.J. lokhande	PA- 150	322
151	Synthesis and Structural studies of Zn doped Mg ferrites synthesized by co-precipitation method	Rakesh Vishwaroop, Akshay B. Kulkarni, S. R. Manohara, Shridhar N. Mathad	PA- 151	323
152	Luminescent property of Erbium doped yttrium oxide: Morphology and effect of concentration	Manmeet Kaur, Prashant K. sahu, D P Bisen, Prabhjot singh V R Panse and M pateria	PA- 152	324
153	PL analysis of Sr 2M $(BO_{3})_{2}$:Tb 3+ green emitting phosphor for solid state lighting	V.R. Panse, Gaurav Rahate, MartaMichalska-Domanskais, S.J. Dhoble, A.N. Yerpude, Manmeet Kaur	PA- 153	325
154	Thermoluminescence properties of Y2O3:Er 3+ nanophosphor: Effect of doping concentration and UV radiation	Manmeet Kaur, Prashant K. sahu, D.P. Bisen, V.R. Panse and Prabhjot Singh	PA- 154	326
155	Synthesis & optical analysis study of red & blue emitting $KNaPO_{4}$ phosphor.	V.R. Panse, S.R. Choubey, A.M. Uke, S.J. Dhoble, J.G. Mahakhode, A. Sharma	PA- 155	327

Key-Note Talk

Colorless and Transparent Polyimides

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Abstract

Aromatic polyimides (PIs) have been used in a variety of advanced electric and microelectronic devices for their simple two-step manufacturing processes, excellent electric insulation ability, and exceptionally high Tg's overcoming the reflow soldering processes (short-term heat resistance). Tg's as high as 350 °C or even more can be obtained by enhancing the chain rigidity of the PIs. Conventional aromatic Pis, however, have deep colors and poor optical transmittance, which considerably restricted their application in microelectronic and optoelectronic engineering, where colorlessness is an important requirement. The intra- and inter-molecular charge-transfer (CT) interactions between the electron donating diamine and electron-accepting aromatic dianhydride are considered the main reason behind the deep color of conventional aromatic PIs. In this regard, the effective strategy for obtaining transparent and less-colored or colorless PIs(CPIs) is to use weak electron accepting dianhydrides and/or weak electron-donating diamines to suppress the CT interactions. In this regard, I will talk on the recent developments on the CPIs that have been reported in my group for recent years.

IT- 01

The Cleavage and Functionalization of C≡C Bond of Ynones

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Abstract

IT- 02

Fibers and Media Filters for effective separation of Oil/water Mixtures

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Abstract

Progressing developments in the petrochemical industry and marine technology in recent times, seriously address the harmful effects of oil spills and industrial wastewater on ecological balance. Conventional techniques of oil/water separation process include the application of filtration and absorption materials. However, eco-friendly and efficient strategies are also developed to fabricate simple and low-cost designs for oil/water separators. In addition to the filtration membranes and porous sponges/aerogels, switchable and controllable technologies using nanoparticles and materials technology also attain significant attention for oil/water separation. Recyclability, reusability and high separation efficiency are the prime parameters determining the industrial feasibility of a particular material. Numerous polymers and their composites are applied in generating light weight and porous structures for the high oil/water intake from a contaminated stream. Block copolymer (BCP) membranes are good candidates in this regard as they are mechanically stable and durable for prolonged use.

The thin film membranes used for oil/water separation are usually in nm thickness and deposited on commercial polymeric substrates for mechanical stability. Introducing porosity to polymer nanocomposites can also be done using electrospinning process, in which non-solvent induced annealing process is targeted for selective etching. Soft, flexible and robust fibers are able to absorb/wipe out the oil molecules from a typical oil/water mixture. Advanced techniques always implement industrial strategies for selective oil removal and this

can at the same time address environmental sustainability, petrochemical industry and water technology. Functional materials with tunable surface properties are possible to achieve by properly connecting the material properties and nanotechnology. Development of such newer technologies are helpful to the industry, society and human health.

IT- 03

Antifogging and Antibacterial Amphiphilic Coating from Organic−Inorganic Hybrids

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Abstract

We fabricate a highly transparent and amphiphilic coating using organic-inorganic hybrids with antifogging and antibacterial properties. Herein, a two-step spin-coating method for amphiphilic organic−inorganic hybrid materials with incorporated transition metal ions is presented. The coating solution was prepared via photochemical thiol−ene click reaction between the mercapto functional group in trimethylolpropane tris(3-mercaptopropionate) and the vinyl functionalized silica precursor 3-(trimethoxysilyl)propyl methacrylate. In the first step of coating, a glass substrate was coated using a solution of metal nitrate hydrates and subsequently showed hydrophobic properties. As the second step, the spin-coated glass substrate was further coated with silica nanoparticles (SiO_2 NPs) and polycaprolactone triol (PCT) suspension, where the contents of SiO_2 NPs were fixed at 0.1 wt %, unless otherwise noted. The coated substrate exhibited hydrophilic properties. For comparison, the coating was also formulated with the SiO_2 NPs/PCT suspension without SiO_2 NPs and with 0.5 wt % SiO_2 NPs as well as by adjusting different coating layer thicknesses. The surface morphology and chemical compositions of the obtained coating materials were analyzed by field emission scanning electron microscopy with energy-dispersive X-ray spectroscopy and X-ray photoelectron spectroscopy. The transparency and static contact angle of coated samples were measured by UV−visible spectrophotometry and drop shape analysis, respectively. It was concluded that our novel hybrid coating materials exhibited excellent antibacterial and antifogging properties with extremely high scratch resistance and transparency.

Keywords: trimethylolpropane tris(3-mercaptopropionate), (trimethoxysilyl)propyl methacrylate, zinc and aluminum, silica nanoparticles, polycaprolactone triol, transparent and stable coating, antifogging, antibacterial

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IT- 04

Photocatalysis for bio-related applications

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Abstract:

Photocatalysts as photo-functional materials are able to convert photo energy to chemical one, thus the property offers wide range of applications in environmental cleaning and resource production. In this presentation, photocatalytic production of solar chemicals for bio-related applications is reported.

1) Production of rare sugars using photocatalysis. Rare sugars have much attention because of their potential candidates for new foods and drags. For example, D-allose has strong suppressive effect against cancer cell proliferation, and D-psicose shows much sweetness, high solubility, water-holding property, spreadability, resiliency and antioxidation. However, it is very hard to obtain those sugars, thus a common and facile new method to produce rare sugars is strongly requested. Our group recently reported that arabinose can be produced from the oxidative decomposition of glucose by titanium dioxide (TiO_2) photocatalysis under ultra-violet (UV) light illumination. In this work, we examined decomposition of monosaccharides to produce rare sugars by using the TiO_2 photocatalyst. Photocatalytic decomposition of galactose was performed with the TiO_2 photocatalyst under UV illumination, resulting in production of lyxose which is a rare sugar. From the comparison of molecular structure between garactose and lyxose, α-carbon was selectively released. We further performed photocatalytic oxidative decomposition of mannose, gulose, and allose, which allows production of arabinose, xylose and ribose, respectively. Those reaction also showed regular molecular conversion by release of α-carbon. Those results suggested that photocatalytic oxidative decomposition is able to produce rare sugars.

2) Spore inactivation with visible light responsive photocatalyst. Bacteria that cause serious food poisoning are known to sporulate under conditions of nutrient and water shortage. The resulting spores have much greater resistance to common sterilization methods, such as heating at 100 °C and exposure to various chemical agents. Since such bacteria cannot be inactivated with typical alcohol disinfectants, peroxyacetic acid (PAA) often is used. In this study, we have developed a new sporicidal disinfection method that employs the combination of an aqueous ethanol solution, visible light irradiation, and a photocatalyst. We successfully produced a sporicidal disinfectant one hundred times as effective as commercially available PAA, while also resolving the hazards and odor problems associated with PAA.

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IT- 05

Functionalized Mesoporous Organosilica Films as Potential Photo Sensors

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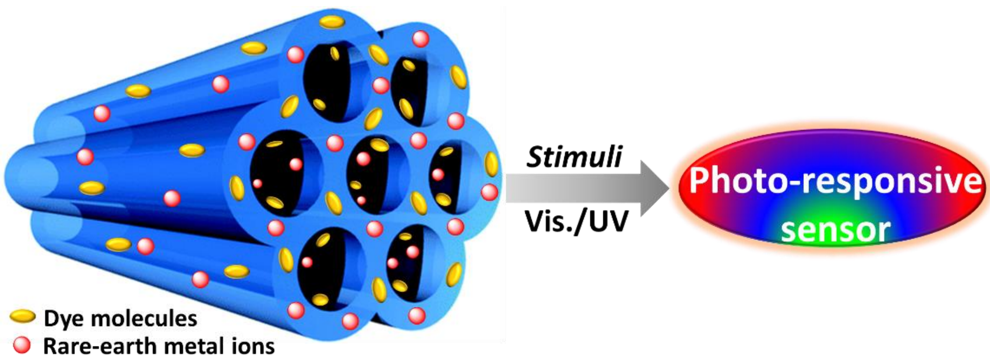
Abstract:

Functionalized and mesostructured organosilica (PMO) films were synthesized via self-assembly and sol-gel process using surfactant and triblock copolymer as templates and ethane-bridged organosilica precursor as silica source. Photo-responsive functional materials were included during the synthesis of these mesoporous organosilica films. First, Eu^{3+}, Tb^{3+} and Tm^{3+}-doped PMO films with hexagonal symmetry lattice (*p6mm*) were synthesized using reactant compositions of 0.35 BTSE $\{(C_2H_5O)_3SiCH_2CH_2Si\text{-}(OC_2H_5)_3\}$: 0.2 CTACl : rare-earth metal ion (Eu^{3+}, Tb^{3+} and Tm^{3+}) : 1.8 x 10^{-6} HCl : 10 EtOH : 10 H_2O (BTSE/rare-earth metal ion = ∞ ~ 10). Optical properties of those Eu^{3+}, Tb^{3+} and Tm^{3+}-doped PMO films were investigated by photoluminescence (PL) spectra to evaluate their potential applicability as UV sensor. Eu^{3+}-, Tb^{3+}- and Tm^{3+}-doped PMO films produced red-, green- and blue-emission upon UV irradiation with the characteristic emission peaks ($^5D_0 \rightarrow {}^7F_0$, $^5D_0 \rightarrow {}^7F_1$, $^5D_0 \rightarrow {}^7F_2$, $^5D_0 \rightarrow {}^7F_3$, and $^5D_0 \rightarrow {}^7F_4$ for Eu^{3+}-doped PMO film, $^5D_4 \rightarrow {}^7F_5$, $^5D_4 \rightarrow {}^7F_4$ and $^5D_4 \rightarrow {}^7F_3$ for Tb^{3+}-doped PMO film, and $^1I_6 \rightarrow {}^3F_4$, $^1D_2 \rightarrow {}^3H_6$ and $^1I_6 \rightarrow {}^3H_5$ for Tm^{3+}-doped PMO film) Second, the synthesis of organic dye-doped {1,3,3-trimethylindolinobenzopyrylospiran, TMLBPS and 2,3-bis(2,4,5-trimethyl-3-thienyl)maleimide, BTMTMI} and free-standing mesoporous organosilica films with cubic mesostructure (*Im3m*) was carried out using reactant mass ratio of 0.8 F108 ($PEO_{132}PPO_{50}PEO_{132}$) : 0.12M-HCl : 10 EtOH : 0.8 H_2O : 7.8 × 10^{-3} – 1.95 × 10^{-2} dye : 1.77 BTSE. Both samples of PMO-TMLBPS and PMO-BTMTMI have photo-chromic properties which show the decrease and increase of fluorescence intensity under visible and UV irradiation. The thickness of dye-impregnated PMO films was controlled from 1.3 μm to 38.1 μm. These PMO films may have potential applications in a variety of fields including light modulation materials, optical recoding materials, optical switches, photochromic ink, and etc.



Scheme 1. The functionalized mesoporous organosilica films with potential applications as photo sensor.

Keywords: mesoporous organosilica film, rare-earth metal ions, organic dye-doped PMO film, photo sensor

References:

1) S. S. Park, B. An and C.-S. Ha, *Micropor. Mesopor. Mater.*, 111, 367-378 (2008).

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IT- 06

Gas Phase Photocatalysis: Towards realization of photocatalytic applications

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Abstract:

Photocatalytic oxidation (PCO) of organic compounds/water is promising for air/water purification and for hydrogen production. Liquid phase photocatalysis is rate limiting process and many of real application on photocatalysis are in gas phase. Further gas phase PCO facilitates real-time investigation of PCO processes and enables the identification of reaction intermediates. PCO mechanism is not well understood because of its complexity and lack of proper tools to investigate the PCO. In the presentation, results on the gas phase PCO of methanol over metal oxide thin films will be presented. Gas phase PCO facilitates access to the real-time investigation of PCO processes and enables the identification of reaction intermediates.

References:

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IT- 07

Hetero- architectured materials for displays and energy storage electrodes

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Abstract:

Various forms of nanostructures have triggered a lot of excitement and expanded breakthrough achievements in all areas of electronics. The 1D nanostructure forms can enhance the unique properties of materials, making them suitable for a wide variety of applications such as gas sensors, smart windows, solar cells, light-emitting diodes, field emitters, and field-effect transistors. However, the 1D nanostructures do still have some drawbacks. For example, in comparison with the bulk materials, the low dimension and small size make the melting points lower but the resistivity higher, so the thermal and chemical stability of the 1D nanostructures may be weakened. Our group is working to overcome these drawbacks and has explored the formation of hetero-architecture of 1D, 0D, 2D nanomaterials.

In this lecture, I shall present how the control over hetero-architecture morphologies of metal oxides can benefit from improving the performance of energy and display applications. I shall present our recent work on the synthesis of metal and metal oxides hetero-architectures. The nanostructures uniformly distributed on conducting substrates were characterized by field-emission scanning electron microscopy (FE-SEM), energy dispersive spectroscopy (EDS), x-ray photoelectron spectroscopy (XPS), and x-ray diffractometry (XRD), etc. At the end of the talk, I shall mention our most recent efforts on the morphology transformation of metal oxides for further improvement in the performance of energy storage, conversion, and displays.

OP-01

Complex optical investigation of sodium superoxide loaded phosphovanadate glass system in ultra-violet and visible region

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Abstract

Sodium superoxide loaded phosphovanadate based glass systems were prepared from a mixture of vanadium pentoxide (V_2O_5), phosphorus pentoxide (P_2O_5) boric acid (H_3BO_3) and sodium superoxide (NaO_2) using a melt-quenching method. Amorphous phase of as-prepared glass system confirmed using X-Ray Diffraction technique. Surface morphology of glass system studied using scanning electron microscope. Ultraviolet-visible spectroscopy was employed to extract complex optical parameters like direct and indirect optical band gap, Urbach energy, refractive index, complex dielectric constant and optical conductivity. This primary report on sodium superoxide loaded phosphovanadate based glass systems opens wide avenue for battery and super-capacitor applications.

OP-02

Thermal, electrical and sensing properties of recycled HDPE/carbonaceous industrial waste composites

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Abstract

This work is an endeavor to contemplate a value-added conductive plastic composite material derived as recycled plastic depending on Polyethylene (PE)/carbon black (CB). We choose to add CB as a filler material to enhance the electrical conductivity as well as other properties associated with the composite. The solution mixing method was adopted to develop this composite where the consequences of CB loadings on various parameters like processability, morphology, and thermal stability of the composites were examined. Electrical conductivity increased with the increasing amount of the CB loading. The perceived better filler-matrix interaction and filler dispersion observed in the Scanning Electron Microscopy (SEM) is the underlying reason behind the improved properties. Electrical, thermal, sensing, and dielectric studies of the prepared plastic composite material will be studied.

Keywords: PE/CB; FTIR; SEM; Dielectric studies

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2. Sahu A, Yadav N, Sudhakar K. Floating photovoltaic power plant: A review. Renew Sustain Energy Rev. 2016;66:815-824. doi:https://doi.org/10.1016/j.rser.2016.08.051

OP-03

Study of different natural dyes for dye sensitized solar cell

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Abstract

The Dye sensitized solar cell (DSSC) converts visible light into electricity. Now a day's most of the researchers have focused their attention on dyes extracted from natural resources. In this paper extract of pomegranate, beet root and black berry was used as a natural dyes to study the effect of these dyes on the DSSC. The response for Beetroot dye was better as compared to pomegranate dye. The common element among all the dyes is that they increase absorption of the cell in the visible region. A lump observed in absorption for blackberry dye in TiO_2 cell which is a unique property not observed for other dyes under study.From the overall study of natural dyes under study it is observed that the solar cells sensitized with blackberry dye gives maximum efficiency as compared to other natural dyes under study.

Keywords: Dye synthesized solar cell; X-ray powder diffraction; working electrode; counter electrode; cell fabrication

OP-04

Estimation of dipole moments of new coumarin dye by experimental and theoretical methods

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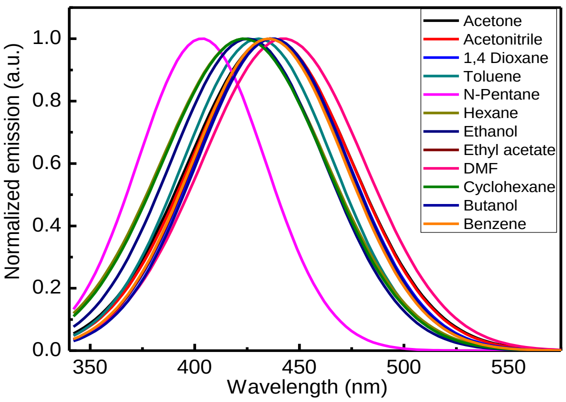
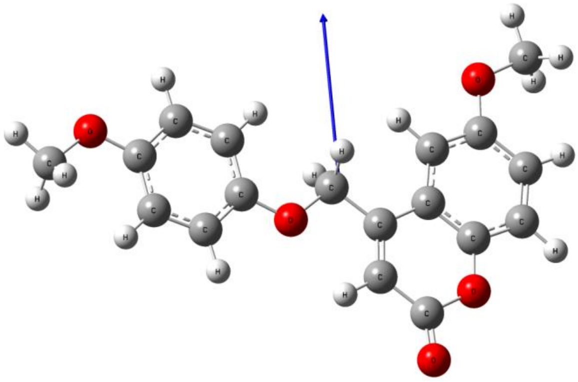
Abstract

The absorption and fluorescence emission spectra of coumarin dye, 4-((4-methoxyphenoxy) methyl)-6-methoxy-2H-chromen-2-one (4-MPMMC) in different polarity solvents were recorded. The effects of solvent polarity on the spectral properties are discussed. It is found that, spectrum peak shifts toward higher wavelength, as the solvent polarity changes. The ground (μ_g) and excited state (μ_e) dipole moments were estimated using Lippert's, Bakshiev's and Kawski-Chamma-Viallet's equations. The μ_e values are found to be higher than μg values for all solvents. This suggests that the dye is more polar in excited state than in ground state. Computational studies were done using Time Dependent Density Functional Theory (TD-DFT), DFT and Zindo methods with the help of Gaussian16W; Integral Equation Formalism Polarizable Continuum Model (IEFPCM). Further, the excited state dipole moments were estimated in different solvents and are compared with the experimental results. The reactive centers like electrophilic and nucleophilic sites are identified along with contour action using electrostatic potential (ESP) 3D map using DFT analysis.

Keywords: Dipole moment, Stokes shift, Coumarin dye, Gaussian 16W.

Graphical Abstract:





OP-05

SYNTHESIS AND CHARACTERIZATION OF A NEW DIAMINE-A BUILDING BLOCK OF ORGANOSOLUBLE POLYMER

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Abstract

Diamines are the key components in synthesis of several polymers therefore synthesis of diamines is of special interest to polymer researcher. Polymers prepared from aromatic monomers are commonly more thermo-resistant, insoluble and hence difficult to process. Worldwide attempts are directed to synthesize novel diamine with which thermo-resistant, organosoluble and easy-processable polymers are obtained. To improve the solubility and decrease the glass transition temperature, flexible bonds are necessary for the polymer-repeating unit. These bonds decrease the internal rotational energies. With this objective, synthesis of a new aromatic - aliphatic diamine, bis-[4-(4'(4"-amino) phenoxybenzyl) benzamide] ether BAPBE, containing preformed amide linkage, flexible ether and methylene linkages has been performed. The new diamine BAPBE was characterized by FT-Infrared (FT-IR), nuclear magnetic resonance (NMR) and mass spectroscopy. Present investigation is designed to prepare a new aromatic - aliphatic diamine with applications in thermo-resistant polymers such as polyamide, polyimide, polyazomethines, polyurea, and polyurethanes.

Keywords: Organosoluble, diamine, flexible ether and methylene linkages, polyamides.

OP-06

SYNTHESIS AND LUMINESCENCE STUDY OF N-UV EXCITABLE Tm3+ ACTIVATED BLUE PHOSPHOR

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Abstract

Tm3+ doped La_2O_3 phosphor was prepared by co-precipitation method. The prepared phosphor was characterized by XRD, SEM and photoluminescence (PL) techniques. The x-ray powder diffraction (XRD) analysis confirmed the formation of La_2O_3. Photoluminescence measurement showed that the phosphor exhibit characteristic Tm3+ bright blue emission attributed to transition from 1D2 à 3F4 of Tm3+ ions, at 363nm excitation. The CIE chromaticity colour coordinates of prepared phosphor was calculated and presented. The excitation peak located at 363nm matched with the emission wavelength of near UV-LED chip, this indicates that the prepared phosphor is a good and promising blue light emitting candidate for eco-friendly solid state lighting (W-LED) application.

Keywords: La_2O_3; Solid state lighthing, Phosphor; W-LED; Tm3+.

OP-07

Solvatochromic and DFT Computational Studies on HOMO-LUMO and MESP Surfaces of 4-((5-amino-1, 3, 4-thiadiazol-2-ylthio) methyl)-7-methoxy-2H-chromen-2-one Coumarin Dye

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Abstract

The solvatochromic shift method has been used to estimate ground (μ_e) and excited (μ_g) state dipole moments of coumarin derivative (5-amino-1, 3, 4-thiadiazol-2-ylthio) methyl)-7-methoxy-2H-chromen-2-one (4A7MC) at room temperature in different solvents. The ground and excited-state dipole moments were estimated from Lippert's, Bakhshiev's and Kawaski-Chamma-Viallet's equation. The change in dipole moment was calculated by using Reichardt's microscopic solvent polarity parameter. It has been observed that the excited-state dipole moments were higher than those of ground state dipole moments. The absorption and emission maxima of selected coumarin derivative undergo bathochromic shift as the polarity of solvent increases, which shows the involvement of $\pi \rightarrow \pi^*$ transition. The angle between ground and excited state dipole moments were calculated. The multiple linear regression method proposed by Kamlet and Catalan has been used to study the influence of solvents on absorption and emission spectra. The ground state dipole moment was calculated theoretically from Gaussian 16 software for optimized geometry by using Semi-empirical method at PM6 basis set. The Mulliken charges in DMSO have been studied, from which one can determine molecular properties such as molecular electronic structure, polarizability, acidity-basicity, molecular polarizability, dipole moment and other characteristics of the compound. The HOMO-LUMO and MESP maps used to study charge distribution within the molecule. The smaller value of energy gap and chemical hardness indicates that the molecule is soft and easier for the electrons to excite from HOMO to LUMO levels. Further, the reactive centres like electrophilic and nucleophilic site were identified with the help of 3D plots of molecular electrostatic potential map using DFT computational method.

Keywords: Solvatochromism, dipole moment, polarity functions, Gaussian 16 Software, Semi-empirical, Mulliken charges, HOMO-LUMO, MESP etc

Graphical abstract:

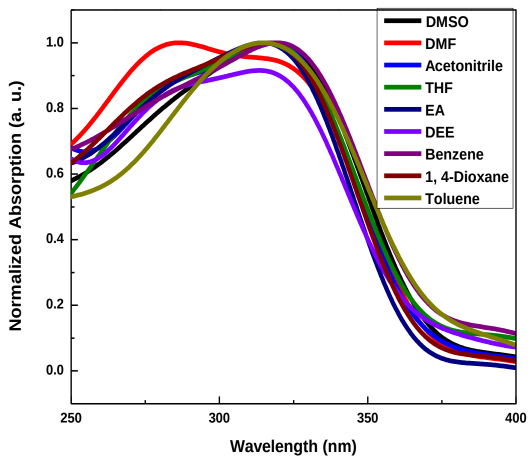

Figure 1. Absorption spectra of 4A7MC Compound in

different solvents.

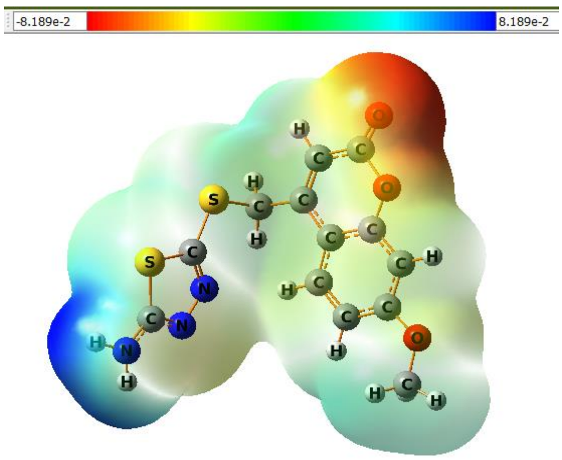

Figure 2. MESP map of 4A7MC in DMSO.

OP-08

Magnetic Susceptibility of nanoparticle sized Aluminium substituted copper cobalt ferrites

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Abstract

The polycrystalline aluminium substituted nano-particle sized copper cobalt ferrite samples $CuxCo1\text{-}xFe_2\text{-}2yAl_2yO_4$ (where x= 0.0, 0.2, 0.4, 0.6, 0.8, 1.0; y = 0.05, 0.15 and 0.25) have been prepared by standard ceramic technique. Phase formation is investigated using X-ray diffraction, Infrared absorption technique and Scanning electron microscope technique. The lattice constants of the all samples are evaluated from x-ray diffraction data. The susceptibility decreases with aluminium and copper content.

Keywords: Polycrystalline, nanoparticle size, standard ceramic technique and Inverse cubic spinel

OP-09

Structural and Dielectric Properties of Polyvinyl Alcohol-TiO2 Doped Thin Films

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Abstract

Polyvinyl Alcohol(PVA)-Titanium dioxide(TiO_2) polymer composite films were synthesized by well-recognized and low cost method of solvent casting. The prepared composite films were characterized by Fourier Transform Infrared Spectroscopy (FTIR), X-Ray Diffraction (XRD), Field Emission Scanning on Electron Microscope (FESEM) and Energy Dispersive X-ray(EDAX). The presence of metal-oxide bond in FTIR spectra of PVA-TiO_2 composites confirms the existence of TiO_2. The combination of anatase and rutile phase of TiO_2 and the polycrystalline behaviour of PVA-TiO_2 composite were confirmed from XRD study. FESEM attached with EDAX suggests the good dispersion of TiO_2 particles in the composites with different composition of it. The real electric modulus (M') spectra show large increment with frequency for 5wt% of TiO_2 as compared to other compositions. The appearance of peaks for each concentration of TiO_2 in M" spectra with the absence of peaks in Dielectric loss (e") spectra specifies that strong coupling in the movement of polymer motion and ions. The impedance plots of Real impedance (Z') Vs imaginary impedance (Z") shows the semicircle, which diameter and thereby bulk resistance (Rb) is decreased with the loading of TiO_2.The AC conductivity (σAC) found to increase with frequency and temperature, and the σAC obeys the universal power law. The prepared PVA/ TiO_2 films could be used in a direct methanol fuel cell, and in optoelectronic devices.

Keywords: PVA-TiO2, FTIR, XRD, dielectric properties, electric modulus, EDAX

OP-10

STUDIES ON THE IMPROVEMENT OF THE MECHANICAL STABILITY OF THE NETWORK OF SILICA COATINGS

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Abstract

Resilience of the self cleaning surfaces is the key issue. Superficial defects are the prominent drawbacks of the most usual real – world surfaces due to poor silica network. The response of the coatings to the external deforming scratches is an issue of paramount importance when industrial applications are concerned. We know very well that, not only the silica network in aerogels but in coatings is weaker. The silica aerogels get easily cracked. The silica coatings are also not durable when actual practical applications are concerned. In the present work, we have modified the sol – gel parameters to get adhesive, transparent and scratch resistance silica coatings on glass based on nanoparticles. We also have studied the exact timing when the binder is to be added in the sol during the sol – gel reaction. This time depends on the rate of rate of reaction of hydrolysis and condensation of the precursor. So the determination of the time of addition of binder is crucial parameter which played a role to augment the mechanical properties of the silica coatings. These coatings were examined through the thermal analysis, pencil scratch hardness tester, transmission electron microscopy, contact angle measurements etc. These coatings exhibited thermal decomposition around 460 °C. We were able to enhance the mechanical strength of the coatings to withstand against external scratches done by the pencil tester from 6 B (softest) to B (Soft) as suggested by ASTM D 3363 method. We have studied the effect of coatings thickness on the scratch hardness. Transmission electron microscopy revealed nanoparticle formation. The water drop contact angles and sliding angle measurements with a volume of 5 mL was done to quantify the hydrophobicity of the silica coatings.

OP-11

COMPUTATIONAL AND EXPERIMENTAL MEANS FOR ESTIMATION OF GROUND AND EXCITED STATE DIPOLE MOMENT OF A SOLUTE

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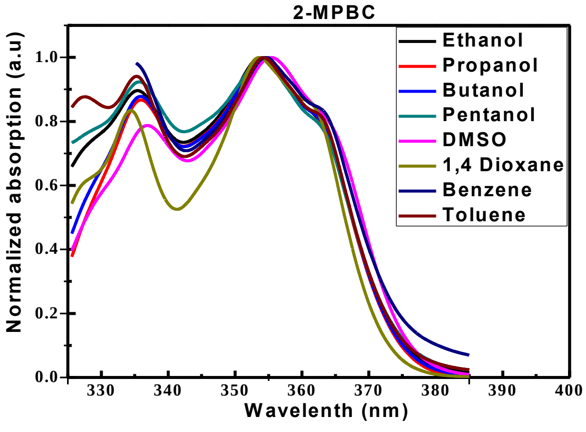
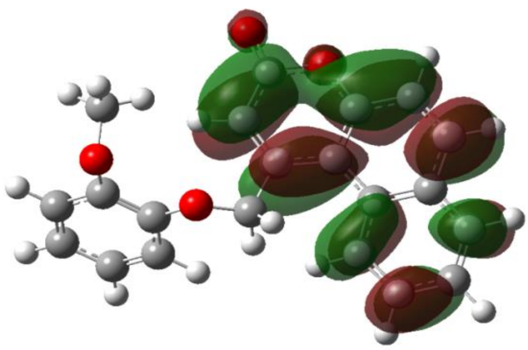
Abstract

The 1-(2-Methoxy-Phenoxymethyl)-Benzo(f)-Chromen-3-one [2-MPBC] has been prepared by the reaction of 5,6-benzo-4-bromomethylcoumarin with 2-methoxyphenol. The structure of the compound is confirmed using IR, NMR and Mass spectral data. The absorption and fluorescence spectra of 2-MPBC are recorded in various solvents like benzene, toluene, ethanol, methanol, butanol, pentanol, dimethylsulphoxide (DMSO) at room temperature in order to estimate the ground (μg) and excited state dipole moments (μe).The results of solvotochromic shift are compared with quantum chemical computational method. The estimation of dipole moment is made by assuming that the molecular polarizability does not change in time of absorption process. It is found that the electronic excited state values are higher than the ground state values. This suggests the less polar nature of the solute in the groundstate rather than in the excited state. Further, HOMO-LUMO energies are also determined. It is also found that the change in the polarity of the solvents is responsible for shifting of spectral peak towards the higher wavelength.

Keywords: 2MPBC. Solvatochromic shift, Dipole moment, HOMO-LUMO

Graphical abstract:





OP-12

Bioremediation via mycogenic synthesize TiO2 nanoparticles

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Abstract

Biosynthesis of TiO_2 nanoparticles was achieved by using an isolated first time using fungus Aspergillus eucalypticola SLF1 from lonar lake soil ecosystem. A simple, facile, eco-friendly and cheaper approach or protocol or method has been used for the synthesis. TiO_2 nanoparticle formation was monitored by visual observation, UV-Vis spectroscopy, FTIR, XRD, FESEM and FETEM studies. Visual observation showed white precipitate formation within 48 hours at 270C, 150 rpm. UV-Vis spectroscopy showed maximum absorbance at 214 nm. FTIR spectra revealed presence of functional groups indicating involvement of biomolecules in capping process. XRD studies showed peaks at 25.210, 38.540, 48.060 and 53.870 respectively indicates pure anatase tetragonal crystal form of TiO2. FESEM revealed spherical shape and size of TiO_2 nanoparticles ranging from 33nm to 50nm. EDAX results showed elemental composition of TiO_2 contain titanium 84.20% and 15.80% of oxygen. FETEM image showed lattice spacing size and interplanar distance 0.36nm, shifting the photoexcitation response of the sample to visible region and degradation of methylene blue dye. We conclude that mycogenic synthesize TiO_2 nanoparticles an excellent photocatalyst for degradation of methylene blue dye effluents obtained from textile industries, purified water can be used in agriculture and domestic sector.

Keywords: TiO_2 nanoparticles, Bioremediation, UV-Vis spectroscopy, FTIR, XRD, FESEM, FETEM

OP-13

Concentration and temperature dependent structural, optical and photocatalytic Properties of MoO_3 Thin Films by Ultra spray pyrolysis

Supriya Shukla, Krishana Godbole, Pravin Waghmare, Vilas Rathod and Sharda Gadale*

Yashwantrao Mohite College of Arts, Science and Commerce, Bharati Vidyapeeth (Deemed to Be University) Pune

Abstract:

Thin films of different concentrations of molybdenum trioxide were deposited onto glass by ultra-spray pyrolysis technique. The effect of concentration (0.05M, 0.025M, 0.0125M) and temperature on the structural properties of MoO_3 thin films were studied by XRD and UV-Visible spectroscopy. Being transition metal oxide molybdenum oxide (MoO_3), exhibits interesting structural, chemical, electrical, and optical properties. The samples were prepared at different temperatures of 150 °C, 250 °C and 350 °C using spray concentration varying between 0.05M, 0.025M and 0.0125M while the other spray operating parameters are fixed at their optimum values. The crystalline nature and crystallite size of the films were investigated by X-ray diffraction. The X-ray diffraction patterns prove that the films deposited at substrate temperature of 150 °C are amorphous while the films deposited at 250 °C, and 350 °C were crystalline with only α- MoO_3 phase. The crystallite size for the prepared samples were found to be in the range from 43 to 65 nm. The band-gap energy was obtained in the range 2.51-3.01 eV. The photocatalytic activity of films was evaluated for their ability to degrade methylene blue (MB) under UV irradiation with excellent results.

Keywords: molybdenum trioxide, ultra-spray pyrolysis, band-gap, photocatalytic, MB

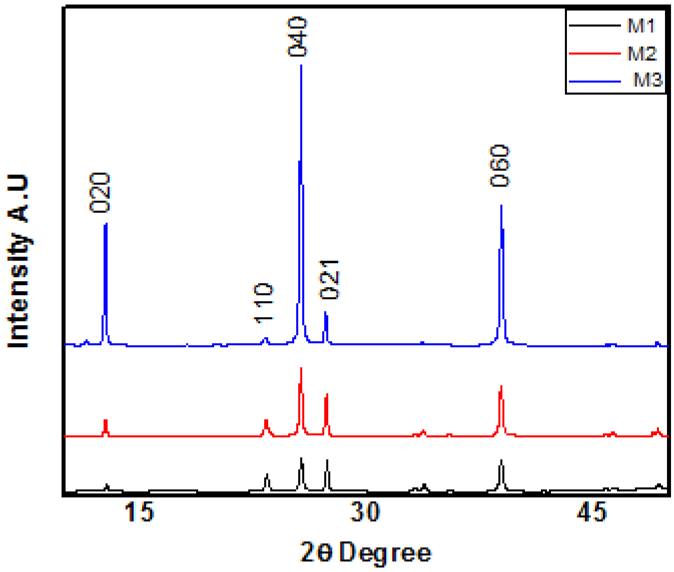

Figure 1. XRD pattern of MoO_3 films obtained at 350 °C

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OP-14

COMPARATIVE ULTRASONIC SYNTHESIS OF QUINOLINE FACTIONALIZED CHALCONE AND ITS ABSORPTION, DISTRIBUTION, METABOLISM AND EXCRETION ANALYSIS

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Abstract

Our assessment wanted to orchestrate the chalcone under receptive ionic fluids for new engineered natural techniques. These undertakings may give greater lucidity to the examination in the frameworks of characteristic reactions using ionic fluid under ultrasonic as reaction media. The 2-chloro-6-ethoxy-3-formyl-quinoline and substituted 2-hydroxy acetophenones base chalcone observe speedy reactions with in a [Bmim][BF4]/sodium ethoxide dissolvable system, under smooth and impartial reaction conditions to manage the cost of the relating chalcone in high to quantitative yields. In this paper we assess and report cytotoxicity, pharmacokinetic, physicochemical and medicinal properties of the solidified quinoline chalcone and separated with three standard medications for example chloroquine, mefloquine, atovaquone. The standard mefloquine has been shown to be more exceptional than the blended quinolyl chalcone in our examination. We extant the new SwissADME web utensil that gives the unrestricted admittance to a pool of keen yet solid perception models for drug-likeness, physicochemical properties, medicinal science straightforwardness, and pharmacokinetics among which in-house fit framework, for instance, BOILED-Egg, iLOGP and bioavailability radar. Gastrointestinal ingestion and brain get to are two pharmacokinetic practices irreplaceable to evaluate at different times of the remedy divulgence structures. To this end, the brain or intestinal estimated entrance methodology (BOILED-Egg) is proposed as a cautious farsighted model that works by selecting the lipophilicity and polarity of little particles.

Keywords: Quinoline, chalcone, [Bmim][BF4], ADME, BOILED-Egg

OP-15

Supercapacitive Performance of Electrodeposited Iron oxide Thin Films: Effect of Electrolytes

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Abstract

The present work describes the growth of iron oxide thin films and study on its structural, morphological and electrochemical properties. The direct growth of uniform and well adherent Fe_2O_3 thin films has been achieved by an elegant electrodeposition method, onto stainless steel substrates. The XRD pattern revealed the crystalline nature and cubic structure of Fe_2O_3 thin films. The FESEM images revealed the formation of nanoflakes covering the entire surface of the substrate. The electrochemical performance of the Fe_2O_3 thin films was studied in Na_2SO_3, NaOH and Na_2SO_4 solution as electrolytes. Fe_2O_3 electrodes show good electrochemical performance, including high specific capacitance and very good stability. The samples exhibit better supercapacitive properties in Na_2SO_4 electrolyte than other two electrolytes. The electrochemical properties coupled with the low cost and environmental benign nature should make this material attractive for energy storage application on large scale.

Keywords: Supercapacitor; electrodeposition; maghemite; nanoflakes

Acknowledgement: Authors are grateful to DAE-BRNS, Govt. of India for providing the financial support through research project No. 2013/37P/41/BRNS/1976.

OP-16

APPLICATION OF PARTHENIUM HYSTEROPHORUS WEED IN SYNTHESIS OF NANOPARTICLES

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Abstract

Development of biologically motivated experimental green processes for the synthesis of nanoparticles is evolving into an important branch of nanotechnology. The bio reduction behavior of leaf extracts of Parthenium hysterophorus (Asteraceae) in the synthesis of Iron oxide nanoparticles was investigated. XRD analysis of these particles shows that they are 45 nm in range. The most needed outcome of this work will be the development of value-added products from Parthenium hysterophorus weed for nanotechnological applications.

Keywords: Leaf extracts, Iron oxide nanoparticles, XRD

OP-17

Structural and Magnetic Properties of Co0.9Zn0.1Fe2O4 Ferrite Nanoparticles Synthesised By Chemical Co-Precipitation Method

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Abstract

In this study the structural and magnetic properties of $Co0.9Zn0.1Fe_2O_4$ ferrite nanoparticles were prepared by using Chemical co-precipitation method with X-ray diffraction (XRD) and Vibrating sample magnetometer (VSM) characterisation. The structural results showed that the particles have a formation of single-phase cubic spinel structure and that the particles have a nano scale, with a clear agglomeration between the particles. The crystallite size of the sample was found 6.21 nm by using Scherer's formula, while the lattice parameters is 8.38 Å. The VSM study showed that the saturation magnetization (Ms) and coercivity (Hc) of the $Co0.9Zn0.1Fe_2O_4$ nanocrystals possessed a linear relationship with the crystallite size. The infrared spectra revealed two principal absorption bands, the high-frequency ν1 around 600 cm−1 and the low-frequency one ν2 around 400 cm−1, attributed to stretching vibrations of the oxygen–metal bond in the tetrahedral (A) and octahedral (B) sites in the spinel lattice, respectively.

Keywords: XRD, FTIR, VSM

OP-18

ELASTIC, MECHANICAL AND THERMOPHYSICAL PROPERTIES OF HMo_2 (H= Zr and Hf) LAVES PHASE COMPOUNDS

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Abstract

A present investigation, the elastic, mechanical, thermophysical and ultrasonic properties for HMo_2 (H= Zr and Hf) laves phase compounds using the Lennard - Jones many body interactions potential approach. The second-order elastic constants are used to determine other ultrasonic parameters. We have also estimated mechanical constants, e.g., Young's modulus, bulk modulus, shear modulus, Poisson’s ration, ductility and anisotropy factor. Born Criterion for mechanical stability is satisfied by laves phase compounds, since the value of Pugh's ratio (the ratio of bulk modulus and shear modulus) is less than 1.75 which shows brittle nature of these laves compounds. The ultrasonic velocities and thermal relaxation time of these $ZrMo_2$ and $HfMo_2$ are evaluated utilizing evaluated values of elastic constants and lattice parameters within the same physical conditions. The orientation dependent ultrasonic velocities and thermal relaxation time have been also evaluated for the determination of anisotropic behaviour and thermophysical properties. The obtained results are analyzed to explore the characteristic of laves phase compounds.

Keywords: Laves phase compounds, Lennard - Jones potential approach, Elastic properties, Ultrasonic properties.

OP-19

MECHANICAL AND THERMAL PROPERTIES OF Gd-doped ZnO NANORODS

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Abstract

The elastic, magnetic and thermal properties of Gd-doped ZnO nanorods (NRs) have been studied using interaction potential model. Gd-doped ZnO nanorods are hexagonal wurtzite structure. The characteristic features of elastic properties of Gd-doped ZnO NRs imply that this is mechanically stable. With the help of second order elastic constants other elastic moduli, elastic stiffness constants and Poisson's ration are estimated at room temperature for elastic and mechanical characterization. The ultrasonic velocities and thermal relaxation time of this nanorods are evaluated utilizing evaluated values of elastic constants and lattice parameters within the same physical conditions. The orientation dependent ultrasonic velocities and thermal relaxation time have been also evaluated for the determination of anisotropic behaviour and thermophysical properties. The mechanical properties of the Gd-doped ZnO nanorods are better than at 6% Gd amount. The obtained results are analyzed to explore the characteristic of ZnO nanorods.

Keywords: Gd-doped Nanorods; Elastic properties; Ultrasonic velocity; Thermal relaxation time

OP-20

Synthesis, characterization and catalytic activityof yttria doped zirconia

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Abstract

In the present study, an easy and an efficient approach is reported for the synthesis ofdifferent concentrations of Y_2O_3/ZrO_2 (YZ1, 2, 3, 4, and5wt. %) catalyst using sol gel method. These synthesized materials were characterized by X-Ray powder diffraction (XRD), Flame EmmitionScanning Electron Microscopy (SEM), Energy Dispersive X-Ray analysis(EDX),Fourier-transform infrared spectroscopy(FT-IR) technique. These Y_2O_3/ZrO_2 mixed oxides were studied for the acetylation of benzyl alcohol with acetic anhydride , 5 wt. % YZ gave best results at 120 ºC with 100.0% conversion of benzyl alcohol and 100 % selectivity of acetate product under solvent free condition and short reaction time. The synthesized products were monitored by Gas Chromatography (GC) techniques to ensure their purity and identity.

Keywords: Yttria dopped Zirconia (YZ); mixed oxide; acetylation reaction, GC, XRD, FE SEM, EDX.

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OP-21

Evaluation of mechanical properties of concrete using MWCNT's and glass fibers

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Abstract

The aim of this research is to evaluate the mechanical properties of concrete such as tensile strength, flexural strength and compressive strength of a novel hardened cement paste reinforced with Multi-walled carbon nano-tubes (MWCNTs) and Glass Fibers. In these composites, the percentage of MWCNTs was fixed at 0.75% by weight of cement, while the percentage of Glass Fibers was fixed at 0.25% by weight of cement. The samples were cured in tap water for 28 days at 25 + 2^{o}C.Composite specimens were tested for compression and flexure in order to evaluate their mechanical properties such as compressive strength, flexural strength, toughness and ductility and compared with the results of plain cement control beams. Surface morphology of the specimens infers the clustering of glass fibres demonstrating the dispersion of glass fibres and interaction between the MWCNTs with Scanning electron microscopy.

Keywords: Carbon fiber; Multi walled carbon nano tubes; Polymer matrix; Flexural strength; Mechanical properties

OP-22

A study of properties, synthesis and characterization of Nanocrystalline Spinal ferrites

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Abstract

The research on ferrites is fast growing in this modern era. The present work is meant for the faster understanding of this research area. Due to quick evolution of electronic technologies, and the development of telecommunication, high-performance microwave absorbing composites in which ferrite is one of their components have attracted a lot of attention. In this article we try to focus on a comparative understanding of various synthesis routes, magnetic properties and characterization of the ferrites. It provides a brief presentation of ferrites and among them are spinel ferrites and hexagonal ferrites. In addition to that, it discusses the classifications of ferrites according to magnetic properties, the synthesis methods to prepare nano ferrites, and control their properties. Also, it presents the main mechanism to absorb the microwaves (e.g. dielectric and magnetic losses) and finally discusses the microwave absorbing characteristics of ferrites . We synthesised the Nanocrystalline spinel ferrite MFe_2O_4 (M = Ni, Co, Mn, Mg, Zn) powders by a hydrothermal method using $Fe(acac)_3$, $M(acac)_3$ (M = Ni, Co, Mn, Mg, Zn) and aloe vera plant extracted solution. And study the properties of synthesized nanocrystalline material and from XRD and TEM result try to find spinel structure ,crystal structure and morphology of the spinel ferrite powders.

Keywords: Telecommunication, microwave, synthesis, characterization , Hexagonal ferrites.

Graphical abstract:

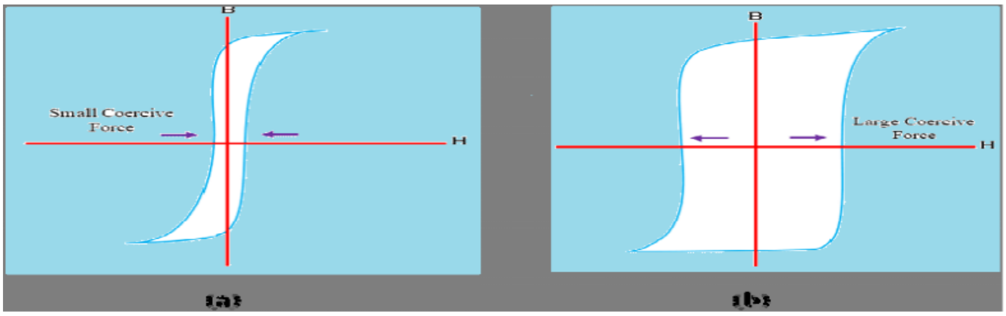

Fig.1 B-H curve for ferrites (a) soft ferrites and (b) hard ferrites

OP-23

Novel Lithium–Sulfur Battery as a Recent Technology

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Abstract

Energy is a very precious need for our daily life. In view of this, recently a novel Lithium Sulfur (Li-S) battery as an energy storage device becomes a good alternative to Li-ion battery for the next generation. It is cheaper, low toxicity, sustainable and has high energy density (2600 Whkg-1). The present paper covers a brief discussion about the introductory concepts of lithium-sulfur battery, the requirements of electrode materials and recent development in cathode materials with their specific properties and some challenges facing by Li-S battery, such as the shuttle effect of lithium-polysulfides (LiPSs) etc. Therefore, there is a need for suitable electrode material for enhancing the performance of Li-S batteries for future.

Keywords: Lithium Sulfur battery, energy storage, energy density, cathode materials, etc

OP-24

ANALYSIS AND COMPARATIVE STUDIED BY UNDOPED AND DOPED CRYSTALS BY SILICA GEL TECHNIQUE

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Abstract

Single crystals of Barium tartrate, and Cobalt Barium tartrate crystals were grown by single diffusion technique at room temperature. Effect of Cobalt doping in the Barium tartarate, crystals has been studied and reported. The XRD pattern shows that barium tartarate, and Cobalt Barium tartrate crystals are polycrystalline in nature and having orthorhombic, structure. Thermo gravimetric analysis (TGA). curve shows the percentages of the weight loss in the different stages of decomposition. Differential scanning calorimetry (DSC). The thermal stability has been studied by the TGA, DTG and DSC.

Keywords: Single diffusion, XRD, TGA, DTG and DSC

OP-25

GROWTH AND THERMAL ANALYSIS OF IRON DOPED BISMUTH TRI-SULPHIDE CRYSTALS BY GEL METHOD

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Abstract

Iron doped Bismuth tri sulphide crystals were grown in silica gel medium at room temperature by single diffusion method. The effects of parameters such as gel aging, gel pH, the density of gel on growth of crystals were studied. The grown crystals were characterized by thermo analytical techniques (TGA and DSC), X-ray powder diffraction (XRD), by powder X-ray diffraction analysis the crystal structure is confirmed to be Orthorhombic having lattice parameters a = 9.98 A°, b = 3.97 A°, and c = 11.60 A° Thermal study reveals that Iron doped Bismuth Tri-Sulphide crystal is Di-hydrous. TGA and DSC analysis shows a remarkable thermal stability.

Keywords: Iron doped Bi2S3 Crystal, growth, XRD, EDAX, TGA and DSC

OP-26

PMMA based Superhydrophobic Nanofiber Membranes prepared by Electrospinning Method for efficient Oil-Water Separation Application

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Abstract

Entire world is facing a very critical problem of oil pollution. An accidental oil spillage in ocean may cause a serious threat to the living animals in ocean. The superhydrophobic nanofirbrous membrane prepared from the various polymers or polymer-nanoparticle composite can efficiently separate the mixed oil from the water. In the current research work, we have used a polymer, polymethylmethacrylate (PMMA) to prepare the nanofirbrous membrane for oil-water separation. A 01 gm of PMMA was mixed in 09 ml of DMF using magnetic stirrer for overnight. A transparent and homogeneous solution of PMMA was obtained. The prepared PMMA solution was transferred to 10 ml syringe and the syringe was located in the electrospinning unit. A voltage of 14.3 kV was applied to the needle and a drum RPM was fixed at 542.6, whereas a syringe pressing rate was fixed at 02 ml/h for 05 h. The nanofibers were collected on the aluminum foil and foil is dried at 135° C for 05 h, a free-standing membrane was obtained by peeling. A water contact angle measured on the membrane was about 61° -63° and oil contact angle is 0° . A detailed study on PMMA – silica composition, the surface morphology, oil-water separation, oil-water separation efficiency, flux rate and mechanical stability of the membrane are under process.

Keywords: Superhydrophobic; Contact Angle, Electrospinning; Oil-water separation; Nanofibers.

OP-27

Synthesis and PL study of Sr3(VO4)2:Eu3+ phosphor for W-LED application

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Abstract

In the present paper, a single host phosphor for white light emitting diode (W-LED) $Sr_3(VO_4)_2$:Eu3+ prepared by co- precipitation method and combustion method is reported. Formation of the compound was confirmed by studying the X-ray diffraction pattern. The photoluminescence (PL) properties were studied by fluorescence spectrophotometer (F-7000). The $Sr_3(VO_4)_2$:Eu3+ shows the broad emission band covering entire visible region centered at 520 nm and sharp peak at 613 nm, when excited by 350 nm. The excitation spectrum at 520 nm emission wavelength is suitable for pc-White-LED application.

Keywords: Strontium Vanadate, Co-precipitation, Photoluminescence, W-LED

OP-28

Morphology, Characterization and Gas Sensor Properties of Sr Doped WO3 Thin Film Nanostructures

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Abstract

A set of novel nanostructures (NS) of Sr (5 wt. %, 10 wt. %, 15 wt. % and 25 wt. %) doped WO_3 (STO) synthesized by co precipitation method and coated on glass substrate as a thin film using electron beam deposition. Particle size distribution, surface morphology, nature, grain boundary, distribution, related photoluminescence properties of the Sr doped WO3 thin films were studied. Nanostructures (NS) were analysed using UV-Visible, scanning electron microscopic method (SEM), atomic force microscopic method (AFM), cyclic voltammetry (CV), X-ray diffractometer (XRD) and photoluminescence spectroscopic (PL) methods. Investigations carried out over various volatile gases and sensing characteristics, response, recovery time revealed that the 25 wt. % of Sr doped WO3 NS exhibited better sensitivity and selectivity towards chloroform gas in presence of other volatile gases. The sensor response of the nanoparticles (NPs) at 100 ppm of chloroform was experimentally recorded and found to be comparatively fast with value of 18 seconds at 200 °C. The overall sensor selective response, rate of recovery time investigated was 18s/14s respectively. Enhanced selectivity, great response time and stability towards other volatile gases tested for 25 wt. % Sr doped WO_3 NS acting as sensor. Enhanced sensitivity is due to the dopant material Sr distributed over surface active portions of the nanoparticles (NPs). The performance of the nano thin films of Sr doped WO_3 towards the effective gas sensing properties is able to deliver its role in the biomedical, food industries as a promising candidate for chloroform detection and other related applications.

Keywords: Nanostructures, Sr, WO_3, Gas Sensors, Thin films, Co precipitation

OP-29

Octadecyltrichlorosilane modified Superhydrophobic Stainless Steel Mesh for Oil-Water Separation

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Abstract

Recently, oil-water separation has become an important topic due to its increasing commercial demand. Here, we report simple technique to prepare superhydrophobic-superoleophilic mesh for oil-water separation. The cleaned stainless steel mesh modified by octadecyltrichlorosilane through solution immersion method. The modified mesh exhibited water contact angle (WCA) 158 ± 2° and oil contact angle (OCA) 0°. The prepared superhydrophobic mesh effectively separate various oils like petrol, kerosene, diesel, vegetable oil, and coconut oil from oil–water mixtures with separation efficiency greater than 95%, and stable recyclability after 15 separation cycles. In case of low viscosity oil (petrol), modified mesh showed permeation flux of 2086.95 ± 104.34 L/(m2.h), which is higher than high viscosity oil.

Keywords: Oil-water separation, superhydrophobic, and superoleophilic mesh

OP-30

EFFECT OF SUBSTRATE THICKNESS ON THE ELECTRO-WETTING PHENOMENON

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Abstract

The electro-wetting phenomenon has wide commercial applications. But the voltage requirement to observe the electro-wetting phenomenon is very large. To use this phenomenon in the commercial applications, this requirement needs to be low. For this we have proposed to probe effect of reduction in substrate thickness. The substrate thickness has been reduced and the phenomenon is studied on two substrates with different thickness. The reduction in the thickness of the substrate reduces the voltage requirement which is desirable.

Keywords: Substrate Thickness, Electro-wetting, Contact Angle

OP-31

Comparative studies on Supercapacitive Properties of Reduced Graphene Oxide Quantum Sheets deposited on Various Substrates.

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Abstract

In the present work, Reduced Graphene oxide was synthesized using a binder-free approach through facile Hydrothermal Method. Reduced graphene oxide was deposited on carbon cloth as well on nickel foam for a comparative study of their supercapacitive properties. The RGO electrode is characterized by using various structural, morphological and electrochemical techniques. XRD study presents a clear distinction of various phases of reduced graphene oxide. Morphology obtained reveals formation of 2D quantum nanosheets. The results obtained contain a clear discussion on the influence of variation of substrate on the supercapacitive performance of RGO. Also, clearly indicate that the synthesized reduced graphene oxide electrode has an enormous potential to be used as a supercapacitor electrode with high specific capacitance, long cycle life and stability. The detailed discussion on comparative studies will be presented in paper.

Keywords: Reduced Graphene Oxide, Supercapacitors, Hydrothermal, Carbon Cloth, Nickel foam

OP-32

Synthesis and Photoluminescence of KBaPO4: Ce3+ phosphors

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Abstract

Blue emitting $KBaPO_4$: Ce3+ phosphors sample is prepared by using combustion synthesis method. Spectroscopic properties of Ce3+ and integrate the Ce3+ ion with host inorganic material shows interest for most of the applications in photoluminescence studies. Prepared sample of $KBaPO_4$: Ce3+carried out for emission and excitation spectra for photoluminescence measurement. XRD, morphology, absorption band and concentration of Ce3+ ion with emission intensity are reported in present work. Structural and morphological studies confirm phase and purity of prepared sample with crystalline in nature. PL spectra of Ce3+ due to the 4f–5d transition of Ce3+ ions peaking at 330 nm. Chromatic properties index with the help of the emission spectra with color coordinate of sample observed in blue region. The photoluminescence emission spectra of $KBaPO_4$: Ce3+ phosphor exhibit blue emission band centered at 440 nm.

Keywords: XRD, Photoluminescence, morphology, chromatic, stability temperature, emission and excitation spectra.

OP-33

EFFECT ON Structural and MAGNETIC PROPERTIES OF Co-Zr Substituted ALUMINIUM Strontium hexaferrites

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Abstract

A series of Co-Zr substituted M type hexaferrite with generic formula SrAl2Fe10-2x (CoZr)xO19 with x = 0.6,1 are prepared by a microwave induced sol-gel combustion route. The structural analysis of the prepared samples have been studied by X Ray diffraction Patterns which confirmed M type hexaferrite structure.The morphology of the prepared samples are carried out by TEM. The average grain size is found in the range of 36-55 nm. The variation in lattice parameters and density with concentration of Co-Zr are studied. The magnetic behavior of substituted ferrite improves with the concentration of Cobalt and Zirconium (Co-Zr). It also improves the Curie temperature which shows the exchange interaction becomes stronger.

Keywords: XRD, TEM, Magnetic properties(Ms,Hc), Curie temperature Tc, exchange interaction etc

OP-34

SIZE SELECTIVE COPPER-MOLYBDENUM OXIDE BIMETALLIC NANOPARTICLES SYNTHESIZED BY ELECTROCHEMICAL REDUCTION METHOD

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Abstract

Bimetallic nanoparticles, composed of two different metal elements are of greater interest than monometallic ones, from both the scientific and technological views, for the improvement of the catalytic properties of metal particles. The bimetallic nanoparticles are basically composed of two different elements i.e. two kinds of metals are combined in one particle. Copper-Molybdenum oxide bimetallic nanoparticles were synthesized by electrochemical reduction method which is environmental bening. The tetra butyl ammonium bromide (TBAB) used as capping agent in an organic medium viz. tetra hydro furan (THF) and acetonitrile (ACN) in 4:1 ratio by optimizing current density. The parameters such as current density, solvent polarity, distance between electrodes, and concentration of stabilizers are used to control the size of nanoparticles. The synthesized copper-molybdenum oxide bimetallic nanoparticles were characterized by using UV-Visible, FT-IR, XRD, SEM-EDS and TEM analysis techniques.

Keywords: Electrochemical cell, Copper-Molybdenum oxide bimetallic nanoparticles, Tetra butyl ammonium bromide, XRD, SEM, and TEM.

OP-35

Effect of pH on Serum Albumin Proteins and Their Conjugates with Biocompatible InP/ZnS QDs

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Abstract

The pH of the biological medium had significant effect on fluorescence intensity of Bovine and Human Serum Albumin proteins. It was found that fluorescence intensity increased with increasing pH from 3.0 to 7.0 and then decreased from pH 7.0 to 9.0. In addition, pH of the medium has considerable effect on fluorescence emission maximum of Trp residue in both the proteins. The red shift in lem of Trp in BSA and HSA alone for various pH values were observed. Subsequently, the effect of pH on the serum albumin protein-InP/ZnS QDs conjugates was also studied. Reduction in the fluorescence intensity of BSA and HSA upon conjugation with PEG-InP/ZnS QDs at various pH gives information about the degree of exposure of the Trp residue to hydrophilic environment. Absence of prominent shift in lem after conjugation with QDs at pH 3.0 and 3.8 can be addressed on the basis of change in the non-polar (hydrophobic) microenvironment of Trp residue. Since at pH 3.0 and 3.8 Trp residue stays in a larger hydrophobic pocket, it prevents the formation of conjugation with QDs. Interestingly, environment of Trp residue moderately becomes non-polar as pH grows from 7.0 to 9.0 which results in blue shift in lem. It is revealed that the PL properties of the QDs depend upon the pH of the medium. In addition, to some extent biological medium is responsible in preventing bioconjugation with InP/ZnS QDs at pH 9.0. It may be observed that the Trp fluorescence was quenched at various pH values due to InP/ZnS QDs conjugation and quenching of Trp fluorescence by PEG-InP/ZnS QDs that result in resonance energy transfer to InP/ZnS QDs. Fluorescence quenching of biomolecules may occur via either static quenching or dynamic quenching. In summary, systematic investigation of effect of pH of the biological medium on the photoluminescence, stability and conjugation between serum proteins (HSA and BSA) and PEG-InP/ZnS QDs were presented.

Keywords: Serum Albumins, Tryptophan, PEG-InP/ZnS QDs, Conjugation

OP-36

PERFORMANCE OF ELECTROCHROMIC WO_3 THIN FILMS FOR ENERGY STORAGE

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Abstract

Electrochromic materials are characterized by its ability to sustain reversible and persistent changes in the optical properties upon application of potential. Tungsten trioxide (WO_3), an n- type, wide band gap semiconductor metal oxide remains the most promising candidate for electrochromism. Recently, electrochromic devices have been adopted to incorporate energy storage, which is recognized as electrochromic supercapacitor (ECSc). ECSc has fascinated the tremendous attention of many researchers owing to optical modulating properties, in particular, an indication of their energy storage level through colour variation. WO_3 thin films were electrodeposited on FTO glass substrates by applying -0.15 V for 20, 40 and 60 minutes followed by annealing at 100^0 C for 60 minutes. Electrodeposited WO_3 thin films were analysed for Structural, Chemical, Optical, Morphological and electrochemical analysis using X-ray diffraction, Micro- RAMAN, FE-SEM, Transmittance, Cyclic Voltammetry, Cronoamperometry, Cronocoulometry, Galvanostatic Charge-Discharge and Electrochemical Impedance Spectroscopy. Effect of deposition time and their subsequent impact on performance for electrochromic supercapacitive properties were investigated. The result shows excellent electrochromic performance, which can be used as energy storage electrode materials.

Keywords: Electrochromism, Energy Storage, Tungsten Trioxide (WO_3), electrodeposition, thin films

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of spray deposited TiO 2 -doped WO 3 thin films," Appl. Surf. Sci., vol. 250, no. 1–4, pp. 117–123, Aug. 2005.

OP-37

Hydrothermally prepared vanadium oxide for NO2 gas sensing application

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Abstract

Vanadium pentoxide nanoparticles have been successfully prepared by simple and direct hydrothermal method. Present work demonstrates, the NO_2 gas sensing performance of hydrothermally prepared vanadium pentoxide. The structural study of calcinated product done with the help of XRD, FTIR and Raman Spectroscopy. This study confirms the orthorhombic crystal structure of the product material. The vanadium oxide nanostructure morphology confirmed by scanning electron microscopy. The optical study of prepared vanadium oxide is done with the help of diffused reflectance spectroscopy. The spectra shows the absorption mainly in ultraviolet region. The band gap about 2.40eV is calculated from Kubelka-Munk theory. The only absorption peak arising at characteristic wavelength 391.74nm in PL techniques reveals the purity of prepared material. Finally the gas sensing of V_2O_5 is checked which shows a surprising response towards oxidizing gas NO_2. The response and recovery time is good.

Keywords: Vanadium pentoxide, hydrothermal method, NO_2, gas sensing

OP-38

GREEN SYNTHESIS OF GOLD NANOPARTICLES AND THEIR OPTICAL CHARACTERIZATION

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Abstract

Present investigation describes the synthesis of gold nanoparticles by facile, environmentally benign and cost-effective technique using the mushroom species grown in rainy season on dried leaves of sugarcane. The change in colour from light yellow to reddish colour of the reaction solution indicate the formation of gold nanoparticles. The prepared colloidal gold nanoparticles are further characterized by UV-visible spectroscopy, zeta sizer and zeta potentiometer. The SPR peak appeared at 518 nm confirm the formation of gold nanoparticles. In our study colloidal gold nanoparticles having the average size 26.51nm are prepared as measured by zeta sizer. Results of Zeta potentiometer measures the zeta potential of -23 mV indicating the better stability of the formed nanoparticles FTIR spectroscopy gives the presence of potential biomolecules present in the reaction medium for the reduction and stabilization of the gold nanoparticles.

OP-39

PROPERTIES STUDY OF LEAD DOPED COPPER NANO-FERRITE BY SOL-GEL AUTO COMBUSTION METHOD

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Abstract

Promising future applications of ferrite nano-particles are in medicine, development of the devices like permanent magnets, memory storage devices etc. Ferrite nano-particles have been the emerging focus of the recent scientific research. Nanostructure powders of ferrites having chemical compositions [PbxCu1-xFe2O4] where, x=0.2, 0.4, synthesized through nitrate citrate by sol-gel auto-combustion method from stoichiometric mixture of their respective metal nitrate. The prepared powders were sintered at 400 0C for 4 hours. The structural, morphology, ferrite formation of powder were characterized by X-ray diffraction (XRD), Scanning Electron Microscopy (SEM). The X-ray revealed the formation of nano-sized ferrite particles with cubic spinel structure and the cubic phase in the ferrite matrix. The average crystalline particle size was calculated by Scherrer method. The crystalline size with Pb Concentration gradually increases. The lattice parameters, X-ray density and bond length are calculated from XRD patterns. Surface morphology wear conformed by scanning electron Microscopy.

Keywords: PbCu nano-crystalline ferrite, XRD,SEM.

OP-40

SYNTHESIS, CHARACTERIZATION AND PROPERTIES OF SPINEL ZINC FERRITE NANOPARTICLES BY CHEMICAL COPRECIPITATION TECHNIQUE

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Abstract:

Nanosized spinel ferrites have many applications in the field of nanoscience and technology due to their exceptional structural, optical, electrical and magnetic properties. In the present work, Zn-ferrite [$ZnFe_2O_4$] nanoparticles (NPs) have been synthesized by the chemical coprecipitation method. The synthesized powder was sintered at 900˚C for 2 hours in the air and characterized by X-ray diffraction(XRD), Scanning Electron Microscopic (SEM), Fourier-Transform Infrared Spectroscopy (FTIR), UV-Vis absorption, and Fluorescence spectroscopic techniques for its structural, morphological, and optical properties. From the XRD pattern of the sample, it is confirmed that the formation of a cubic spinel structure with Fd-3m space group and the average crystalline size (D) of the powder was found to be 40.93 nm. SEM micrographs reveal that the polyhedral crystal-like shape of synthesized ferrite NPs also analyzed for the elemental composition using energy dispersive spectrometry (EDS). The FTIR measurements carried out in the range of 4000-450 cm -1 and observed the presence of metal-oxygen vibrations in the tetrahedral and octahedral sites. The UV-Visible absorption and fluorescence spectrum of synthesized NPs confirms that these NPs are optically active and will have potential appliances in light-harvesting applications.

Keywords: Zinc ferrites; Coprecipitation; Nanoparticles; XRD; SEM; FTIR.

OP-41

EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF Co (II) WITH 4-CHLOROISONITROSOACETOPHENONE SEMICARBAZONE (HICAPSC)

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Abstract

Oxime react with metal ions to give characteristics coloured complexes which can be extracted into organic solvent. Generally, carbonyl monoximes give coloured complexes with metal ions. This complex can be extracted into organic solvent. Muller and Pechman synthesized isonitroso-p-methyl acetophenone (HIMAP). Isonitrosopropiophenone (HIMPP) was developed as a reagent for determination of Cobalt (II). It is used for the extraction and spectrophotometric determination of some transition metals. Cobalt can be quantitatively extracted by HICAPSC into chloroform from an aqueous solution at pH 7.5 to 8.1. Organic solvents can be arranged in the following order on the basis of the extraction coefficient values. Chloroform > Diethyl ether > Benzene > n-Butanol > Toluene > Ethyl methyl-ketone > Carbon tetrachloride > Ethyl acetate > Isoamyl alcohol > Nitrobenzene. The absorption spectrum of Co: HIC PSC complex in chloroform shows an absorption maximum around 368 nm. At this wavelength the Beer's law is found to be obeyed over a range of 0.2 ug to 0.5 ug of copper per mL and the molar absorptivity of the extracted species is 3.16764 x 105 lit mol-1 cm-1, calculated on the basis of the total amount of copper taken. The following ions when present in amounts indicated do not interfere in the spectrophotometric determination of Co (II) 10 mg each of Li(I), Na(I), K(I), Sr (II), Mn (II); 5 mg each of Ba (II), Ca (II), Mg (II), Pb (II), Al (III), Bi (III), As (III), Mo (IV), V(V), W(VI), ; 10 mg each of chloride, bromide, iodide, fluoride, chlorate, bromate, iodate, sulphate, persulphate, sulphite, nitrate, nitrite, cyanate, acetate, pyrophosphate, perchlorate, thiourea and thiocyanate. The interference of the ions Ag(I), Cu(II), Pd(II), Zn(II), Ce(IV), Zr(IV), Th(IV), V(VI), Cyanide, Oxalate and EDTA can be removed by using appropriate masking agents. The composition has been studied by Job's continuous variation and mole ratio methods. The result suggests 1:2 (metal ligand stichometry for Co (II) The method has been successfully applied for the determination of Cobalt in steel sample, Synthetic mixtures, cast iron and cyanocobalamin injection. The result of analysis is found to be in good agreement with those obtained by the standard method.

OP-42

Mini Review: Comparative Study between Microwave Sintered and Conventionally Sintered Spinel Ferrites.

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Abstract

Microwave sintering of spinel ferrites exhibits remarkable physio-mechanical, electrical, physio-chemical, magnetic and dielectric properties as compared to conventionally sintered spinel ferrites. In microwave sintering, heat transfers rapidly to the spinel ferrite material and hence the process of densification is accelerated. The temperature gradient between surface and interior of the spinel ferrite material is minimum during Microwave Sintering Process as compared to the Conventional Sintering. Microstructure of the microwave sintered spinel ferrite material is more homogeneous in comparison of conventionally sintered spinel ferrite material. The grain size of spinel ferrite material is found to be enhanced under microwave sintering which results in improved electro mechanical characteristics of spinel ferrites. The dielectric constant of the microwave sintered spinel ferrite material is observed to be lower down as compared to conventionally synthesized spinel ferrites and hence such spinel ferrites give excellent response to high frequency devices. The coercivity of spinel ferrites is decreased due to Microwave sintering which leads to their applications in electric transformer. The squareness of magnetic hysteresis loop of the spinel ferrites is enhanced under microwave sintering. The rectangular hysteresis loop characteristic of spinel ferrites is best suitable for magnetic data storage applications.

Keywords: spinel ferrites, microwave sintering, conventional sintering, coercivity, magnetic hysteresis

OP-43

Biogenic synthesis and characterization of ZnO nanoparticles from Aloe Barbadensis Miller leaf extract

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Abstract

Recent research has witnessed the development of metallic, semiconductor or oxide nanoparticles (NPs) using green synthesis methods. Hence an attempt has been made to synthesize the zinc oxide NPs using Aloe barbadensis miller plant extract at room temperature, here the aqueous leaf extract act as a reducing agent along with promoter, stabilizer, and template for synthesis of ZnO NPs. The biosynthesized NPs were characterized by X-Ray Diffraction (XRD), UV-Vis Spectroscopy (UV-Vis), Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscope (SEM), consequently the synthesized ZnO NPs were pure, predominantly spherical in shape with the size around 16.8 nm and has a good degree of crystalline structure. FTIR analysis shown characteristics peak for ZnO bond at 513cm -1 and confirms the formation of ZnO NPs, also reveals the presence of important biomolecules such as proteins, lignin, lipids, amino acids, phenols, vitamins and etc. The UV-Vis absorption spectrum confirms strong absorption peak at 347nm and optical band gap obtained is about 3.57 eV. The morphology of fabricated ZnO NPs is in the form of cluster which is confirmed by SEM. Further, these NPs will find the applications in biosensing and photo catalytic activity.

Keywords: Aloe barbadensis, ZnO, Nanoparticles, XRD, FTIR, SEM

OP-44

Electrodeposited Nanoleaves (NLs) like Mn3O4 thin film for electrochemical supercapacitor study

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Abstract

In the present study, we report here synthesis and characterization of manganese oxide (Mn_3O_4) thin films by potentiostatic electrodeposition for supercapacitor application. The crystal structure and surface morphological behaviour of Mn_3O_4 thin film were carried out by using X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM) study. The structural study of Mn3O4 thin film shows hausmannite tetragonal crystal structure. The surface morphological study showed that the formation of nanoleaves (NLs) of Mn_3O_4 thin film. The electrochemical supercapacitive performance of Mn_3O_4 NLs was characterized by using cyclic voltammetry (CV), charging-discharging (CD) and electrochemical impedance spectroscopy (EIS) techniques. The Mn_3O_4 NLs shows maximum specific capacitance of 460 F.g-1 at scan rate 5 mV.s-1 and 92% cycling stability in 0.5 M Na_2SO_4 electrolyte solution. Hence, potentiostatically deposited Mn_3O_4 NLs is best for energy storage application.

Keywords: electrochemical supercapacitor, electrodeposition, Mn_3O_4, XRD, FESEM, EIS

OP-45

HIGHLY ORIENTED GROWTH OF INN THIN FILMS ON QUARTZ SUBSTRATE AT RELATIVELY LOW TEMPERATURE USING PLASMA ASSISTED PLD

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Abstract

The III-nitride semiconductors namely AlN, GaN and InN are known for their applications in the field of opto-electronic devices due to their unique set of properties. Out of all these materials, InN received special attention due to its chemical/physical properties followed by the miscibility with others for band gap engineering. Though the material is extensively studied, the material is highly debated in research community to fix its exact band gap, address the correct reasoning for observed conductivity, growth along non polar directions and many more. There properties are observed to depend on the synthesis/growth technique followed. For high quality crystal growth sophisticated techniques viz molecular beam epitaxy (MBE), metal organic chemical vapor deposition (MOCVD), Atomic layer deposition (ALD) are widely used. However, these techniques are expensive, needs expertise to handle and has lowest growth rate. Further the quality growth using this technique is carried out at extremely high temperature <500 oC and that also on selected substrates only (i.e. lattice matched substrates). This has hindered its use to develop wearable, flexible technologies, where growth is always preferred on low cost, flexible substrates for e.g. polymers mainly. Hence there is a huge demand for alternative growth technique which enables growth of nitrides on flexible, amorphic substrates at very low temperatures. Herewith we report growth of highly oriented indium nitride thin film on amorphic substrate (i.e. quartz) at relatively low temperature > 300 oC using novel deposition route i.e. Plasma Enhanced Pulsed Laser Deposition technique. The growth of film on quartz is confirmed using various characterization techniques.

OP-46

Synthesis and Characterization of CuO-SnO2 nanocomposite for CO gas sensing application

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Abstract

CuO-SnO2 nanocomposite was synthesized and its potential for sensing the CO gas is studied. The nanocomposite was synthesized using chemical co-precipitation method. The precursor and nanocomposite were characterized using TG/DTA, XRD, FTIR, UV-visible and SEM-EDX spectroscopy techniques. The TG-DTA study gives the information about thermal stability of precursor and product. XRD result shows that the CuO is having monoclinic phase and SnO_2 with tetragonal phase is formed. The UV study shows that the CuO-SnO_2 nanocomposite has a band-gap of 2.63eV. The SEM image indicates that the CuO is having a flake like shape whereas the SnO_2 show rod like structure. As synthesized CuO-SnO_2 nanocomposite was examined for sensing of CO gas.

OP-47

FACILE SYNTHESIS AND ELECTROCHEMICAL INVESTIGATION OF UNDOPED AND MN DOPED ZNO ELECTRODES FOR THE ENERGY STORAGE APPLICATION

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Abstract

In the present investigation, we have reported the synthesis of ZnO and Mn doped ZnO thin film electrodes for energy storage applications through spray pyrolysis technique. As-prepared thin films are characterized by XRD and SEM techniques for the crystal structural and morphological analysis respectively. The XRD pattern showed substitution of Mn2+ in ion might have substituted Zn site without changing the hexagonal structure. The micrograph of pure ZnO thin films showed that the grains are agglomerated. The Mn doped ZnO thin film micrographs showed the spherical type morphology. The electrochemical study was carried for various concentrations of KOH electrolyte. The maximum specific capacitance of pristine ZnO and 5%Mn/ZnO was optimized at 3M KOH electrolyte concentration. The pristine ZnO and M5Z electrode were exhibited 151 and 360 F/g maximum specific capacitance respectively.

Keywords: Mn/ZnO; Spray pyrolysis; XRD; SEM; Supercapacitor.

OP-48

Catalytic Role of Acidic Ionic Liquid for the Synthesis of Biscoumarin Derivatives at Room Temperature

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Abstract

In the present research work, we have reported novel horse tail plant ash supported SO3H group functionalized acidic ionic liquid as an efficient catalyst for the synthesis of biscoumarin derivatives. All the biscoumarin derivatives characterized by elemental composition, 1H NMR, 13CMR, SEM-EDS, FT-IR (Fourier transform infrared spectroscopy), and LCMS (liquid crystal mass spectrometer) spectroscopic methods. Solid supported catalyst immobilized with sulphonic acid ionic liquid provides large surface area, porosity, high absorption capacity at room temperature and all the synthesized biscomarin obtained in good yield. Average composition calculated from SEM-EDS analysis was found to be, C- 12.8 %, O-15.6 % and Si-71.6 %. 1HNMR and 13 CMR spectra showed no additional peaks indicating high purity of the synthesized derivatives. High purity (95 % to 98.7 %), at room temperature, less reaction time of the bis coumarin derivatives obtained in acidic functionalized ionic liquid as compared with synthesis of biscoumarin reported with other catalytic conditions. Present work discusses attractive features of usability of the sulphonic acid homogeneous catalytic transformation of bis coumarin derivatives in easy separation, optimum yield, high purity, less reaction time and high percentage of the reusability of the catalyst (5 times) at room temperature.

Keywords: SO_3H functionalized ionic liquid, synthesis, bis coumarin, horse tail plant ash, SEM-EDS, 1H-NMR.

OP-49

Removal of heavy metal chromium using industry sludge as an adsorbent by adsorption studies

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Abstract

A new low-cost activated carbon was prepared from corn industry sludge in order to remove Cr (VI) ions from aqueous solution. With rapid industrialization and urbanization, consumption of heavy metals has increased drastically. The result of unregulated disposal of these heavy metals containing effluent into the environment, had led to the destruction of the living ecosystem. Among all the heavy metals, chromium, which is often present in industrial wastewaters as chromate and dichromate ion, is considered highly toxic which is extensively used in electroplating, leather tanning, cement, dyeing, metal processing, wood preservatives, paint and pigments, textile, steel fabrication and canning industries. There are many conventional methods for the removal of heavy metal pollutants in aqueous solutions but use low-cost adsorbents are the new area of research. The present study is to investigate the ability of activated sludge obtained from corn industry for the removal of chromium. The effects of adsorption studies were carried out by varying the parameters like contact time, pH, adsorbent dosage, contact time temperature and concentration of chromium were studied by experimental tests. Analysis of equilibrium adsorption data in terms of isotherm studies that Langmuir isotherm with respect to Freundlich isotherm indicates better agreement with the experimental data. The kinetics studies of Cr (VI) adsorption onto activated carbon were described with the pseudo-first-order and pseudo-second-order model which indicates the dominance of chemisorption mechanism.

OP-50

Comparative antimicrobial activity of bimettalic nanoparticles and monomettalic nanoparticles

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Abstract

From ayurvedic formulation point of view, bimetallic nanoparticles of CuNi and AgNi were synthesized using a green approach. These bimetallic nanoparticles have biocompatible properties which enhance our interest to carry out pharmacological studies. Formulations were prepared, by tagging these synthesized bimetallic nanoparticles with known antibiotics from a local pharmacy shop. These all formulations were characterized by using UV-Visible and TEM analysis. All These formulation samples were tested for MDR with above bimetallic nanoparticles in Sahyadri hospital isolates. Few of them were shown enhanced inhibition activity against isolates. Additional Photodynamic therapy has been carried with Cu-Ni and Ag-Ni bimetallic nanoparticles and in result, enhanced zones of inhibition was observed against Staphylococcus aureus.

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OP-51

Nickel Doped Sodium A Zeolite thick films: An efficient ethanol sensor

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Abstract

This work demonstrates successful utilization of thick films of Nickel doped sodium A zeolite coated on glass substrate using screen printing method for ethanol sensing application. The structural and morphological investigation of the nickel doped sodium A zeolite material were performed by range of experimental techniques, such as X-ray diffraction, Thermogravimetric and differential thermal analysis, Fourier transform infrared spectroscopy and Atomic Force Microscopy. The sensing parameter of the thick films such as operating temperature, response and recovery time, gas uptake capacity were conducted by two probe set up. The sensor displayed good response and recovery behavior with a maximum sensitivity to ethanol gas at 50°C. Sensor shows the response time 25 sec. and recovery time of 75 sec. with gas uptake capacity equals to 80 ppm.

Keywords: Zeolite, Sensor, Ethanol, XRD, FTIR, TG-DTA, AFM

OP-52

Fe-ZnO nanoparticles for photo-catalytic degradation of Methyl Orange

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Abstract

Chemical precipitation Method was used to synthesize pure ZnO and Fe-ZnO nanoparticles. The XRD patterns and SEM topography shows that prepared nanoparticles were wurzite structure. The average particle size of 2% Fe-ZnO(25to40nm) exhibited excellent achievable photo-catalytic degradation of Methyl orange in the acidic condition (pH-4). It was found that 2% Fe-ZnO shows the highest activity for degradation of Methyl orange compare to ZnO.

Keywords: Fe-ZnO nanoparticles XRD pattern, SEM topography, Photocatalytic degradation

OP-53

"EFFECT OF NITROGEN DOPING ON STRUCTURAL AND OPTICAL PROPERTIES OF TIO2 NANOPARTICLES"

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Abstract

Optimum compositions of N doped TiO_2 nanoparticles were prepared by sol-gel method at room temperature. The samples were sintered after confirmation by TGA studies. The structural phase formation of materials was analyzed by XRD studies shows anatase phase. The particle size was calculated from XRD data which is nanometer range. FTIR spectra was studied to confirm the O-Ti-O, O-Ti-N bonding in N-doped TiO_2 and formation of -OH groups on the surface, which can extensively affect the TiO_2 band structure and surface of catalyst. The morphology of samples was investigated by FESEM and HR-TEM. The compositional stoichiometry was confirmed by EDAX analysis. The UV DRS studies revealed that, as the mole% of N increases in the TiO_2, the visible absorption edge shifted towards higher absorbance as well as higher wavelength region; this is reflected through decrease in the optical band gap of N-doped TiO_2 samples show stronger absorption edge in the range of wavelengths from 400 to 530 nm. This is attributed to isolated levels of N-2p orbital's in the band gap of TiO_2. The energy band gap decreases from 3.2 to 2.5 eV as the doping of mole % of N increases further reduced to 2.6 eV for 3 mole% N and 2.5 eV for 5 mole% N doping in TiO_2. The N doped TiO_2 NPs having higher surface area, lower optical energy band gap, lower charge transfer resistance, lesser charge recombination rate; which increases the overall absorption in the visible region.

Keywords: Nitrogen, Sol-gel, Doping, Anatase, Band gap

OP-54

SYNTHESIS, CHARACTERIZATION AND PYRIDINE STUDY TO DETERMINE LEWIS ACIDITY OF MIXED METAL OXIDE $Zn_{0.5}Cu_{0.5}Al_2O_4$

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Abstract

Mixed metal oxide system $Zn_{0.5}Cu_{0.5}Al_2O_4$ was prepared by sol-gel method by taking metal nitrates as starting material and citric acid. The synthesized material was characterized by TGA, XRD, SEM, TEM and EDX. Phase formation was determined by X-ray analysis. The samples showed a single-phase cubic structure. Surface morphology was studied by scanning electron microscopic studies, which reveals homogenous grain size. Transmission electron microscopic study indicated the nanostructure of the catalysts. EDX analysis confirms agreement between theoretical composition and as prepared mixed metal material. Before the studies of catalytic activity of the sample it is essential to investigate nature of active centers. The presence of active centers on the surface of the material was confirmed through pyridine adsorption studies. Stretching vibrations pyridine adsorbed metal oxides have been investigated by infrared spectroscopy it suggest surface acidity of the catalyst which is responsible for better catalytic performance and will reduce time for conversion of reaction under study.

Keywords: X-ray, Spinel, Mixed-Metal Oxides, IR

OP-55

STRENGTH PROPERTIES OF ALKALI ACTIVATED SLAG CONCRETE CURED AT AMBIENT TEMPERATURE

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Abstract

This paper reports use of properties of novel fly ash or slag as a primary binder in concrete by activating them with alkaline solutions. The detailed experimental investigation made on alkali activated slag concrete specimens with 100% ground granulated blast furnace slag (GGBS) for different grade of concrete and molarity of sodium hydroxide cured at ambient temperature. Grade of concrete and molarity of sodium hydroxide includes M30, M50 & M70 and 8M, 10M & 12M. The specimens were tested for versatile tests like compressive strength, split tensile strength and flexural strength at 3, 7 and 28 days. It is found that rate of gain of compressive strength is lower in ambient cured samples compared to heat oven cured samples, split tensile strength and flexural strength of ambient cured samples are less than OPC concrete samples.

Keywords: Alkali activated slag concrete; ground granulated blast furnace slag (GGBS); sodium hydroxide; molarity; split tensile strength; flexural strength

OP-56

INFLUENCE OF DIVERSE PARAMETERS ON KNOEVENAGEL CONDENSATION REACTION (KCR) USING A CATALYST DERIVED FROM COAL WASTE: A GREEN STUDY

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Abstract

Homogeneous and heterogeneous catalysis arrive across widespread relevance in 'fine chemicals' manufacturing industries. It has been newly reviewed that in comparison with the homogenous catalysts, heterogeneous catalysts generally offer more advantages and hence is an area of growing interest. The Knoevenagel condensation reaction is an organic reaction with a modification of the aldol condensation (involving two C=O bonds), named after Emil Knoevenagel. A Knoevenagel condensation is a nucleophilic addition of an active hydrogen compound to a carbonyl group followed by a dehydration reaction in which a molecule of water is eliminated (hence condensation). Oftenlly, the product is α, β conjugated enone which are important key products that include nitriles used in anionic polymerization, the α,β-unsaturated ester intermediates are employed in the synthesis of several therapeutic drugs and pharmacological products. Extensive studies were conducted on KCR of aromatic compounds using heterogeneous catalyst such as mesoporous molecular sieves MCM-41 having a regular pore distribution between 20-100Å has expanded the capabilities of heterogeneous catalyst and hence it is a useful candidate compared to the microporous zeolites. However, mesoporous zeolites such as CFA-MCM-41 synthesized in our research laboratory from industrial waste coal fly ash (CFA) is found to be a potential basic heterogeneous catalyst to catalyze the KCR. Since siliceous CFA-MCM-41 does not possess the required basicity, it is difficult to use as synthesized material as a catalyst. Thus, it has been the subject of research leading to industrially relevant results enhancing the yields with selectivity up to 90% at 95% conversion. Therefore, incorporation of metals such as Sodium, Cesium and Aluminium etc. into mesoporous structure has been investigated in order to enable CFA-MCM-41 as effective solid basic catalysts. The combinations of large pores and basicity in catalyst have shown positive results in KCR.

Keywords: CFA-MCM-41, KCR; Mesoporous Material, Solid Base Catalyst etc.

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OP-57

Study of zirconia xerogels and aerogels prepared using various catalysts

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Abstract

The experimental results on the study of zirconia xerogels and aerogels prepared using various catalysts are reported here. The catalysts (acid and base) have the major impact on the hydrolysis and polycondensation of the precursor solution. Therefore, zirconia xerogels and aerogels were prepared using various catalysts such as ammonium hydroxide (NH_4OH), ammonium fluoride (NH_4F), hydrochloric acid (HCl), acetic acid (CH_3COOH), and citric acid ($C_6H_8O_7$) via ambient pressure drying. The influence of these catalysts on the physical and structural characteristics of zirconia was studied by measuring the bulk density, contact angle with water as well as fourier transform infrared (FTIR), thermo gravimetric-differential scanning calorimetric (TG-DSC), X-ray diffraction analyses. During the synthesis, the molar ratio of ZrPro:PrOH:Acac.:H_2O:HMDZ was kept fixed at 1:27:0.39:3.6:3.3 respectively. Amongst all zirconia samples, xerogels catalyzed using ammonium fluoride and acetic acid were observed to be low dense (∼0.67 g/cc). Moreover, zirconia aerogels catalyzed with ammonium fluoride and acetic acid exhibited lower density (0.27 g/cc) than xerogels. The zirconia xerogels and aerogels showed hydrophobic property (θ>90o). FTIR spectra revealed the high peak intensity of C-H, Si-C and Zr-O-Si chemical bonds in zirconia xerogels and aerogels manifesting their hydrophobic characteristics. The zirconia aerogels retained their hydrophobicity up to around 250 oC as confirmed from the TG-DSC analysis. Further, the X-ray diffractogram indicated the amorphous nature of the aerogels.

Keywords: Acetylacetonate, catalysts, sol-gel, zirconia, xerogels, aerogels

OP-58

Electrical and Dielectric studies of the Cd doped Co-Ni ferrites synthesized by solid state reaction method

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Abstract

The present study reports the dielectric and DC resistivity studies of the Cd doped Co-Ni ferrites synthesized by solid state reaction method. The XRD studies confirm the cubic spinel structure of the samples. The substitution of the cadmium in the ferrite system significantly influenced the AC conductivity, involvement of the grain boundary involvement in conduction. The variations of dielectric constant and dielectric loss for all the samples are studied as a function of frequency and shown an increase with doping concentration. The DC resistivity studies confirm the semiconducting nature of the synthesized ferrites. The activation energy is observed to be in the range of (0.534-0.629 eV).

Keywords: Co-Ni ferrites; AC conductivity, Cole-Cole plot, Dielectric constant, DC resistivity.

OP-59

ELECTRICAL AND OPTICAL PROPERTIES OF CdTe THIN FILMS BY CLOSED SPACE SUBLIMATION TECHNIQUE

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Abstract

Thin films having different thickness of CdTe were deposited by closed space sublimation techniques, onto precleaned amorphous glass substrate at room temperature. The pressure during evaporation was maintained at 10-5 torr. The structural properties of films were evaluated by XRD. The X-ray diffraction analysis confirms that films are polycrystalline in nature. The lattice parameters in the prepared thin films have been determined as a= 4.57Å and c=7.48Å. The crystallite size (D) were calculated and found to be 10.9 – 13.6 nm. The optical transmission spectra were obtained in the wavelength range 200nm – 1100 nm by UV-visible spectrophotometer. The optical band gap of the films was found to be in the range from 1.6 to 2.2 eV. The resistivity of films of different thicknesses was measured for all samples at room temperature. Activation energy is determined whose values lie between 0.24 to 0.26eVand it is found to be thickness dependent. Bulk resistivity and mean free path were also evaluated. Hall mobility, Hall coefficient and carrier concentration were also studied. The Hall coefficient shows a positive sign exhibiting P-type of semiconducting material. TEP measurement shows the deposited films are of P- type semiconducting in nature. From TEP measurement the value of Fermi energy and Absorption Coefficient (Scattering parameter) were found to be 2 -57 meV and 0.006 – 0.122 respectively.

Keywords: Thermal evaporation, Activation energy, Hall coefficient, TEP, Optical band gap.

OP-60

INVESTIGATING THE COMPLEX OPTICAL PROPERTIES OF THIOPHENE/INDOLE COPOLYMERS AS AN OPTOELECTRONIC MATERIALS

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Abstract

The present work reports the complex optical properties of thiophene/indole copolymers synthesized through novel one pot chemical oxidation copolymerization of their monomers in aqueous medium at room temperature using anhydrous ferric chloride ($FeCl_3$) as an oxidant. The result of X-ray diffraction (XRD) analysis depicts the amorphous nature of these synthesized copolymers. Field emission-scanning electron microscopy (FE-SEM) ensured the morphology of prepared samples. The complex optical parameters have been analysed using ultraviolet-visible (UV-Vis) spectroscopy. The studied samples exhibited absorption around 240 - 300 nm. The optical band gap values were found to be 2.52 and 2.67 eV for 1:1 and 1:2 molar feed ratios of thiophene/indole copolymers. The estimated optical energy band gap validated that the studied material has potential applications in optoelectronic devices. The optical conductivity shows gradual increase around 280 nm.

Keywords: Chemical copolymerization, complex optical properties, optical conductivity.

OP-61

Bio-smart material in self-healing of concrete

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Abstract

Microbial self-healing is an innovative technology which repairs cracks in concrete by precipitation of calcite. The biological method when applied to concrete improves the service life of concrete. The research work is focused on accessing the performance of synthesized microbial agent in repairing cracks in fly ash concrete. Addition of microbial agent in cracks improved the properties of concrete. Strength was found to improve by 10 % and durability by around 6% in micro-repaired concrete with microbial solution to water ratio of 0.5. Scanning electron microscope of bacterial samples showed presence of calcite near microbial cells. The synthesized bio-based agent would act as an appropriate bio-agent to heal cracks in concrete. Use of bio-based agent would lead to environmental and economical benefit. Over all the maintenance and repair cost could be reduced and also play a role in reducing green house gas emissions and help to develop sustainable concrete.

Keywords: Microbial-healing; Bio-smart material; Mechanical strength; Water absorption, SEM observations.

OP-62

SYNTHESIS, CHARACTERIZATION AND GAS SENSING STUDY OF NiO THICK FILM SENSOR TOWARDS ETHANOL, ACETONE, NH3 AND CO_2

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Abstract

Nickel oxide nanoparticles (NiO NPs) were synthesized by solution combustion method using glycine as fuels. The X-ray diffraction (XRD) result confirms the face centered cubic (fcc) structure of NiO. Crystal structure and particle size is studied by XRD. Particle size of synthesized sample is investigated by TEM, FE-SEM and Scherrer formula. Crystalline nature is observed by SAED. FE-SEM of sample is carried out for knowing surface morphology and particle size. The thick film of NiO is fabricated by screen printing technique for exploring I-V characteristics and conductivity. The gas sensing response of NiO thick film sensor towards Ethanol, acetone, NH3 and CO_2 is studied.

Keywords: NiO, Thin film, TEM, Gas sensor

OP-63

GROWTH OF ZnO NANOWIRES AND NANOTETRAPODS FOR GAS SENSING APPLICATIONS

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Abstract

The gas sensing capability of the synthesized ZnO nanostructures has been studied in this paper. A variety of ZnO nanostructures were prepared using physical as well as chemical methods. Vacuum coating machine is used to fabricate ZnO thin films. The growth of ZnO nanowires were accomplished using chemical and thermal evaporation techniques. The prepared nanostructures were characterized for UV-visible absorption spectroscopy, Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD) and particle size analysing system. The synthesized Nanomaterials were studied for their applications in LPG, Oxygen sensing. The samples are found to have good response, sensitivity and low recovery time. Thermoelectric power measurement using Seeback effect shows good response for the prepared materials.

Keywords: ZnO nanorods, ZnO nanotetrapods, Seeback Effect, Gas sensing, Thermal evaporation

OP-64

FACILE SYNTHESIS AND CHARACTERIZATION OF INDIUM DOPED CdSe THIN FILMS FOR PHOTOELECTROCHEMICAL SOLAR CELL

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Abstract

CdSe and Indium doped CdSe (In:CdSe) thin films have been successfully synthesized on a cost-effective stainless steel substrate by simple and economical chemical bath deposition (CBD) method. Various preparative parameters are optimized using renowned phototelectrochemical (PEC) method. The CdSe and indium doped CdSe thin films are characterized for structural, morphological, optical and photoelectrochemical (PEC) studies, using various physico-chemical techniques. The structural study shows presence of mixed phase in undoped CdSe thin film that contains dominant cubic and weak hexagonal phase. Modest improvement in crystallinity and intensity of hexagonal (100) plane is observed subsequent to Indium doping. Synthesis of stiochiometric CdSe is confirmed with EDAX analysis. Inclusion of Indium in CdSe lattice alters morphology from cauliflower to elliptical shaped elongated grains. Water contact angle for In:CdSe thin films (58.8°) is smaller than CdSe thin films (64.8°). The films possess direct transitions with band gap energies of 2.1 eV and 1.91 eV before and after doping, respectively. Both thin films exhibit n-type conductivity. Improved photoconversion efficiency is recorded as a result of indium doping.

Keywords: CdSe, doping, Photoelectrochemical, structural property, morphology

OP-65

The Performance of Post-paired EDFA based optical fiber networks with high Extinction ratio

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Abstract

The channel between transmitter and receiver is the most important part of the optical fiber networks like LAN, FTTH, EPON, NBN, OTN etc. But, in order to make successful communication it is important to think how signal is transmitted; what amount of signal is transmitted and how long it is transmitted through the fiber. Finally, it is said that the optical fiber network behaves as the backbone of 5th generation communication but there are several limitations like, Cross Phase Modulation (XPM). So, it is necessary to investigate and provide the treatment of XPM.

OP-66

Elaboration and Characterization of Nanocomposite In2O3:MoO3 Binary Oxides Thin Films Prepared by Spray Pyrolysis Method for CO Gas Sensor

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Abstract

Nano composite In_2O_3:MoO_3 binary oxides precursor solutions were used in 0.1N:0.1N, 0.1N:0.2N and 0.1N:0.3N ratios to prepared thin films on glass substrate by using spray pyrolysis method (SPM). The electrical characterization of binary oxides thin films were studied using resistivity, activation energy and temperature coefficient of resistance. The effects of indium (In) on the structural, morphological and gas sensing properties In_2O_3:MoO_3 binary oxides thin films have been investigated by XRD, SEM and EDAX techniques respectively. The scanning electron microscope (SEM) measurements show that the surface morphology of the film changes with In concentration. XRD reveals that the films are polycrystalline with monoclinic structure to each ratio. The grain size of film at concentrations 0.1N: 0.1N, 0.1N: 0.2N and 0.1N: 0.3N were found 18 nm, 5 nm and 3 nm respectively using Scherer's formula. The prepared In_2O_3:MoO_3 thin films were exposed to LPG, Ethanol, NH_3, NO_2 and CO gases to determine sensitivity and selectivity. Carbon dioxide gas sensing characteristics such as sensing response, operating temperature, stability, response and recovery time was also reported.

Keywords: Binary oxide, spray pyrolysis method, selectivity, XRD, SEM and EDAX

OP-67

Y3+ Composition Influenced Micro Strain, Porosity and Hopping Length Properties of Ni1-x Cdx Yy Fe2-y O4 Nanoferrites

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Abstract

The Yttrium (Y3+) nanoparticles doped Ni1-x Cdx Yy Fe_2-y O4 (where x = 0, 0.2, 0.4, 0.6 and y = 0, 0.075) were prepared by Sol-gel Autocombustion Technique. The X-ray diffraction (XRD) and Energy dispersive X-ray spectroscopy (EDAX) has been used to investigate the structural properties of the synthesized samples. XRD revealed that the structure of these nanoparticles is spinel with average grain size lies in the range between 34.8 to 12.5 nm. Increasing in lattice parameter to increases with Ni-Cd concentration may be due to the larger ionic radius of the Y3+ ion. The substitution was resulted in slight increase in the lattice constant. The determined values of micro strain increases and porosity, hopping length, X-ray density, surface area and lattice parameter decreased with increasing yttrium concentration. The increase in the Y3+ concentration gives the significant changes in structural properties of the composition.

Keywords: Autocombustion technique, Nanoparticles, Micro strain, Porosity, Hoping Length, etc

OP-68

D. C. Conductivity of Mesoporous Material Synthesized From An Industrial-Waste: A Green Study

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Abstract

In current decade global energy consumption due to demands of growing industrializing nations was very high. At this moment, an economical and sustainable handling of energy sources, simultaneously avoiding any environmental harm due to carbo-gases, became important to a greater extent. Hence, investigation of renewable energy production and clean-energy conversion devices (Ex. Solar collectors, Fuel Cells etc.) is the apex necessity now a day. In this correlation solid ion conducting materials have grown curiosity due to their potential applications in various electrochemical devices.

Keywords: CFA-MCM-41, Fictionalization, Industrial Waste

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OP-69

An Efficient and Eco friendly Photocatalytic Synthesis and Characterization of N-Heterocyclic compounds

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Abstract

Photocatalysis is a process that involves effective utilization of light for various applications such as environmental remediation, H_2 production, biomass conversion, and green synthesis of commodity chemicals1. Various semiconductor-based photocatalysts have been explored for this purpose with utilization of solar light. TiO_2 is one of the most promising photocatalysts that has been employed for photocatalytic process including organic transformations2, synthesis3 and chemical biology4. Particularly, Cobalt doped TiO_2 photo catalyst has widespread applications in materials5and also in the development of efficient synthetic methodologies for the incorporation of catalysis into organic frameworks is significant interest. Benzimidazole is a very important class of heterocyclic compounds and it occupies unique position in the field of pharmaceutical chemistry. The present study explores the photocatalytic synthesis of 2-Aryl Benzimidazoles over Cobalt doped TiO_2 under solar light irradiation. It is an efficient process for the synthesis of various substituted Benzimidazoles using orthophenylenediamines and Cobalt doped TiO_2 catalyst under solar light irradiation. This process demonstrates that titanium oxide-based photocatalysts have a great potential as a versatile tool in “green” organic synthesis. The chemical structures of synthesized compounds were confirmed by IR, 1HNMR, 13CNMR and mass Spectroscopic methods. The characterization of catalyst was evaluated by XRD, TEM and SEM techniques.

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OP-70

Silver Nanoparticle Surface Plasmon Resonance (SPR) based Optical Fiber Probe for Soil Ammonium Ion Sensing

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Abstract

Ammonium ion is a significant source of nitrogen for many plant species, particularly those growing on hypoxic soils. Though, it is also toxic to most crop species and is rarely applied as exclusive nitrogen source. It is well known that ammonium ion is generally sensed using different methods like ion selective electrodes, field effect transistors, spectrophotometric methods, potentiometric measurements, fluorescence detection methods, etc. Currently surface plasmon resonance (SPR) is gaining a lot of importance because it makes a low-cost, miniature and portable device [1]. It is observed in various applications in the fields like chemical sensing, bio-imaging, environmental monitoring, glucose monitoring, medical diagnostics, disease detection and telemedicine [2]. Also optical fiber sensing is gaining popularity because it offers following advantages over other methods like high sensitivity, electrical and chemical passive nature and immunity from electromagnetic interference [3]. In our work, we are proposing a modified optical fiber sensor for soil ammonium ion detection using polyvinylpyrrolidone (PVP) capped silver nanoparticles. Due to their structure and surface chemistry, PVP capped silver nanoparticles are reported to have excellent selectivity for detecting ammonium ions. They tend to form Ag (NH3)2+ complexes with ammonium ions. Positive ammonium ion forms bonds with negative vinyl chain capping of PVP on silver nanoparticle surface which causes aggregation of silver nanoparticles leading to changes in the SPR absorption peak that are used for detection of ammonium (NH3+) ions. Ammonium ion was chemically extracted from soil. For portable sensing, a home built optical fiber sensor system was developed. Optical fiber cladding was modified with PVP capped silver nanoparticles according to the standard practice. The results of optical fiber sensor were compared with the UV-Visible spectrometry data. At the end the developed sensor probe was found to be convenient for in-situ sensing with good selectivity and detection range. X-Ray Diffraction (XRD) was used for studying the crystal structure of synthesized nanoparticles. Zeta potential was recorded for observing PVP capping and studying surface charge. Fourier Transform Infrared Spectroscopy (FTIR) showed the presence of various functional groups and UV-Visible spectroscopy was used for monitoring the SPR absorption spectrum. Ion chromatography was used for measuring ammonium ion concentration in extracted soil samples. Ammonium ion sensing was studied using UV-Visible spectroscopy and the optical fiber sensor. Detection limit is 100 ppm for UV-Visible

spectroscopy. These changes can also be tracked by the naked eye. Competing ions interference ability was tested. Also, soil samples were tested using the material. Probe sensing response was studied for varying concentration of ammonium ions on red, blue and green LEDs (RGB). The sensor exhibited a good linear relationship between observed voltage and varying ammonium ion concentration in the range of 5.4 mM to 13.4 M and sensitivity is 133 mV/M.

OP-71

AC Conductivity and Magneto electric properties of $(Y)Li_{0.5}Ni_{0.5}Zn_{0.05}Fe_2O_4 + (1-Y)Ba_{0.5}Sr_{0.5}TiO_3$ Magneto electric composites

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Abstract

Ceramic method is used to synthesis $(Y)Li_{0.5}Ni_{0.5}Zn_{0.05}Fe_2O_4$+ (1-Y) $Ba_{0.5}Sr_{0.5}TiO_3$ magneto electric composites. The XRD patterns shows that, all composites with the increase in Ferrite content, lattice constant increases. In all the composites dielectric constant is maximum at 100Hz. Composites resistivity decreases with increase in temperature, shows Semiconducting behavior.

Keywords: Li,Ni,Dielectric constant, XRD

OP-72

Studies on complex optical behavior of MgO nanoparticles on Polyaniline

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Abstract

The Conducting polymer pani and Pani/MgO nanocomposites were synthesized by chemical Oxidative method at 5°c temperature. Optical band gap of chemically synthesized pani and Pani/MgO nanocomposites at different weight percentages of MgO have been studied at room temperature and normal pressure. Optical energy band gap of these materials are determined using absorption spectra in the wavelength range 200 to 800nm by UV/Vis Spectrometer. The peak in absorbance spectra for nanocomposites of different weight percentages are 250nm and 286nm. The absorbance peak appeared at 286nm in all the nanocomposites confirmed the formation of pani and it is also the characteristic peak of pani. The optical band gap energy 4.45eV is obtained for the nanocomposites. The optical properties of this conducting polymer make them a suitable application in field of optoelectronic devices.

Keywords: Conducting polymer,Absorption,optical band gap,optoelectronics and Pani/MgO.

OP-73

One-pot Three-Component Synthesis of Biologically Active Structurally Diverse Functionalized Thiazolidinones

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Abstract

A simple, efficient and facile synthesis of 3-benzimidazolyl-2-aryl thiazolidinones derivatives via one-pot three-component reaction using environmentally benign choline chloride-based deep eutectic solvent (DES) is reported. Easy work-up, rapid, excellent yield of the desired products are the remarkable features of this methodology. The eutectic solvent acts as a catalyst as well as reaction media and recyclable up to five times without loss in its catalytic ability. Superparamagnetic MNP-Fe_3O_4 nanoparticles in deep eutectic solvent were also explored for the synthesis of various heterocyclic moieties.

Keywords: Choline Chloride, Multicomponent reaction, Thiazolidinones, Thioglycolic acid, MNP- Fe_3O_4

OP-74

EFFECT OF CU DOPING ON THE PROPERTIES OF ELECTRODEPOSITED ZNTE THIN FILM

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Abstract

The II-VI compound ZnTe is considered as a potential candidate for applications in the field of solar cells due their appropriate optoelectronics properties. The conductivity of the doped ZnTe is p-type due to self doping by intrinsic defects (Zn vacancies). The conductivity can further be enhanced through doping with substitutional acceptors of group I or V group elements. Previous investigations showed that Cu is a suitable dopant for several applications because it produces a relatively shallow acceptor defect. Cu-doped ZnTe is used as a buffer layer or multijunction to CdTe in the CdS/CdTe solar cell to improve performance of solar cell devices and harvesting more solar spectrum. Cu:ZnTe thin films have been synthesized using an electrodeposition process from an acidic aqueous solution by potentiostatic conditions on FTO substrates. The reaction mechanism has been studied by cyclic voltammetry with scan rate 5 mV sec−1 to identify the deposition potential. ZnTe thin films electrodeposited at -0.9 V with respect to Ag/AgCl reference electrode. As deposited films are close to the stoichiometric composition. The band gap energy of ZnTe thin films is observed at 2.25eV by Vis– UV spectroscopy. X-ray diffraction, Raman spectra as well as SEM techniques have been employed to investigate the structure and surface morphology of as-deposited and annealed films. As-deposited ZnTe layer has cubic structure with (111) preferential orientation. Globular surface morphology was observed from SEM micrograph. Zn-rich layer are grown at growth potential -0.9V.The carrier concentration, p-type conductivity suitable to produce ohmic contact to CdTe was found to improved upon Cu-doping.

Keywords: Zinc Telluride, Thin film, Electrodeposition, Back Contact.

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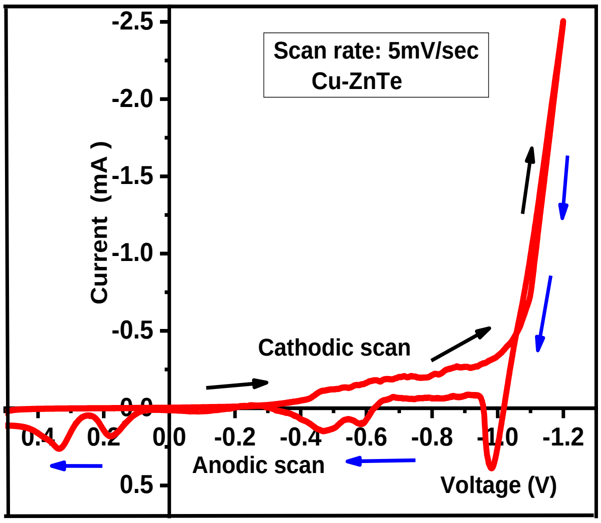
Graphical abstract:



OP-75

X-ray mass attenuation coefficient of biological produced Cu nanoparticles in the energy region (17.781 keV to 44.216 keV)

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Abstract

The accurate value of X-ray/γ-rays mass attenuation in various different materials are necessary in different fields, like biological, medical, agricultural, environmental and industrial field, the parameter mass attenuation coefficient (symbolical indicated as μ/ρ) is important in determining the radiation parameters like effective atomic number, mass energy absorption coefficient, total electronic cross section, total atomic cross section, molecular cross section, X-ray fluorescence, etc. The knowledge of physical parameter such as mass attenuation coefficient of X-ray/photon (μ/ρ in cm2/g) is useful in understanding physical properties of any elements and materials in compounds form, for characterizing the sample. In this context by employing non destructive technique the X-ray mass attenuation coefficients of biological produced nanoparticles was measured. Using variable energy source Am241, characteristic X-rays or photons of low energy (17.781, 22.581, 32.890 are and 44.216 keV) were produced, and these photon energy was used in experimental process, for interaction with the pellet biologically produced copper nanoparticles, than incident and transmitted photons are received by NaI(Tl) scintillation detector, A bicron-made integrated assembly of 25mm dia x 4 mm thick NaI(Tl) scintillation crystal mounted on a photomultiplier tube (PMT) served as the x-ray detector. Oxford model PCAP plus PC plug-in single PCI card had on board high voltage supply, pre-amplifier, amplifier, and 1k ADC. The components on the card were individually controlled and used as 1k channel MCA using the software package OXWIN MCA, here sample from four different manufacturers were collected for present study and results are compared with the calculated values which were obtained by the WinXcom software program. From obtained results it is revealed that the varying percentage difference (PD) between experimental and theoretically calculated values corresponds to amount of bioenhancers incorporated in study sample during preparation process, the variation in PD here reflects the change in quality of sample from one manufacture to other manufacturer.

OP-76

Structural, morphological and dielectric evaluation of Co2+ doped zinc ferrite aluminate

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Abstract

Cobalt substituted zinc ferrite aluminate with composition Zn1-xCoxFeAlO_4 (x =0.0, 0.2, 0.4, and 0.6) was prepared by chemical sol–gel synthesis. The prepared samples were characterized by X-Ray diffraction (XRD), Transmission electron microscope (TEM) technique. The cubic spinel single phase was confirmed from X-ray and selected area electron diffraction (SAED) pattern. The true values of lattice constant were obtained from Nelson–Riley extrapolation plot and lattice strain also conformed with the help of Williamsons-Hall equation. The TEM image confirmed average crystallite size of 31nm. The dielectric study confirms dielectric constant and loss tangent decreases with the increasing frequency of applied field.

OP-77

LOW TEMPERATURE SINTERED NiCoZn FERRITE FOR INTEGRATED MANGETIC DEVICES IN LTCC

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Abstract

The magnetic devices such as inductors, transformers are the least space-efficient passive components. The technology that offers high possibility of integration are low temperature co-fired ceramic (LTCC), which has prompted studies into soft ferrite material with high permeability operating at increasingly higher frequencies. In this work, NiCoZn ferrite powders were obtained by combustion synthesis method with neutral precursor solution with aim of using it with LTCC technology. The synthesized powders were characterized using x-ray diffraction (XRD) and vibrating sample magnetometer (VSM) in order to study their structural and magnetic properties. The formation of single phase spinel structure was confirmed by XRD. The VSM result shows coercivity, saturation magnetization and remanent magnetization close to ~80 Oe, ~72 emu/g and ~5 emu/g respectively. Both properties augurs well for magnetic device applications. The integration of synthesized ferrite material in LTCC requires matching sintering temperatures (~ 900oC) of ferrite and LTCC. Experiments are also carried out to optimize glass percentage and sintering temperature so as to achieve high dense NiCoZn ferrite pellets suitable for use in LTCC process. The pellets were made with a glass Bi2O3-B2O3-SiO2-ZnO (BBSZ) with optimum sintering aid content of 2 wt %. The microstructure of the sintered samples was dense with sintered density of 87% occurred at 900oC sintering temperature. The shrinkage of ferrite pellets were comparable with that of LTCC shrinkage. The sintered ferrite pellets exhibit permeability in the range 10 and bulk resistivity in the range ~1011 Ω.cm. All magneto-structural properties and the ability to sinter at 900oC provides the synthesized ferrite material a promising candidate for low-temperature cofired ceramic technology.

Keywords: LTCC, NiCoZn ferrite, combustion synthesis, embedded magnetic devices

OP-78

Complete micro-structural analysis and elastic properties of Sm3+ doped Ni-Mn-Zn mixed spinel ferrite nanoparticles

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Abstract

A series of Ni-Mn-Zn mixed spinel ferrite doped with Sm3+ ions was prepared by using sol-gel auto-combustion technique. Structure of the samples was characterized by using X-ray diffraction (XRD) technique and Infrared spectra (IR). Single phase cubic spinel structure of all the samples was confirmed by using XRD analysis. Williamson – Hall (W-H) and strain size plot (SSP) methods were employed for the complete microstructural analysis of the samples. Incorporation of Sm3+ ions in Ni-Mn-Zn-Fe-O crystal lattice increases the lattice parameter from 8.4105 to 8.4134 Å. W-H and SSP analysis confirms the tensile type strain induced in the crystal lattice which increases with the addition of Sm3+ ions. Average crystallite size estimated from Scherrer equation is found in the range 21.7 to 24.9 nm which in good agreement with the results obtained from W-H and SSP analysis. Specific surface area decreases from 58.9 to 55.1 m2/gm with the increasing concentration of Sm3+ ions. Infrared spectra recorded in the wavenumber range 350 to 800 cm-1 reveals the characteristic features of spinel ferrites. Higher frequency band n1 is observed near 580 cm-1 and lower frequency band n2 is observed near 380 cm-1. By using the IR data, elastic constant (stiffness constant) and elastic moduli (Young's modulus, bulk modulus and rigidity modulus) were evaluated. Debye temperature obtained from Anderson formula ranging from 535 to 562 K and from Waldron equation ranging from 676 to 713 K with the substitution of Sm3+ ions.

Keywords: Sol-gel technique, W-H analysis, strain-size plots, elastic properties, Debye temperature.

OP-79

CATALYTIC ACTIVITY OF POLYETHYLENE GLYCOLS ON OXIDATION OF BIOMOLECULES UNDER CONVENTIONAL AND NON CONVENTIONAL CONDITIONS

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Abstract

Catalytic activity of Polyethylene glycols on oxidation of Xanthine alkaloids have been studied with various one and two electron oxidizing agents. The reaction is too sluggish in solution phase, but moderately fast in presence of Polyethylene glycols. However, the reactions are dramatically enhanced under microwave irradiations. Present protocol has several advantages, such as solvent-free conditions, during work-up, fast reaction times, high yields, eco-friendly operational and experimental simplicity, readily available additives as catalysts. Dramatic rate accelerations followed by an increase in the product yield were observed in all these reactions encouraged by the striking features and applications of Polyethylene glycols. Microwave irradiation in chemical processes and organic synthesis, coupled with zeal to employ atom economy eco-friendly reagents, proposes to take up oxidation of certain biologically important compounds such as xanthine(XAN) & derivatives of Xanthine alkaloids, using commonly available laboratory desktop eco friendly reagents such as Hydrogen peroxide(H_2O_2), Tetra Butyl Hydrogen Peroxide(TBHP), Potassium peroxy disulfate($K_2S_2O_8$), Potassium peroxy diphosphate($K_4P_2O_8$), Sodium perborate($NaBO_4$), Potassium periodate(KIO_4), Pyridinium chloro chromate(PCC) and Quinolonium chloro chromate (QCC). The proposed work is taken up in different stages (a) to conduct the reactions under and microwave conditions to save energy (b) to conduct the reactions in a mortar by grinding with a pestle under solvent-free conditions or by using microwave irradiation under solid phase conditions.

OP-80

Structural analysis of nickel cobaltite prepared via low temperature auto combustion method

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Abstract

In this work, we have synthesized nickel cobaltite nanoparticles by low-temperature sol-gel auto combustion method. The Synthesized sample of nickel cobaltite powder is annealed at 360° C for 5h. Further the detailed study of the structural parameter has been performed in this work. X-ray diffraction patterns of the prepared sample confirm the formation of the single phase cubic structure with space group Fd3m. The average particle size has been calculated by the Debye Scherrer formula, modified Debye Scherrer formula, and Williamson - Hall isotropic strain (W-H-ISM) model and found the particle size using the above three methods was founded to be13.55 nm, 15.06 nm, and 46.06 nm, respectively. The observed variation in size seems to be due to dislocation and anisotropic nature of nickel cobaltite. In continuation the least square method (W-H-ISM) gives more accurate results in estimating the crystalline size.

Keywords: cobaltites, x-ray, sol-gel auto combustion, synthasis, nanoparticles.

OP-81

Structural study of $Co_2(NiCu)O_4$:Green Synthesis Approach

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Abstract

Synthesis process of nano particle induced a great impact on the physical and chemical properties of the material. Green synthesis of metal oxide nano particle is emerging technique as it uses plant extract as a source of precursor material. In this study, we have prepared copper doped nickel cobaltite nanoparticles by environment-friendly green synthesis process using extract of aloe vera leaves. Calcination of the prepared sample of nickel copper cobaltite, $Co_2(NiCu)O_4$, performed at 360°C for 6h. The annealed powder is studied by the X- ray diffraction (XRD) technique at room temperature. The XRD pattern of diffraction peak confirms the formation of $Co_2(NiCu)O_4$ which is well crystalline and having a cubic spinel structure with space group Fd3m. There is no secondary impurity phase observed in the synthesized sample. The crystalline size, lattice strain and dislocation density of the synthesized sample have been estimated by three different approaches Debye Scherrer equation, modified Scherrer equation and Williamson – Hall model. The estimation in the crystalline size clearly indicates that the least square fitting method is more accurate in the determination of the average crystalline size.

Keywords: synthesis, X-ray, green synthesis, spinel, nanoparticles.

OP-82

SYNTHESIS, CHARACTERIZATION AND SENSOR STUDIES OF POLYVINYL ALCOHOL/CdO NANOCOMPOSITES

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Abstract

Cadmium oxide nanocomposites were synthesized by using Low Solution Heat Combustion method. The Polyvinyl alcohol/Cadmium oxide nanocomposites were prepared by solution casting technique. The prepared samples were characterized by X-ray diffraction and Fourier Transform Infrared Spectroscopy. The crystallite size of these nanoparticles is found to be 19nm.The FTIR spectra of nano CdO show peaks at 460cm-1,541cm-1 and 1105cm-1 which corresponds to metallic stretch. The dynamic gas response of PVA/1% CdO and PVA/4% CdO nanocomposites for 100 ppm of NO_2 at room temperature is found to be 15.66% and 4.41% respectively. The PVA/1% CdO nanocomposite film shows high response towards 100 ppm of NO_2 than NH_3 and H_2S gases.

OP-83

SYNTHESIS AND CHARACTERIZATION OF CuO NANO MATERIALS AND ITS ANTIBACTERIAL ACTIVITY

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Abstract

Nanotechnology and Nano related technology is the study of manipulating material on an atomic and molecular scale. Synthesis of Nanomaterials possess unique characteristics such as miniature particle sizes with a close particle size distribution properties and pose as a highly dispersed and non-agglomerative mass. The typical blend and diverse characteristics of these particles prove to be of added advantage in typical applications such as medical and pharmaceutical treatments for bacterial infections. This paper describes the detailed process of synthesizing Copper Oxide Nanoparticles all the way through the sol-gel formulation route technique. The morphology and microstructure of prepared CuO Nanoparticles were well understood by Scanning Electron Microscopy (SEM), Surface area and pore volume of synthesized CuO nanomaterials were be studied by Brunauer-Emmett-Teller (BET) analysis. The Crystal structure and chemical properties of prepared CuO nanomaterials were studied by using X-Ray Diffraction (XRD). The oxides of synthesized CuO nanomaterials is done through X-Ray Fluorescence (XRF) techniques. The synthesized CuO nanomaterials were tested against gram +ve and gram –ve bacteria. Synthesized Copper oxide nanoparticles exhibited good anti bacterial results on E.coli, Staphylococcus aureus, and Pseudomonas aeruginosa.

Keywords: CuO Nano Materials, antibacterial agent, Sol-Gel method, X-Ray Diffraction, X-Ray Fluorescence, Scanning Electron Microscopy, BET (Brunauer-Emmett-Teller).

OP-84

Influence of calcium phosphate nano fertilizer over the conventional fertilizer

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Abstract

The expansion of global population and the inflammation of in global food demand has use of fertilizer in the agricultural field is important for the plant growth, but more amount of pure chemical contents used to a serious problem to all leaving beings as well as the environment. The problem is reduced to chemical exposure, the use of nano fertilizer or calcium phosphate fertilizers becomes essential. Calcium phosphate powered nano fertilizer synthesized by using coprecipitation method with the help of various chemical by balancing the PH of calcium phosphate Nano-fertilizer. Powdered calcium phosphate nanoparticles are characterized by UV spectroscopy and FTIR. UV Vis spectroscopy shows the maximum absorption at 0.448 and 0.268 and the bandgap was 3.69 and 3.87 FTIR spectrum shows PO4 bond at the range 1035.59 and 1074.16ev Calcium phosphate Nano-fertilizer increased growth rate of the plant. This study may prove that calcium phosphate nano fertilizer had a significant positive influence on slow release and improve efficiency.

Keywords: Nano-fertilizer, Calcium Phosphate, UV spectroscopy, FTIR, etc.

OP-85

SYNTHESIS AND LPG SENSING CHARACTERIZATION OF TiO_2 DOPED MoO_3 NANOCRYSTALLINE THIN FILMS.

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Abstract

The synthesis and liquefied petroleum gas (LPG) sensing characteristics of pure MoO_3 and TiO_2 doped molybdenum trioxide nanocomposite thin films were studied. The thin films were

as a dopant in the functional material MoO_3 at 02:01 N concentration. The effects of dopant TiO2 on the surface morphology, grain size, structural, electrical and gas sensing properties of MoO3 thin films were investigated. LPG gas sensing properties of thin films were also studied at 50°C to 350°C towards different concentration. Maximum gas response recorded to TiO2 doped MoO3 nanocomposite thin films. Gas response of TiO_2 doped MoO3 nanocrystalline thin film reached the maximum value of 65.30% when it exposed to 100 ppm of LPG at 50°C temperature.Response and recovery time were reported low to TiO_2 doped MoO_3 thin films.

Keywords: LPG, spray pyrolysis technique, sensitivity, thim films.

OP-86

The Effect of ZnO Nanorods on Seed Germination and Seedling Growth of Mung Bean

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Abstract

Nowadays due to increasing population, agriculture field is stepping back to provide food because of environmental condition, diseases and less % of seed germination. Pre-sowing treatment was used to enhance seed germination % with respect to rate of germination and uniformity at favorable and unfavorable environmental conditions, it resulted into improving seedling growth and better crop establishment. Zinc (Zn) as a micronutrient is highly important in plant growth and development, it influences the seed viability and radical boost for seed germination, it increases the capacity of water uptake transport and reduces the bad effects of heat, drought or salt stresses. The enzymes responsible for synthesis of some protein are activated with help of Zn. It is also used in chlorophyll formation and carbohydrates, in conversion of starches into sugar. It also plays an important role in the production of auxins and gibberellins which act as plant growth promoters. In the present study we have shown the effects of synthesized ZnO nanorods (NRs) on the seed germination rate, root and shoot elongation, root numbers, biomass of seedling and chlorophyll content of Vigna radiata (mung bean) seeds were investigated. The NRs of ZnO were synthesized by physical method (top-down method) and characterized by scanning electron microscope and X-ray diffraction to investigate structural and morphological properties. The sizes of ZnO NRs are found to be 25 to 50 nm. The seed germination experiment was carried out with five concentrations from 0 to 400 ppm. (400 mg/L). The results of seed germination were taken on 7th, 14th and 21st days, it showed that application of ZnO significantly stimulate germination rate and seedling growth at certain concentration compared with control. The highest germination rate of seeds on 7th day was observed in 100 and 200 ppm ZnO NRs treatments i.e. 100 %, root elongation is highest in 200 ppm i.e. 8.94 cm compared with control i.e. 4.26 cm. Chlorophyll content in pre-treated seeds is increased as compared to untreated seeds. Therefore applying ZnO NRs in suitable concentration is useful for 100 % germination of Vigna radiata and seedling growth, with rich content of nutritious values.

OP-87

THE USE OF POLYVINYLPYRROLIDONE AS A POTENTIAL FLUOROPHORE FOR ENSING EXPLOSIVES

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Abstract

Detection of explosives is one of the major issues faced in global security and to date remains a challenge even though there are materials designed for them detection. The use of polyvinylpyrrolidone (PVP), a non-conjugated conducting polymer, as a possible fluorophore for sensing nitroaromatics is studied. The stimuli - response of fluorescence of PVP on contact with energetic nitroaromatics was investigated. The fluorescence quenching study was carried out addition of different concentrations of quenchers to PVP solution. The maximum emission peak intensity was observed aroud 420nm. UV-Visible and FT-IR studies were also carried out to understand the nature of interaction taking place between the quenchers and PVP. The limit of detection for picric acid was found to be 1.73*10 -3 M -1, for dinitrobenzene was found to be 5.0*10 -4 M.

OP-88

Enhanced Characteristics of Ammonia Sensing at Ambient Temperature by Plasma Polymerized Thiophene

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Abstract

Ammonia is one of the most commonly used chemicals in manufacturing industry. Around 80% of ammonia is used for soil fertilizers and 20% is manufactured for pharmaceuticals, cleaning products, explosives, and refrigeration. Given the common use and harmful effects on human body and environment, need of enhanced NH3 sensing materials and sensors is underlined. In present study, we have explored possibility of Plasma Polymerized Thiophene (PPTh) as NH3 sensors, studied temperature stability of these thin films and degradation after exposure to open air for period of 60 days. Polymers synthesized through plasma polymerization differ in structural and electrical properties from that of chemically polymerized polymers. Thin films were fabricated using Plasma Polymerization of Thiophene monomer vapors at room temperature. Glass substrate was chosen as it does not chemically react with deposited materials or exposed gases and it is stable at higher temperatures. Distance between the electrodes of Plasma Polymerization system was kept constant at 8cm, optimized from previous experiments. Pulsed plasma was used for polymerization instead of continuous plasma. Variation in duty cycle was employed to fabricate number of samples. PPTh films were then doped with Iodine to their saturation to enhance conductivity of PPTh. These samples then studied to find optimized parameters for maximizing conductivity and sensing response of PPTh films. Roughness and thickness measurements of thin films were done by LASER microscope. Scanning electron microscope was used for morphological studies of PPTh films. Orientation of the functional group and elemental analysis was studied by FTIR spectroscopy. Keithley 2400 sourcemeter and four probe based homemade gas sensing system was used to record conductivity measurement of PPTh films at room temperature in air and in presence of gas. Commonly used volatile compounds in manufacturing industry like Ammonia, Acetone, Benzene, Toluene, Dichloromethane were studied for their sensing response to PPTh thin films. Temperature stability studies were done for temperatures ranging between 30°C to 70°C with 5°C step. Film degradation study was carried out over the period of 60 days. It was observed that Iodine doped Plasma Polymerized Thiophene thin films have sensitivity of ~1200 for Ammonia vapors at ambient temperature. While response time for Ammonia was ~400sec, recovery time was recorded below ~20sec. Number of cycles were recorded to check repeatability of the material. PPTh films were found to be highly stable for any temperature

changes in the surrounding environment. Degradation studies showed minor changes in sensitivity after 5 days of exposure to air in 60-day study making them durable for longer period of time. Iodine doped PPTh films showed negligible sensitivity towards other volatile compounds under study. Highest sensitivity among other volatile compounds was recorded at ~60 for Acetone making PPTh thin films highly selective for Ammonia sensing.

OP-89

Investigations on ferroelectric and dielectric studies of pure and doped $BiFeO_3$ perovskite ceramics

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Abstract

The perovskite $BiFeO_3$, Zn substituted $BiFeO_3$ (doping concentrations of 0.05, 0.1, 0.15, 0.2) and Ni substituted $BiFeO_3$ (doping concentrations of 0.05, 0.1, 0.15) ceramics were synthesised by a novel solution combustion method (SCM). The structural investigations were carried out using X-ray diffraction (XRD). The XRD pattern reveals that, the pure $BiFeO_3$, Zn substituted $BiFeO_3$ and Ni substituted $BiFeO_3$ ceramics crystallizes in a single-phase rhombohedral perovskite structure. The surface morphology of pure $BiFeO_3$ and Zn, Ni substituted $BiFeO_3$ samples were observed by scanning electron microscope (SEM). The ferroelectric P-E measurements were carried out for pure $BiFeO_3$ and Zn, Ni substituted $BiFeO_3$ depicts the unsaturated behaviour of the hysteresis loop which indicates the partial reversal of polarization at room temperature. A dielectric constant with temperature measurements were recorded at different frequencies for pure $BiFeO_3$ ceramic presents an anomaly around 490°C. The dielectric studies of samples $BiFe_{1-x}Zn_xO_3$ (x = 0.05 – 0.2) represents an anomaly between 410 – 470°C and $BiFe_{1-x}Ni_xO_3$ (x= 0.1, 0.15) samples reveals an apparent dielectric anomaly between 390 - 425 °C. These dielectric anomalies prove an antiferromagnetic to paramagnetic phase transition (T_N) of bismuth ferrite.

Keywords: Pure and doped $BiFeO_3$, Solution combustion method, Characterizations, Ferroelectric and dielectric studies

OP-90

Optical, Structural, Morphological and Photocatalytic study of Wurtzite ZnSe using Hydrothermal Method

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Abstract:

In the present study, we have reported the efficient synthesis of Zinc-selenide (ZnSe) micro particles by hydrothermal route and the Wurtzite phase structure of the synthesized material were confirmed by X-ray diffraction (XRD). The microstructural information has been obtained by Scanning Electron Microscopy (SEM) images which exhibit microscale dimensions of synthesized ZnSe. The UV-VIS spectra exhibit blue shifts in the samples. The photocatalytic degradation efficiency and rate constant have been determined and confirmed to the excellent potential photocatalytic behavior of the ZnSe particles.

Keywords: Synthesis, Hydrothermal method, ZnSe, Optical properties, Dyes, Photodegradation.

OP-91

Studies on growth and characterization of spray deposited NiO thin films

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Abstract

Nanostructured nickel oxide (NiO) thin films have been spray deposited using nickel nitrate hexahydrate precursor at different substrate temperatures. The influence of substrate temperature on various physical properties has been studied. X-ray diffraction study reveals polycrystalline nature of NiO thin films with face centred cubic crystal structure. The crystalline sizes are found to be in the range of 23-27 nm depending on the substrate temperature. The scanning electron microscopy results show that the films are porous. The optical study reveals direct allowed type transition with bandgap energies in the range of 3.42-3.65 eV. The structural, morphological and optical properties of NiO thin films suggest that these films can be utilised in various device applications.

Keywords: NiO thin films, X-ray Diffraction, SEM, UV-Vis Spectroscopy.

OP-92

Impact of praseodymium (Pr3+) ion on the structural and magnetic properties of Co-Ni ferrite synthesized by sol-gel auto-combustion route

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Abstract

Rare earth Pr3+ substituted Co-Ni nanocrystalline ferrite having a chemical formula Co0.6Ni0.4Fe2-xPrxO4 (x = 0, 0.025, 0.050, 0.075, 0.1) was prepared via the sol-gel auto-combustion technique. The as-prepared powders were sintered at 500°C for 4 h in air. The sintering temperature of the samples were confirmed by the thermogravimetric with differential scanning calorimetry. The multiphase spinel ferrite of Pr-substituted Co-Ni ferrite was analysed by X-ray diffractometry. The lattice constant is increased with doping of Pr3+ in Cobalt-Nickel ferrites. The value of crystallite size lies within the range of 25-20 nm which confirms the nanocrystalline nature of the samples. The transmission electron microscopy and scanning electron microscopy were used to study the morphology of the samples. The composition of different elements present in the sample was investigated by energy dispersive spectroscopy, which showed the presence of all elements in good stoichiometry proportion. The tetrahedral and octahedral band positions were determined by infrared spectroscopy, which confirms the formation of spinel phase and supports the X-ray diffraction study. The substitution of Pr3+ strongly influences the magnetic parameters which were confirmed from the magnetization measurements examined by vibrating sample magnetometer (VSM). The saturation magnetizations are decreased with increasing the Pr3+ ions.

Keywords: Thermal decomposition, Structural properties, Cation distribution, Surface morphology, Saturation magnetization, Sol-gel method.

OP-93

Characterisation and Dielectrics study of nanosized BaTiO3 Synthesis By Sol-gel Method.

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Abstract

Nanosized BaTiO3 material was synthesized by sol-gel method. The crystallization temperature of the material was conformed from TG/ DTA analysis. The Rietveld refined XRD and The FTIR used to characterised synthesized material. The tetragonal phase with the lattice parameters: a = b = 3.9956Å, c = 4.0266Å and space group P4mm was conformed. The tetragonality ratio (c/a) was found to be 1.008 which is less than single crystal. The particle size was calculated by using the XRD data and TEM images and it was found to be 70 nm approximately. Dielectric Property of sample with temperature and frequency were also studied.

OP-94

"Influence of Boron Doping on Optical & Electrical Properties of Zinc Oxide Thin Films Deposited By Spray CVD Technique"

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Abstract

The doping of Boron by facile, novel, newly fabricated spray CVD technique offers an ideal system to explore the effect of dopants into ZnO matrix. It yields highly transparent, conductive and quality films as the deposition process is analogous to aerosol assisted chemical vapor deposition rather than droplet deposition by spray pyrolysis technique. The properties of these thin films are governed by the additives of Boric Acid in non-aqueous solution of Zinc Acetate as a starting material. The influence of doping concentration in the range of 0.2 at% to 1 at% in steps of 0.2 on the crystalline structure and orientation of ZnO thin films have been investigated by X- ray diffraction (XRD) technique. The surface morphology and topography of these films have been characterized by FESEM and AFM techniques. The result of this study is to provide insight into the transition of triangular shaped pyramidal morphology of undoped ZnO to nanospherical, nanobeads shaped morphology whose role is played by Boron dopants into ZnO lattice. Optical transmittance measured using a double-beam spectrophotometer reveals that the average optical transmittance of films increases with doping concentration showing maximum transparency for 0.8at% doping concentration (≈90%). The transmittance curve indicates interference fringe pattern between the wave fronts generated at the two interfaces (air and substrate). The extinction coefficient of the films is nearly equal to zero which suggests there is no absorption of light at grain boundary. Boron doping results blue shifted optical band gap. The deteriorated crystallinity by addition of Boron may cause the blue shift in optical band gap. Nevertheless, refractive index and absorption edge of the ZnO films are similar to that of single crystal ZnO. The electrical studies established that 0.8 at% of B doping was the optimum for enhancing electrical conduction in ZnO thin films showing minimum resistivity and beyond that the distortion caused in the lattice which results to lower the conductivity.

OP-95

Structural and Morphological Study of Lanthanum doped BaNd2Ti3O10

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Abstract

It is well known that the dielectric materials are having high quality factor, high dielectric constant, low dielectric loss and small temperature coefficient of resonant frequency. Considering the hazardous nature of lead-based ceramics many research groups has paid great attention to the research on non-lead-based perovskite ceramic. Here the material $BaNd_2Ti_3O_{10}$ was synthesized by solid state reaction method which is low cost and easy. The X-ray diffraction (XRD) technique was used for structural study of sample. The XRD data confirm its orthorhombic crystal structure and SEM picture gives grain size less than 2 μm. The dielectric measurement gives temperature independency in the range from room temperature to 523 K. Measurement complex impedance gives double hemisphere indicating separate grain and grain-boundary contributions and is well resolved at higher temperature.

Keywords: Dielectric materials, quality factor, perovskite ceramic, complex impedance, grain-boundary etc.

OP-96

Photoluminescence properties of $Ca_4Al_{14}O_{25}$:Dy3+ phosphor for solid state lighting

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Abstract:

$Ca_4Al_{14}O_{25}$:Dy3+ phosphor was synthesized by combustion synthesis. Photoluminescence (PL) characterization employed to characterize their luminescent properties. Under ultraviolet excitation with a wavelength of 347 nm, phosphor shows blue and yellow emission, which were probably attributed to the transitions from 4F9/2 excited state to 6H15/2 and 6H13/2 ground states of Dy3+ ions. When the yellow emission is stronger than that of blue emission and dominant in the PL spectrum then the Dy3+ is at low symmetry local site. Concentration quenching was observed at o.5 mole percentage. The photoluminescence results suggest that prepared phosphor might be applicable in solid state lighting.

PA-01

Structural and electrically induced polarization properties of multiferroic $CoCr_2O_4$ nanoparticles

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Abstract

We report the room temperature electrically induced polarization behavior of multiferroic $CoCr_2O_4$ nanoparticles. In this solid-solution unfilled d-block elements (Co, Cr) exhibiting a spacious diversity of physical properties. Cr3+ ions are almost always covering octahedral (Oh) site due to their large crystal field stabilization energy ~224.5 kJ mol-1. Nanoparticles/ high surface area of spinel metal oxides based $CoCr_2O_4$ chromites have been successfully synthesized by sol-gel auto combustion technique. Laboratory and Synchrotron based X-ray diffraction (SXRD) analysis confirms the single-phase crystalline nature with space group Fd3m. SXRD based average crystallite size is estimated by Williamson Hall [W-H] and Debye Scherrer's is ~ 17 and 26.62 nm respectively. W-H analyses shows lower crystallite size of nanoparticles, which is attributed due to induced micro strain and this micro strain related to lattice defects in microstructure. Scanning electron micrograph and surface topography confirm the proper agglomeration. Electrically induced polarization study reveals weaker ferroelectricity, which is mainly due to charge reversal in $CoCr_2O_4$ nanoparticles. Observed value of retaining polarization RP ~ 65.4% at 300 K. Henceforth, multiferroic $CoCr_2O_4$ nanoparticles are promising and efficient material for memory applications.

Keywords: Multiferroics $CoCr_2O_4$, SXRD, Surface topography, Electric-Polarization.

PA-02

POLYMER-METAL OXIDE COMPOSITE (PPy-MoO_3) FOR AMMONIA AND ETHANOL GAS SENSOR.

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Abstract

Polypyrrole (PPy)- Molybdenum trioxide (MoO_3) is a polymer-metal oxide composite (99.9% pure) was mixed mechanically with different wt. % in Acetone medium to obtain different PPy- MoO_3 composite material. The thick films of Pure Polypyrrole and PPy-MoO3 polymer-metal oxide composite were prepared by screen printing technique. The prepared mixed composite polymer-metal oxide materials were calcinated at 800oC for 8 h in air. The thick films were investigated to structural, electrical and morphological properties. The surface morphology of the thick films was studied by Scanning Electron Microscope (SEM) shows that the films are granular and porous in nature. The gas response of Pure PPy and PPy- MoO_3 polymer-metal oxide composite thick films was studied for different gases such as ammonia gas (NH3) and Ethanol gas at operating temperature ranging from 70oC to 200°C. The Pure Polypyrrole (PPy) thick film showed the poor response to ammonia and Ethanol gas, while the thick film doped with 20 wt. % MoO_3 gave the good response to ethanol gas (200ppm) at 120°C. The gas selectivity, Sensitivity, stability, gas response and recovery time of the sensor were measured and presented.

Keywords: PPy; MoO_3, screen printing technique, NH3 gas, Ethanol Gas, Gas Response, Selectivity, Stability, Response and Recovery Time.

PA-03

Synthesis, characterization and the effect of concentration optimization of waste tea residue derived carbon dots on the growth of Fenugreek plant.

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Abstract

Water soluble waste tea residue carbon dots (WTR-CDs) were synthesized by pyrolysis of kitchen-derived waste tea residue. Synthesized WTR-CDs were characterized using various techniques such as Transmission electron microscopy (TEM), UV-Visible spectroscopy (UV-Vis), Fluorescence Spectroscopy (FL) and FTIR. Further, the effect of different concentrations of WTR-CDs on fenugreek (FG) (Trigonella foenum-graecum) plant was investigated in hydroponic media and optimized concentration of WTR-CDs. From the study, it was concluded that the 50mg/L concentration of WTR-CDs show optimistic effect on seed germination as well as sprouted seed root length. Water uptake capacity of seeds was measured through Thermal gravimetric analysis (TGA). The uptake of WTR-CDs in FG seeds was examined under UV light and suggested easy absorption of WTR-CDs through seed coat as well as root with water. Therefore, these advantages make waste based and biomass derived WTR-CDs as a strong candidate in the field of agriculture.

Keywords: WTR-CDs, fenugreek plant, seed germination.

PA-04

Electrical and Dielectric studies of the Cd doped Co-Ni ferrites synthesized by solid state reaction method

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Abstract

The present study reports the dielectric and DC resistivity studies of the Cd doped Co-Ni ferrites synthesized by solid state reaction method. The XRD studies confirm the cubic spinel structure of the samples. The substitution of the cadmium in the ferrite system significantly influenced the AC conductivity, involvement of the grain boundary involvement in conduction. The variations of dielectric constant and dielectric loss for all the samples are studied as a function of frequency and shown an increase with doping concentration. The DC resistivity studies confirm the semiconducting nature of the synthesized ferrites. The activation energy is observed to be in the range of (0.534-0.629 eV).

Keywords: Co-Ni ferrites, AC conductivity, Cole-Cole plot, Dielectric constant, DC resistivity.

PA-05

Studies on Optical, Structure and Photoconductivity of Titanium Dioxide Thin Films Prepared by Chemical Bath Deposition Via Aqueous Route

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Abstract

Titanium dioxide (TiO_2) thin films of different concentrations were prepared by using titanium trichloride on conducting FTO glass substrate by Chemical Bath Deposition (CBD) method. The X-ray powder diffraction (XRD) method was used to study the structure of TiO_2 thin film. XRD analysis has confirmed amorphous nature of the TiO_2.The surface morphology of the film was studied using Field Emission Scanning Electron Microscopy (FE-SEM). The optical properties were studied using the UV-VIS and photoluminescence (PL) spectroscopy. The band gap of prepared titanium dioxide (TiO_2) thin film is 2.84 eV. A photo-electrochemical cell analysis shows that the conversion efficiency of 3.24 % with a fill factor of 43 %.

Keywords: Titanium dioxide (TiO_2), CBD, Optical analysis, Photoluminescence, Solar cell.

PA-06

Electrospun Nanofiberous Tin Oxide for High Performance Flexible Supercapacitors

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Abstract

With the rapid growth of portable, lightweight, and even flexible electronics, there is an increasing demand for flexible supercapacitors with admirable electrochemical performance. Here, we report the facial electrospining technique for the synthesis of SnO_2 nanofibers (NFs) based flexible electrode envisaged in energy storage application. The elemental property of SnO_2 was studied by X-ray photoelectron spectroscopy. Whereas, Existence of Sn and O elements in the NFs evidenced by EDAX analysis. The thin and fibrous structure with beads formation type morphology was confirmed through SEM analysis. While, electrochemical properties investigated by using cyclic voltammetry and galvanostatic charge-discharge measurement which are explored a specific capacitance of 218 F/g at 5mV/s scan rate, a specific energy of 43.5 Wh/kg, a specific power of 50 kW/kg tested in 1M NaOH aqueous electrolyte solution.

Keywords: Electrospinning, SnO_2 Nanofibers, SEM, Electrochemical properties.

PA-07

PHOTOLUMINESCENCE OF EU3+ DOPED STRONTIUM-CALCIUM PENTABOROALUMINATE ($Sr_3Ca_3B_5AlO_{15}$) PHOSPHORS

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Abstract

Strontium calcium penta boroaluminate phosphors were prepared via solid state synthesis. The all reagent was unit together to obtain a homogeneous mixture. After for 30 minutes, the precursor mixture was transferred to furnace pre-heated to anneal 500°C for 2 hrs. Then prepared phosphors were again re-annealed at 8000C for 4hrs. Remove the sample from the furnace after slow cooling having white crystalline floppy powder of Eu^{3+} Doped Strontium Calcium Penta Boroaluminate Phosphors. All PL-Spectrum for various concentrations of Strontium-Calcium Penta Boroaluminate phosphor assigned due to the 5D0 à 7F1 and 5D0 à 7F2 transition of Eu^{3+} in red – orange region. The second one, is due to force electric dipole transition, first one occurs due to magnetic dipole transition.In the near future as lighting sources, demand for new material with low energy consumption and Hg free lamps as lighting increasing. The mercury free fluorescent lamp required excitation wavelength other than 254nm. The excitation of Eu^{3+} doped Strontium-Calcium Pentaboroaluminate phosphor is observed at 395nm. The PL emission peak at 596nm and 610nm in the red orange region of the visible spectrum after excitation of 392nm lights. PL emission of 596-610nm is due to the transition of Eu^{3+} located at 395nm. The excitation peak 395nm is near UV excitation and other than that of the conventional mercury excited lamp (254nm). Eu doped Strontium-Calcium Penta Boroaluminate phosphor may be useful for solid state lighting and lamp industry.

Keywords: Photoluminescence, long lasting, phosphorescence, boroaluminate.

References:

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PA-08

Hydrothermal Synthesis of Molybdenum Disulfide as Electrode Material for Supercapacitor Application

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Abstract

In this work, molybdenum disulfide (MoS_2) nanoparticle have been prepared by a simple hydrothermal method, and its properties were characterized by X-ray diffraction (XRD), Scanning electron microscopy (SEM), UV-Visible spectroscopy (UV-Vis), Fourier transform infrared spectroscopic (FT-IR) techniques respectively. The effect of temperature on properties of MoS_2 material was studied. As the temperature increases the crystalline nature of material goes on increasing. The SEM images show agglomerated, inhomogeneous shape and porous nature of MoS_2 material. From the UV-Visible absorption spectra the band gap of optimized MoS_2 material is found to be 1.73 eV. The electrochemical performances of the product were evaluated by cyclic voltammetry. The effect of scan rate on specific capacitance of MoS_2 material was studied. The optimized MoS_2 sample shows maximum specific capacitance 197 F/g.

Keywords: MoS_2, Supercapacitor, Band gap, SEM, XRD, FT-IR.

PA-09

Photoluminescence properties of $Ca_2Al_2O_5$:Sm3+ phosphor for eco- friendly solid state lighting applications

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Abstract

Present paper reports the study on luminescence and optical behaviour of samarium doped calcium aluminate ($Ca_2Al_2O_5$:Sm3+) phosphor for their potentiality in solid state lighting. The conventional combustion method was employed to synthesize the phosphor $Ca_2Al_2O_5$:Sm3+ for 1 mole%. Under an excitation wavelength of 409 nm, the Sm3+ intra-4f transition appears in the emission spectrum including emission peaks located at 520–670 nm. Based on the results, prepared compound $Ca_2Al_2O_5$:Sm3+ phosphors exhibit great potential may be applicable as a LED to enhance the efficiency for solid state lighting.

Keywords: Aluminate, samarium (Sm3+), LED, Solid state lighting.

PA-10

Green Synthesis of ZnO Nanoparticles Using Sugarcane Stem Extracts for LPG Sensing Applications

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Abstract

In contemporary science the green synthesis of nanoparticles have been a keen interest amongst researchers and scientist due to its simplicity, eco-friendliness, non-toxic, inexpensive approach. Thus, in the present work, the synthesis of zinc oxide nanoparticles using sugarcane stem extract was reported. Green synthesized ZnO NPs were examined for its Structural, morphological and optical characteristics by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), and ultraviolet-visible spectroscopy (UV–Vis). X-ray analyses indicate that ZnO NPs show hexagonal crystalline structure with average crystallite size 30 nm. The results showed that ZnO NPs synthesized by sugarcane stem extract. SEM images reveal that particles were found to be of uniform spherical shape and were agglomerated. The optical measurements show that the band gap was 3.15 eV. Synthesized ZnO NPs were investigated for its LPG gas sensing study including operating temperature, response/recovery time and gas uptake capacity. Eventually, we found out that the green synthesis route, to fabricate sensor devices is more advantageous as it is cost-effective, eco-friendly and simple.

Keywords: Green synthesis; ZnO nanoparticles, XRD, UV-Vis, SEM, Gas Sensor.

PA-11

Synthesis of calcium ferrite by inherent source for ethanol sensor

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Abstract

In this work Gas sensing properties of the p-type orthorhombic $CaFe_2O_4$ are demonstrated. $CaFe_2O_4$ were successfully synthesized with natural source of precursors by the milling method. The formation of orthorhombic $CaFe_2O_4$ compound was confirmed by X-ray diffraction, scanning electron microscopy shows agglomerated porous crystalline type morphology. Photoluminescence spectra showed $CaFe_2O_4$ absorbs visible regain at wavelength 584nm. The synthesized $CaFe_2O_4$ compound showed p-type gas sensing behaviour and high gas response towards ethanol 38.4% at 225°C operating temperature at concentration of 120 ppm ethanol gas.

Keywords: Nanostructures, XRD, SEM, PL Gas sensor.

PA-12

Photodegradation of Dye Pollutants on Nanocrystalline Co Doped Li0.5Fe2.5O_4 under UV-Visible Light Irradiation

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Abstract

The Co doped Li0.5Fe2.5O_4 ferrites were successfully prepared by using sol-gel synthetic process. The resulting nanosample has been characterized by using XRD and SEM techniques. The X-Ray diffraction (XRD) analysis studies clearly suggest the formation of single phase nanomaterials. The SEM analysis indicates the formation of uniform and fine grains like morphology in mixed-metal oxides. The results of combustion synthesis elucidate that the fuel to oxidizer ratio is the most effective factor for the formation and surface morphology of mixed-metal oxides. The synthesized Co doped Li0.5Fe2.5O_4 ferrite has been used for the adsorption studies of Methyl orange dye by batch experiments. It is found from the adsorption studies that the removal percentage of Methyl orange is much better. Li0.5Fe2.5O_4 particles are good adsorbent materials for removal of Methyl Orange dyes as compare to the Co doped Li0.5Fe2.5O_4 nanopowder. However, the adsorption capacity of Li0.5Fe2.5O4 can be lower by doping with Cobalt.

Keywords: Sol-gel Chemistry, XRD, SEM, Photodegradation, Magnetic materials.

PA-13

Superhydrophilic and Photocatalytic TiO_2 Coatings on Marble for Self-Cleaning Applications

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Abstract

The application of photocatalytic and self-cleaning titanium dioxide (TiO_2) nanomaterials coating on the stone of architectural heritage (particularly on marble) can be to preserve their aesthetic qualities. The present work describes the effect of dipping time in TiO_2/SiO_2 coating and effect of UV irradiation on coating in term of hydrophilicity. The SiO_2 solution prepared by tetraethylorthosilicate (TEOS) through sol-gel process and 30-50 nm sized TiO_2 Particles added to prepared coating solution. The hydrophilicity increases with increasing dipping time of piece of marble in TiO_2/SiO_2 solution. Also the hydrophilicity of coating increases with increasing UV illumination time. The 2-D and 3-D laser microscope analysis revealed significant changes in surface structure and stable surface roughness of 0.74µm. Such type of superhydrophilic TiO_2/SiO_2 coating on marble may be used to apply architectural heritage and buildings

Keywords: Superhydrophilic, photocatalytic, TiO_2 coating and self-cleaning.

PA-14

PREPARATION OF ZINC FERRITE BY SOLID STATE METHOD AND ITS CHARACTERIZATIONS

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Abstract

The zinc ferrite nano particles were synthesised by a simple and low cost solid state technique. The synthesized powder was pre-sintered at 200°C for 5 h and annealing at different temperatures. The crystal structure, phase purity, optical and morphological analysis studies of synthesised ferrites materiel were investigated by X-ray diffraction (XRD), scanning electron microscopic (SEM), UV-Visible spectroscopy and FT-IR spectroscopic techniques respectively. The X-ray diffraction patterns of all zinc ferrite samples shows the formation of single phase cubic spinel structure. The optical band gap of zinc ferrite was found to be 1.96 eV. The change in morphology of zinc ferrite is observed due to the effect of the annealing temperature.

Keywords: Zinc ferrite; Solid state method, Crystallite size, XRD, SEM, FT-IR.

PA-15

DESIGNE AND STUDY REAL TIME CLOCK WITH TEMPERATURE LOGGER

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Abstract

A simple real time clock with temperature logger. The project shows time, date and real-time temperature on the LCD. The logger records the maximum and minimum temperature for each day and can keep entries for 51 days. The recorded temperatures can be viewed any time together with the dates. The temperature is sensed via single-wire temperature sensor and the maximum and minimum temperatures for each day are stored in EEPROM via I2C protocol. Real-time clock. Serial I 2C-based real-time clock DS1307 provides the current date and real time to be dis- played on the LCD. DS1307 is a low- power, full BCD clock/calendar with 56 bytes of NV SRAM. Address and data are transferred serially through I 2C bi-directional bus. The clock/calendar provides seconds, minutes, hours, day, date, month and year information. The end of the month date is auto- matically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format. A temperature data logger also called temperature monitor is a portable measurement instrument that is capable of autonomously recording temperature over defined period of time. The digital data can be retrieved, viewed and can evaluated after it has been recorded. A data logger is commonly used to monitor shipment in cold chain and to gather temperature data from diverse field condition. Temperature data logger is used in weather station which record maximum and minimum temperature in a day.

PA-16

ONE POT SYNTHESIS OF ZNO NANORODS FOR LPG SENSING APPLICATIONS

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Abstract

In the present work, ZnO nanorods (NR) were grown on glass substrates by using simple one pot chemical bath deposition method. Zinc nitrate hexahydrate (($Zn(NO_3)_2.6H_2O$) was used as source of zinc ion, while hexamethylenetetramine (HMT, $C6H_{12}N_4$) solution served as the complexing agent. Ammonia (NH_4OH) and acetic acid (CH_3COOH) were used to achieve the desired pH value. The structural, morphological and optical properties of ZnO NR were investigated using XRD, SEM and UV analysis respectively. X-ray analyses indicate hexagonal wurtzite type structure. SEM images reveal that uniformly upright standing growth of nanorods on glass substrate. The optical measurements show that the band gap was 3.3 eV. Synthesized ZnO NR substrate were investigated for its LPG gas sensing study including operating temperature, response/recovery time and gas uptake capacity. The ZnO NR based sensor demonstrated lower operating temperature 190°C with gas response of 105 %, with fast response/recovery times 80/70 sec. respectively. While LPG gas uptake capacity remained sensible up to 10,000 ppm.

Keywords: Zinc oxide nanorods, Gas sensors, LPG, Chemical bath deposition method.

PA-17

Magnetic and dielectric properties of nanophase Cu-Co ferrite

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Abstract

Nanocrystalline Cobalt-substituted Cu-ferrites were prepared by Co-precipitation method. X-ray diffraction analysis confirmed that all the samples were cubic in nature. The variation of saturation magnetization was studied as a function of copper content. All the compositions indicate that they are ferromagnetic in nature. The dielectric constant, dielectric loss of all samples were measured at room temperature as a function of frequency. These parameters decrease with increase in frequency for all of the samples. The compositional variation of dielectric constant and d.c. resistivity shows an inverse trend of variation with each other.

Keywords: XRD, TEM, Dielectric permittivity

PA-18

Enhancement in antimicrobial activity with bimetallic nanoparticles as compared with mono metallic nanoparticles

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Abstract

From ayurvedic formulation point of view, bimetallic nanoparticles of CuNi and AgNi were synthesized using a green approach. These bimetallic nanoparticles have biocompatible properties which enhance our interest to carry out pharmacological studies. Formulations were prepared, by tagging these synthesized bimetallic nanoparticles with known antibiotics from a local pharmacy shop. These all formulations were characterized by using UV-Visible and TEM analysis. All These formulation samples were tested for MDR with above bimetallic nanoparticles in Sahyadri hospital isolates. Few of them were shown enhanced inhibition activity against isolates. Additional Photodynamic therapy has been carried with Cu-Ni and Ag-Ni bimetallic nanoparticles and in result, enhanced zones of inhibition was observed against Staphylococcus aureus.

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PA-19

Solar light-driven photocatalytic degradation of MB dye with hydrothermally synthesized Sn_3O_4 nanostructures

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Abstract

Sn_3O_4 is a low-cost, promising, nontoxic catalyst with suitable bandgap structure for visible-light methylene blue dye degradation. Microstructural changes that result in more efficient charge separation are critical for improving photocatalytic efficiency. A nanostructured Sn_3O_4 photocatalyst was synthesized using a one-step hydrothermal method with tin oxalate and ethylene glycol in this sample. The degradation of MB dye was tested using the synthesized nanostructure, and the findings were compared to ZnO and Degussa P25. The Sn_3O_4 nanostructure found to be the best MB degradation efficiency, degrading 10 ppm of MB dye in 40 minutes, which was faster than ZnO and Degussa P25. The enhanced MB degradation activity can be attributed to the effective charge separation, morphology and crystallinity of triclinic Sn_3O_4 photocatalyst.

Keywords: Sn_3O_4, XRD, Morphology, optical property.

References:

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PA-20

Photodegradation of Dye Pollutants on Nanocrystalline Co Doped $Li0.5Fe2.5O_4$ under UV-Visible Light Irradiation

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Abstract

The Co doped $Li0.5Fe2.5O_4$ ferrites were successfully prepared by using sol-gel synthetic process. The resulting nanosample has been characterized by using XRD and SEM techniques. The X-Ray diffraction (XRD) analysis studies clearly suggest the formation of single phase nanomaterials. The SEM analysis indicates the formation of uniform and fine grains like morphology in mixed-metal oxides. The results of combustion synthesis elucidate that the fuel to oxidizer ratio is the most effective factor for the formation and surface morphology of mixed-metal oxides. The synthesized Co doped $Li0.5Fe2.5O_4$ ferrite has been used for the adsorption studies of Methyl orange dye by batch experiments. It is found from the adsorption studies that the removal percentage of Methyl orange is much better. $Li0.5Fe2.5O_4$ particles are good adsorbent materials for removal of Methyl Orange dyes as compare to the Co doped $Li0.5Fe2.5O_4$ nanopowder. However, the adsorption capacity of $Li0.5Fe2.5O_4$ can be lower by doping with Cobalt.

Keywords: Sol-gel Chemistry, XRD, SEM, Photodegradation, Magnetic materials.

PA-21

Superhydrophobic Coating on Marble for Self-Cleaning Application

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Abstract

The Superhydrophobic surfaces are highly water repellent with water contact angle (WCA) higher than 150° and sliding angle less than 10°. Water repellency to the solid surfaces can be provided by alkoxysilanes, silicones and fluoropolymers. Most of the sculptures around the globe are made up of the marbles. Soiling, atmospheric pollution, air pollution, vehicle pollution are among the main factors for marble deterioration. In this work, we have prepared a silica sol by tetraethoxysilane (TEOS) and polydimethoxysilane (PDMS) to obtain superhydrophobic silica coating on marble surface. In a typical sol-gel processing, 0.4 ml of TEOS was added in 4 ml of EtOH, 4 ml of distilled water and 0.2 mg of oxalic acid for hydrolysis to take place. This solution was stirred for 120 min at 500 rpm using magnetic stirrer. After that, 0.016 µl of PDMS was added dropwise in above solution. This solution was again stirred for 60 min at 500 rpm. The prepared solution was applied onto the marble surface using spray deposition technique. The marble specimen was dried at 100° C for 1h. The prepared coating exhibited a WCA ~ 140°. Some of the experiments like controlling the sol-gel parameters, effect of PDMS concentration, wettability, self-cleaning property, durability of the coating are still under process.

Keywords: Superhydrophobic; Marble; Self-cleaning; Contact angle; Wettability

PA-22

Synthesis of calcium ferrite by inherent source for ethanol sensor

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Abstract

In this work Gas sensing properties of the p-type orthorhombic $CaFe_2O_4$ are demonstrated. $CaFe_2O_4$ were successfully synthesized with natural source of precursors by the milling method. The formation of orthorhombic $CaFe_2O_4$ compound was confirmed by X-ray diffraction, scanning electron microscopy shows agglomerated porous crystalline type morphology. Photoluminescence spectra showed $CaFe_2O_4$ absorbs visible regain at wavelength 584nm. The synthesized $CaFe_2O_4$ compound showed p-type gas sensing behaviour and high gas response towards ethanol 38.4% at 225°C operating temperature at concentration of 120 ppm ethanol gas.

Keywords: Nanostructures, XRD, SEM, PL Gas sensor.

PA-23

Magnetic and dielectric properties of nanophase Cu-Co ferrite

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Abstract

Nanocrystalline Cobalt-substituted Cu-ferrites were prepared by Co-precipitation method. X-ray diffraction analysis confirmed that all the samples were cubic in nature. The variation of saturation magnetization was studied as a function of copper content. All the compositions indicate that they are ferromagnetic in nature. The dielectric constant, dielectric loss of all samples were measured at room temperature as a function of frequency. These parameters decrease with increase in frequency for all of the samples. The compositional variation of dielectric constant and d.c.resistivity shows an inverse trend of variation with each other.

Keywords: XRD, TEM, Dielectric permittivity.

PA-24

Murraya koenigii assisted Synthesis of Bio-active Silver Nano-material

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Abstract

The development of a green method for the synthesis of nanomaterials is day by day becoming popular among nanotechnologists. In the present study, the synthesis of silver materials at room temperature using Murraya koenigii leaf extract was carried out. The synthesized materials are stable for several months. The nano-materials were characterized using UV Vis Spectroscopy, XRD, FTIR, FESEM equipped with EDAX. The UV Vis spectrophotometric analysis was carried out to ensure the formation of silver nano-materials. XRD pattern reveals the formation of polycrystalline silver nano-materials with the cubic crystal structure. Irregularly shaped particles were observed under field emission scanning electron microscopic observations. Elemental studies showed the presence of Ag and O elements. The synthesized nano-material is multi-applicative and shows potential efficacy against pathogenic microorganisms like Pseudomonas aeruginasa and Staphylococcus aureus. The results showed that the leaf extract of Murraya koenigii is an efficient bio-reductant for the synthesis of silver nano-materials.

Keywords: Green synthesis, Murraya koenigii, XRD, FESEM, Biogenic activities.

PA-25

Silica Nanoparticles from Rice Husk for Antifungal Activity on Wheat Plant

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Abstract

Study of Antifungal activity on crop is largely explored. Fungi causes significant losses to food crops in tropical and subtropical countries. Various conventional chemical based fertilizer used for removal of fungus. Since these methods have several demerits for replacement of harmful fungicide. A highly pure, small particle sized nano silica powder was prepared from rice husk ash using alkali extraction by an acid precipitation method. The morphology, size and surface area of synthesized nano silica powder was investigated by UV, FT-IR, X-ray diffraction and scanning electron microscope. The high purity silica nanoparticles was obtained by sodium hydroxide purification treatment.

PA-26

Acoustical study of Ternary Liquid Mixture of Alcohol + Tri-ethylamine +Acetic Acid through Molar Volume, Freelength and Excess Freelength

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Abstract

Ultrasonic velocity, density and viscosity for ternary liquid mixture of alcohol + tri-ethylamine(TEA) + acetic acid in the whole range of composition have been carried out at various temperatures 30°, 35°, and 40°. From the measured parameters, some derived parameters like free length, excess freelength and molar volume are also estimated. The non linear behaviour of freelength and molar volume confirms the existence of molecular interaction. The sign and magnitude of excess freelength are evident for the nature of interaction between component molecules.

PA-27

Studies on Biosensing properties of electrodeposited copper oxide films

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Abstract

The copper oxide (CuO) based films have been prepared for biosensing application. Electrodeposition method has been used for preparation of CuO films on cost effective stainless steel substrates. The structural properties of CuO material were studied using X-ray diffraction (XRD) pattern. The energy dispersive X-ray analysis (EDAX) pattern display wt. % of Cu and oxygen in CuO material is 52.80 % and 57.61 %. The glucose sensing of CuO electrodes were carried out in NaOH and glucose electrolyte at different concentration of glucose and different scan rates. The effect of glucose sensing on two different CuO electrodes have been studied.

Keywords: Copper oxide, Stainless steel substrates, SEM, EDAX, Glucose sensing.

PA-28

Influence of eucalyptus Leaves extract on antibacterial activity of ZnO nanoparticles

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Abstract

In the current research work, zinc oxide nano particles are synthesized by simple precipitation method and studied its antibacterial activity. The antibacterial activity can be successfully enhanced after the addition of eucalyptus leaves extract. The structural, morphological and elemental properties of synthesized material and the effect of eucalyptus leaves extract on these properties are studied by using XRD, SEM and EDAX respectively. Enhanced crystalline size and porosity is observed after the addition of eucalyptus leaves extract while synthesizing ZnO. In addition, eucalyptus leaves extract assist to avoid agglomeration of ZnO nano particles. Role of eucalyptus leaves extract in the antibacterial activity of synthesized ZnO nano particles were studied against gram positive bacterium (Bacillus) and gram negative bacterium (E-coli). It reveals that after addition of eucalyptus leaves extract, antibacterial activity against gram positive bacteria (bacillus) is enhanced. However it does not show any antibacterial activity on a gram negative bacterium (E-coli). The eucalyptus leaves extract may be responsible for the resistance against E-coli.

Keywords: Zinc oxide nano particles, eucalyptus leaves extract, antibacterial activity, crystalline and morphological properties.

PA-29

Synthesis of bioactive 1,4 DHPs using sulfated tin oxide as an efficient solid acid catalyst

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Abstract

A novel synthetic approach has been intended for the synthesis of 1,4 dihydropyridine derivatives via one pot condensation of aromatic aldehydes, beta keto ester and ammonium hydroxide by using prepared STO as solid acid heterogenous catalyst in ethanol at reflux condition. The synthesized sulfated tin oxide was confirmed by FTIR, XRD and SEM EDX. The catalyst was studied for surface area by BET plots. The reactions were optimized for different solvents and loading of catalyst. The yields of all of 1,4 dihydropyridine derivatives were observed in the range of 80-92 %. All the synthesized DHPs were authenticated by spectral data. The use of environmentally benign catalyst, good atom economy, low cost and ease of work up makes this exercise efficient and green.

Keywords: STO, aromatic aldehydes, beta keto esters, ethanol, reflux.

PA-30

SYNTHESIS AND STRUCTURAL PROPERTES OF MANGANESE, ZINC AND MANGANESE-ZINC FERRITE

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Abstract

Polycrystalline samples of Mn, Zn, Mn-Zn ferrites were prepared through the wet chemical co-precipitation method. The prepared samples were sintered at 700°C for 3 h and characterized using X-ray diffraction (XRD) and FT-IR technique. XRD studies revealed the formation of single phase spinel cubic structure. The values of lattice constant, crystalline size, X-ray density, ionic radii and bond length have been calculated using X-ray diffraction data. Two prominent infrared absorption bands for all ferrite samples are observed; one at around 550 cm^{-1} due to tetrahedral (A) interstitial voids and other at around 425 cm^{-1} due to octahedral (B) interstitial voids.

Keywords: Mn-Zn Ferrite, Spinel ferrites, co-precipitation method.

PA-31

Dielectric properties of Sm3+- Dy3+ Substituted $MgFe_2O_4$

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Abstract

The nano-crystalline ferrites with composition Mg[(Sm)0.6(Dy)0.4]xFe2-xO_4 were prepared by chemical combustion route. On Sm3+- Dy3+ substitution, the ionic radii on octahedral sites increases whereas ionic radii on tetrahedral sites of Mg ferrites almost constant. The dielectric properties of ferrites were measured by using Hioki LCR Q-meter instrument in the frequency range 100Hz – 1MHz. The variation of dielectric constant and dielectric loss with frequency shows normal dielectric behavior. It is found that, the dielectric constant and dielectric loss of Sm3+-Dy3+ substituted Mg ferrite becomes smaller whereas resistivity is larger than pure Mg-ferrite.

Keywords: Mg-Sm-Dy, Ferrites, Combustion, Dielectric, Resistivity.

PA-32

Synthesis and Characterization study of nanocrystalline Cu_2ZnSnS_4 (CZTS) thin films.

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Abstract

The Cu_2ZnSnS_4 (CZTS) thin film is composed of economical and common elements. It is ecofriendly photovoltaic semiconductor material because of its very advantageous properties like high absorption coefficient and best band gap. Here we have applied low lost; low temperature based chemical bath deposition technique for synthesis and characterization of CZTS thin films. The films were characterized by techniques like X-Ray diffraction, Raman scattering which confirms its kasterite phase and nanocrystalline nature of CZTS. The UV-Visible spectroscopy analyses its band gap near about 1.5 eV. The electrical conductivity technique gives type of conductivity. The scanning electron microscopy and EDS techniques reveal its morphology and elemental composition respectively.

Keywords: CZTS, nanocrystallin, kasterite, raman, band gap etc.

PA-33

Metal Organic Framework (MOF) to Metal Nanoparticles (M2N): Effect of heat treatment on Cu-MOF

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Abstract

In the present study, we reported size, shape and morphology of copper (Cu) and copper oxide (CuO) nanoparticles. The nanoparticles obtained from metal organic frameworks (MOFs) dispersed inside the carbon matrix. The thermolysis/ pyrolysis of MOFs carried out at different temperatures to avoid impurities. It obtained during multistep chemical oxidation or reduction approaches. The reaction temperature plays a substantial role in the formation of different sized nanoparticles. We report systematic study of 'in situ' synthesis of Cu metal within porous carbon matrix with the thermal cracking of copper based MOF. The Cu nanoparticles have been synthesized from Cu-MOF under inert atmosphere in the range of 100ºC- 600°C. However, it confirmed by spectroscopy technique. Our investigation indicates that MOF can be used as a precursor for the preparation of nanoparticles via new developed 'M2N' method. The synthesized nanoparticles were characterized by Powder X-ray diffraction (PXRD), Transmission Electron Microscopy (TEM) and Brunauer–Emmett–Teller (BET) surface area analyzer. Different conditions are discussed in the present study and average particle size calculated through open source software 'ImageJ'.

Keywords: Copper, metal organic framework, metal nanoparticles, argon, morphology, pyrolysis.

PA-34

AN EFFICIENT AND CONVENIENT HETEROGENOUS Cu/MCM-41 CATALYST FOR THE SYNTHESIS OF 7,10,11,12-TETRAHYDROBENZO[c]ACRIDIN-8(9H)-ONE DERIVATIVES IN ETHANOL AT REFLUX CONDITION

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Abstract

An efficient and convenient method for synthesis of 7,10,11,12-tetrahydrobenzo[c]acridin-8(9H)-one derivatives using Cu/MCM-41 (20 mg) as heterogeneous catalyst. The advantages have an excellent product yield within a short time, easy work-up procedure, and the products have directly recrystallized from hot methanol with cost-effective catalyst. One-pot three-component reaction from aromatic aldehyde, cyclic 1,3-dicarbonyl compounds, and 1-naphthyl amine has carried under ethanol as a solvent with reflux condition. Moreover, the catalyst can be recovered conveniently and reused efficiently, and recyclable.

PA-35

SYNTHESIS, CHARACTERIZATION AND ENHANCED DIELECTRIC PROPERTIES OF POLYANILINE-CADMIUM OXIDE COMPOSITES

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Abstract

Present work depicts the progress of CdO-polyaniline composites synthesized by chemical oxidative technique. The composites with change in CdO composition were subjected to structural, electrical, dielectric and morphology using X-ray diffraction, AC conductivity and scanning electron microscopy. The thermogravimetric analysis carried out to study the thermal stability, which shows that the composite with highest CdO concentration displayed better stability. The electrical conductivity of the modified polyaniline tends to change with change in the frequency indicating hopping of charge carriers as a dominant mechanism. The variation of dielectric constant of all modified polyaniline with respect to the frequency was analysed at room temperature. The dielectric constant was found to increase with the decrease in CdO concentration and was found to highest for composite with 2% CdO.

PA-36

In-situ synthesis of linear monocarboxylic acid-PANI for Ammonia gas sensor

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Abstract

The room temperature in-situ chemical oxidative synthesis of PANI for ammonia (NH_3) gas sensor by using carboxylic acid like linear enanthic acid and caprylic acid as a dopant. The synthesized material is characterized to understand the morphology, composition, structural and optical properties. The electrical conductivity was studied by using the two-probe method. The highest yield and electrical conductivity were observed by enthanic acid-PANI. the caprylic acid-PANI film gives to be highly selective towards ammonia gas 210% to 100 ppm concentration of NH_3. while the enanthic acid-PANI gives low selectivity ammonia gas 170% to 100 ppm concentration of ammonia. The synthesized PANI was characterized by using FTIR, XRD, and SEM techniques.

Keywords: ammonia gas sensor, In-situ chemical polymerization, SEM, XRD

PA-37

COMPUTATIONAL AND EXPERIMENTAL MEANS FOR ESTIMATION OF GROUND AND EXCITED STATE DIPOLE MOMENT OF A SOLUTE

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Abstract

The 1-(2-Methoxy-Phenoxymethyl)-Benzo(f)-Chromen-3-one [2-MPBC] has been prepared by the reaction of 5,6-benzo-4-bromomethylcoumarin with 2-methoxyphenol. The structure of the compound is confirmed using IR, NMR and Mass spectral data. The absorption and fluorescence spectra of 2-MPBC are recorded in various solvents like benzene, toluene, ethanol, methanol, butanol, pentanol, dimethylsulphoxide (DMSO) at room temperature in order to estimate the ground (μg) and excited state dipole moments (μe).The results of solvotochromic shift are compared with quantum chemical computational method. The estimation of dipole moment is made by assuming that the molecular polarizability does not change in time of absorption process. It is found that the electronic excited state values are higher than the ground state values. This suggests the less polar nature of the solute in the groundstate rather than in the excited state. Further, HOMO-LUMO energies are also determined. It is also found that the change in the polarity of the solvents is responsible for shifting of spectral peak towards the higher wavelength.

Keywords: 2MPBC. Solvatochromic shift, Dipole moment, HOMO-LUMO.

PA-38

Solar light-driven photocatalytic degradation of MB dye with hydrothermally synthesized Sn3O4 nanostructures

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Abstract

Sn3O4 is a low-cost, promising, nontoxic catalyst with suitable bandgap structure for visible-light methylene blue dye degradation. Microstructural changes that result in more efficient charge separation are critical for improving photocatalytic efficiency. A nanostructured Sn3O4 photocatalyst was synthesized using a one-step hydrothermal method with tin oxalate and ethylene glycol in this sample. The degradation of MB dye was tested using the synthesized nanostructure, and the findings were compared to ZnO and Degussa P25. The Sn3O4 nanostructure found to be the best MB degradation efficiency, degrading 10 ppm of MB dye in 40 minutes, which was faster than ZnO and Degussa P25. The enhanced MB degradation activity can be attributed to the effective charge separation, morphology and crystallinity of triclinic Sn3O4 photocatalyst.

Keywords: Sn3O4, XRD, Morphology, optical property.

References:

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PA-39

Structural, morphological and vibrational properties of porous a-Fe_2O_3 nanoparticles prepared by combustion method

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Abstract

Porous Iron oxide (a-Fe_2O_3) nano particles are synthesized by solution combustion technique using glycine as a fuel. The present work reports, role of fuel in the formation of a-Fe_2O_3 phase. To study the role of fuel in the phase formation and its impact on structural properties, two fuels viz. citric acid and glycine are used as a fuel. X-ray diffraction spectroscopy is used to study its structural properties. As revealed in XRD, single phase a-Fe_2O_3 is obtained in glycine assisted combustion. Further, as prepared a-Fe_2O_3 is calcined at different temperature, it observed that crystallanity of a-Fe_2O_3 is enhanced with the calcination temperature. Raman spectroscopy is employed to study vibrational modes of molecule. Morphology of calcined material is studied by using FESEM. These results reveal that, fuel plays major role in the phase formation of a-Fe_2O_3 and released gases during combustion are responsible for the morphology. Electrical conductivity of synthesized material was measured by using two probe method.

Keywords: Combustion technique, Fe_2O_3, XRD, RAMAN.

PA-40

Photophysical properties of Urethane sidechain functionalized Diketopyrrolopyrrole organogel

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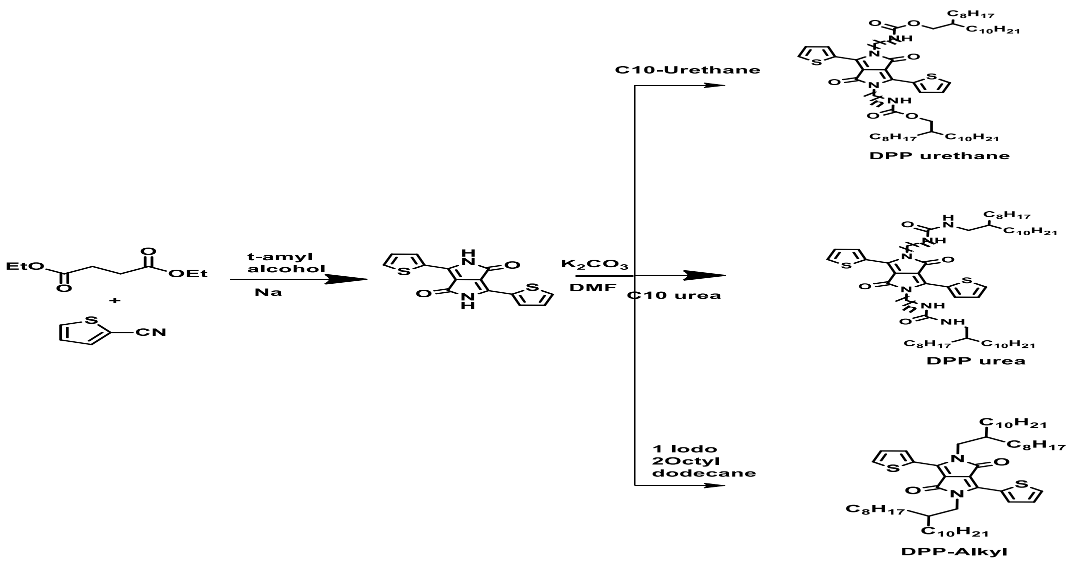
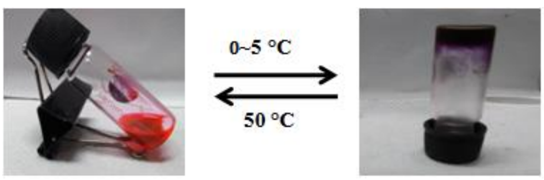
Abstract

Organogels, being an important class of soft materials, have evolved to be one of the most attractive subjects bridging supramolecular chemistry and material sciences due to their structural diversity and associated physical properties. Herein, we developed a $DPP_{urethane}$ based organogletor by substitution urethane side chains. We examine the gelation of a $DPP_{urethane}$ in different solvents. The $DPP_{urethane}$ forms gel in non-polar solvent. The $DPP_{urethane}$ gel was studied using absorption and NMR spectroscopy.





Picture of Sol-Gel transformation of $DPP_{urethane}$ in methylcyclohexane

PA-41

A REVIEW ON MN3O4 AND ITS COMPOSITE NANOMATERIALS OF DIFFERENT MORPHOLOGIES AS AN ELECTRODE MATERIAL IN SUPERCAPACITORS

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Abstract

In last decade, due to the parameters like low cost, non-toxicity, large abundance, high porosity and high capacitance values in aqueous electrolyte, Mn_3O_4 and its composite nanomaterials attracted the attention of researchers as an electrode for supercapacitor devices. Different groups of the researchers prepared variety of Mn_3O_4 and its composite nanomaterials having outstanding properties and several morphologies. Herein, we provide a detail discussion of latest development of the synthesis of Mn_3O_4 and its composite nanomaterials and their use as electrode material in supercapacitors.

PA-42

Synthesis and characterization of TiO_2 nanoparticles by CBD

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Abstract

Synthesis of TiO_2 (Titanium dioxide) nanoparticles were successfully synthesized by chemical bath deposition method (CBD) at room temperature. Obtained sample was annealed and characterized to determine it's structural, optical, morphological and compositional properties using x-ray diffraction, UV-DRS, SEM, EDS, UV-Vis spectroscopy and photoluminescence (PL). XRD confirmed pure phase anatase in the prepared sample. SEM depicted the nanorod like morphology and EDS micrograph confirms the existence of Ti and O atoms. The optical study revealed that the observed band gap of TiO_2 nanoparticle is 3.1eV.

Keywords: XRD, SEM, EDS, UV-Vis etc

PA-43

SnO_2-CuO Composite Thick Film for H_2S Gas Sensor

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Abstract

The SnO_2 and CuO powder mixed with different ratio and heated at 800°C and then this powder is used to prepared thick films by a screen – printing technique on glass substrate. The H_2S gas sensing properties, particularly the rate of response of CuO-SnO_2 sensors are influenced by the CuO loadings at room temperature. XRD analysis showed that crystallite size is small (97.3nm) for 50SnO2-50CuO composition. The Sensitivity increases drastically as the expose of H2S gas for 50 SnO_2-50 CuO sample. This sample is found to be better sensing material as regards to other.

Keywords: Hydrogen sulphide; SnO_2-CuO, Sensors; X-Ray Diffraction.

PA-44

Dielectric permittivity and magnetic study for TiO_2 supported Zinc ferrite

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Abstract

Nanocrystalline TiO_2 loaded $ZnFe_2O_4$ was synthesized by wet chemical process. Phase formation study was carried out by using x-ray diffraction technique and it's reveals that TiO_2 properly supported on the surface of zinc ferrite. Nano sized two different layers such as cubic zinc ferrite and TiO_2 were confirmed by transmission electron microscopy technique. Magnetic data for all samples indicates that ferromagnetism was decreases with increasing non magnetic titania. Dielectric permittivity data reveals dielectric permittivity decreases with frequency and increases with TiO_2 composition. In this manuscript detailed study of structural, magnetic and dielectric properties of TiO_2 supported Zinc ferrites nanocomposites samples were investigated.

Keywords: Nanocomposite, XRD, TEM, Dielectric permittivity

PA-45

A review of Mathematical Modelling for Metal oxide gas sensor by using transient response

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Abstract

In recent decades, some metal oxide semiconductor gas sensors (MOS) are widely used in sensing of CO_2 gas in many industries. They have certain benefits like low price, high sensitivity and quick response .On another side ,they have some drawbacks viz. varying response under certain changes in atmospheric conditions. They are used comprehensively in various applications like electronic nose for CO_2 gas detection, plume tracking and odor localizing etc. These sensors have a different response nature with respect to variation of temperature, humidity and gas odour concentration. In this review we are trying to study some mathematical models based on such responses for understanding metal oxide gas sensor's performance and the design of various system in which MOS gas sensors are included.In this review paper, we attempts to some mathematical model in which ,the best possible transfer function of the SnO_2 type MOS gas sensor specifically electrochemical gas sensors for transient response and steady-state zones, based on the acquired data of the sensor. The model could be used to obtain the mathematical equation for the response, as a transfer function based on various concentrations, for the specific temperature and humidly.

Data analysis has been done with Matlab software and Genetic algorithm is further used to optimize the transfer function parameters. Moreover, the effect of variation in concentration on the transfer function coefficients has been explored. The results shows that the mathematical modelling may be useful for for sensor response behaviour in terms of physical and chemical characteristics.

Keywords: MOS, SnO_2, Matlab software and Genetic algorithm

References:

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PA-46

Synthesis and Characterization of Undoped and Mn Doped Copper Oxide Nanoparticles

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Abstract

Copper oxide (CuO) is one such p-type Metal-oxide semiconductors (MOS) that has a tiny bandgap of 1.2 eV and has been found in countless applications like solar cells, High Temperature (HT) superconductors, sensors, Diluted Magnetic Semiconductors (DMS), etc. In this research work, an attempt has done to characterize CuO nanopowders by doping of transition metal (Mn) using cost-effective simple soft chemical method. The prepared nanopowders were characterized via structural, morphological, functional, optical, properties. XRD results suggest that the development of high purity single monoclinic phase CuO nanoparticles. The crystallite size (30 nm) and lattice parameters were decreased for Mn doped CuO samples. The optical studies showed that the intensity decreases with Mn doping. These results suggest that Mn doped CuO nanoparticles are a suitable candidate for the optoelectronic devices and photocatalytic degradation of organic compounds in the near future.

Keywords: CuO nanoparticles, Mn doping, XRD, SEM, PL.

PA-47

Synthesis and Kinetic Parameters of Traps in Eu2+ Activated Halide Phosphors KSr2Br5 and CsBa2I5

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Abstract

Divalent Europium (Eu2+) doped alkali halides KSrBr5 and CsBa2I5 phosphors are synthesized by simple wet chemical method in aqueous solution. Thermoluminescence (TL) properties of these phosphors were investigated. Samples were irradiated with different γ-dose using Co60 source. For CsBa2I5:Eu2+, thermoluminescence curve shows maxima at 207.5 0C and for KSr_2Br_5:Eu2+, TL maxima peaks around 261.74 °C which are related to the defects at trap depths. Kinetic parameters of the peak are calculated. The activation energy value for $KSrBr_5$ and $CsBa_2I_5$ are 1.5 eV and 0.811 eV respectively, suggest a possible good stability of the trapped charges produced during irradiation. Hence, Eu (0.5%) doped KSr_2Br_5 and $CsBa_2I_5$ phosphors could be used for possible TL Dosimetry applications.

Keywords: Thermoluminescence, Eu2+, kinetic order, trap depth

PA-48

Excess volumes and isentropic compressibilities of binary liquid mixtures of sulfolane with some organic solvents at 313.15K

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Abstract

An experimental determination of physical parameters of speed of sound propagation, density parameter and viscosity for the binary mixtures of various combination of organic solvents (sulfolane + n-Butylacetate), (sulfolane + Butanone), (sulfolane + n-Butylamine) has been attempted at the temperature of 313.15 K. The thermodynamic properties of various liquids and their possible mixtures which are required for the purpose of design, storage of energy and other equipment processing have been measured. There has been a significant deviation exhibited by the various thermodynamic properties of binary mixtures which contains components that are of ability of being subjected to specific interactions. The deviations from established ideality have been in terms of fluctuations of molecular size and changes in structural shape. The data obtained in the experiment have been fitted to a polynomial equation of Redlich-Kister for estimating the coefficients along with standard deviations observed in measurements.

Keywords: Thermodynamics, Transport properties, Excess molar volume, Deviation in Isentropic Compressibility, Sulfolane, Intermolecular interactions.

PA-49

PYRIDINE-2-ALDEHYDE THIOSEMICARBAZONE - SYNTHESIS, CHARACTERISATION AND ANALYTICAL APPLICATIONS.

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Abstract

Number of analytical reagents are available to determination of metal ion concentration in small quantity from various samples. Pyridine-2-aldehyde thiosemicarbazone (Py-2-TSC) is an innovative analytical reagent for determination of transition metals in µg quantity from various samples. Py-2-TSC is prepared by refluxing equimolar quantities of Pyridine -2-aldehyde with thiosemicarbazide in alcohol for an hour. Synthesized reagent has M.P. 170°C with formula weight 180.23. Its elemental analysis was found to be 45.97% C, 4.20%H, 17.60% S and 30.80% N. It shows antimicrobial activity against Klebsiella pneumonia. Its shows λmax at 370 nm and it's IR spectral frequencies is in between 3000-800 cm^{-1}. With standard Fe (III) and Ni(II) solutions Py-2-TSC forms coloured (complexes) solution and it can be determined photometrically. For Fe(III), standard plot of Beers law was prepared using standard Fe (III) solution. The Panchganga river water was used as a sample to determine Fe (III) content per cm3. From standard plot, Fe (III) content in water sample was determined. It was determined by both calculation and graphical method. In calculation method ratio of concentration of known to unknown and ratio of optical density of known and unknown were compared. Results obtained by both the methods were almost same. Fe (III) from sample obtained by calculation and graphical method was 0.82 and 0.80 ppm/cm3 respectively. Similarly Ni(II) content from Cadbury chocolate was determined using Py-2-TSC by same method as used for determination of Fe(III) content from water sample. Like Fe (III) from water sample, Ni (II) content of cadbury chocolate was also determined by both calculation and graphical method and found to be 85.8 and 80µm/gm respectively. By this method concentration of most of the transition metals in µg quantity can be determined accurately by using Py-2-TSC.

Keywords: Pyridine-2-aldehyde thiosemicarbazone, Fe (III), Ni (II), Beers law, antimicrobial activity.

PA-50

STUDY OF OPTICAL PROPERTIES OF DOPED POLYMER BLEND

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Abstract

In the present work we evaluated optical parameters of doped polymer blends (PVC / PMMA doped with iodine) such as optical energy gap (Eopt), absorption edge, optical dielectric constant, refractive index, constant B, (n0B)-1 and N/m* are found to be compositional dependent. For increasing concentration of dopant. The refractive index (n0) Calculated in the range 400 to 1000 nm and also study the nature whether it is linear or nonlinear with increasing content of iodine have been evaluated. The ratio of carrier concentration to the effective mass (N/m*) have been evaluated.

Keywords: optical properties, PVC/PMMA blend, optical constants.

PA-51

Layered Polyaniline-Manganese Oxide Nanocomposite Electrode Material for Supercapacitor Application

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Abstract

In the present research work, layerd nanoconposite of Polyaniline-Manganese Oxide electrode were synthesized using potentiostatic electrodeposition method. The structural and morphological properties of the nanocopmposite electrode materials were tested using XRD and FE-SEM technique. The XRD analysis shows the amorphous nature of the electrode material. The FE-SEM micrographs show porous morphology. The supercapacitive properties were investigated using cyclic voltammetry, galvonostatic charge-discharge, cyclic stability and electrochemical impedance spectroscopy techniques in 1M Na_2SO_4 electrolyte. The layerd nanocomposite shows maximum values of specific capacitance which is 582 F/g at scan rate 5 mv/sec. The syngestic effect of layerd nanocomposite leads to enhancement in the supercapacitive performance than the pristine electrode.

Keywords: Polyaniline, Layered Nanocomposite, Electrodeposition; Supercapacitors.

PA-52

SYNTHESIS AND LINEAR OPTICAL CHARACTERIZATION OF L-VALINE CAPPED ZN DOPED MGO NANOPARTICLES

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Abstract

We report synthesis, structural and linear optical properties of L-valine capped Zn doped MgO nanoparticles (NPs). L-valine capped (15 mol%) MgO NPs doped with Zn (1, 2 and 5 wt%) were obtained by chemical co-precipitation method and were calcined at 500oC for 2h. X-ray diffraction (XRD) pattern shows major reflections at 2θ = 42.91°, 62.11° and 78.34° corresponding to (200), (220) and (222) planes of MgO with a face-centered cubic structure respectively and the average particle size was found to be 13 nm. Energy dispersive X-ray spectroscopy (EDS) attests the purity of prepared samples. Utraviolet-visible (UV-vis) spectroscopic studies of both uncalcined and calcined samples attest the formation of NPs and strong blue shift in the excitonic absorption has been observed.

Keywords: MgO nanoparticles, L-valine, XRD, UV-vis.

PA-53

SYNTHESIS AND STRUCTURAL PROPERTIES OF NANOSTRUCTURE COPPER FERRITE

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Abstract

In this work, copper ferrite nano crystalline powders were prepared by sol gel method. The nitrate-citrate gels were prepared from metal nitrates and citric acid solution of 1:1. The results showed that nitrate citrate gels exhibit a self propagating behaviour after ignition in air at room temperature. The as-prepared powder was annealed at 550°C for 6 hrs. The phase composition and structural properties of the obtained sample is investigated by X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM). The result shows single phase of tetragonal structure with the reflection the samples planes (220), (311), (400), (422), and (511). The D.C. electrical resistivity were shows two regions corresponding to ferrimagnetic (high temperature region) and paramagnetic (low temperature region). The D.C. electrical conductivity decreases with increase of temperature ensuring the semiconducting nature of the ferrite.

Keywords: Copper ferrite, Sol-gel auto combustion, nitrate-citric acid fuel, d. c. electrical.

PA-54

GRAPHENE OXIDE BLENDED HYDROXYAPATITE AMMONIA SENSOR

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Abstract

Calcium hydroxyapatite (HAp) is an inorganic compound composed of calcium, phosphorus, and hydroxyl ions. The dielectric properties and some salient features like porous structure, high specific surface area, and fine grain size of the HAp are attractive features for the researchers working in the field of chemical sensors. The main objective of this study is to see the effect of Graphene Oxide (GO) doping on the ammonia sensing performance of HAp thick films and to derive the correlation between the doping and ammonia sensing properties. Therefore the study is focused on to present a new approach for utilizing properties of HAp and carbon containing material in sensing applications. Nano crystalline Hydroxyapatite (HAp) is synthesized by wet chemical precipitation method. A nano ceramic composite based on Hydroxyapatite mixed with 2 wt% concentration of Graphene Oxide (GO) is prepared just by mechanically mixing method. The nano crystalline material and nano composites are characterized by X-Ray Diffraction (XRD), Fourier Transform Microscopy (FTIR), Thermo Gravimetric Analysis (TGA) and Scanning Electron Microscopy (SEM). A simple and cost effective screen printing technique is utilized for the development of thick films on glass substrate. The ammonia sensing properties of the nano crystalline material HAp and 2 wt% Graphene Oxide doped HAp is investigated by two probe electric method. The gas sensing parameters like operating temperature, response and recovery time, maximum detection limit etc are studied. The results for ammonia vapor detection corroborate that addition of GO even in small weight concentration dramatically ameliorate the sensing property of nano HAp. The best sensing performance is shown by 2wt% GO doped HAp thick film for the detection of 10 ppm of ammonia at 350C operating temperature then the pure HAp.

Keywords: Hydroxyapatite, Graphene Oxide, Gas sensing, Graphite, Ammoni

PA-55

INTRODUCTION, ADVANTAGES AND APLLICATIONS OF SMART MATERIALS

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Abstract

Smart materials are getting high attentions due to their extra ordinary properties and their commercial applications in either actuator or sensors, self healing and so on. Smart materials already impacted us by their enormous applications in daily life. Smart materials are those that change one or more of their properties such as shape, colour, size etc when subjected to an external stimulus like pressure, temperature, humidity, light, electric field, magnetic field etc. Smart materials include piezoelectric , shape memory alloys, magnetostrictive , shape memory polymers, hydrogels etc. Smart materials shows their potential applications in the fields like civil engineering, medical computers and electronic devices, field of defense and space, reducing waste etc. This paper provides the brief introduction to Smart materials, their properties, advantages and their applications in various fields.

Keywords: Smart materials, actuators, sensors, external stimulus, piezoelectric.

PA-56

Examination of Zinc Oxide Thin Films for enhanced performance in Structural, Optical and Magnetic Characterization

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Abstract

Dilute Magnetic Semiconductor have attracted wide interest because of their potential application in spintronic devices such as spin field effect transistor and spin light emitting diodes among the system ZnO based DMS have been actively investigated since its wide band gap of 3.7 eV and its single phase crystal is easy to synthesize. Thin uniform adherent nanorod formed conducting ZnO thin films from aqueous alkaline bath (pH=12) using ammonia as a reducing agent have been deposited on to glass substrate by simple chemical bath deposition technique. Deposition temperature, pH of the solution, concentration of the precursor and annealing temperature are preparative parameters to optimize for deposition of the ZnO films. The structural of deposited thin film analysis was done by X-ray diffraction spectra reveals c axis oriented wurtzite crystal structure with uniform hexagonal growth. Surface morphology analysis shows the growth of the film in the form of up growing hexagon towards nanorods of 350nm diameters. The chemical composition of the films was evaluated by means of scanning electron microscope equipped with an energy dispersive X-ray spectrometer. A commercial VSM vectorial magnetometer was used for magnetization vs. field measurements at variable temperatures. Hysteresis loop have been corrected for the diamagnetic contribution of thermally cycled blank substrates. The variation of magnetization with magnetic films reveals intrinsic ferromagnetism attributed donor like defects such as oxygen vacancies and zinc interstitials are easily generated in ZnO, which usually induced n-type charge carriers which are responsible for magnetization.

Keywords: Diluted Magnetic Semiconductors, wurtzite, nanorods, magnetometer

PA-57

MOLECULAR DOCKING STUDIES OF BENZIMIDAZOLE DERIVATIVES FOR EVALUATION OF COX-2 INHIBITION.

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Abstract

COX-2 inhibitors are a subclass of nonsteroidal anti-inflammatory drugs (NSAIDs). NSAIDs work by reducing the production of prostaglandins, chemicals that promote inflammation, pain, and fever. Non-steroidal anti-inflammatory drugs (NSAIDs) are the competitive inhibitors of cyclooxygenase (COX), the enzyme which mediates the bioconversion of arachidonic acid to inflammatory prostaglandins (PGs). Their use is associated with the side effects such as gastrointestinal and renal toxicity. The therapeutic anti-inflammatory action of NSAIDs is produced by the inhibition of COX-2, while the undesired side effects arise from inhibition of COX-1 activity. Thus, it was though that more selective COX-2 inhibitors would have reduced side effects. Based upon a number of selective COX-2 inhibitors were developed as safer NSAIDs with improved gastric safety profile. Present work discuss molecular docking studies of 6-substituted and different amoniacid conjugated benzimidazole derivatives for evaluation of cox-2 inhibition. Docking results revealed that compounds involved in hydrogen bonding and van der Waals interactions with the active site. Among these compounds, glycine coupled benzimidazole was the best inhibitor of COX-2.

PA-58

Processable Poly(ether ether ketone imide)s

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Abstract:

A new series of aromatic poly(ether ether ketone imide)s [PEEKimide]s was synthesized from a new aromatic diamine viz. 1,3-bis-4-(4"-aminophenoxy benzoyl) benzene and various aromatic dianhydrides such as; pyromellitic dianhydride (PMDA), 3,3',4,4'-Benzophenone tetracarboxylic dianhydride (BTDA), 3,3',4,4'- Biphenyl tetracarboxylic dianhydride (BPDA), 4,4'-Oxydiphthalic anhydride (OPDA), 4,4'-(Hexafluro isoproylidene) diphthalic anhydride (6-FDA); by low temperature two step polycondensation method. These PEEKimides were characterized by FT-IR, Solubility in organic solvents, Inherent viscosity, TGA, DSC and WXRD. Inherent viscosities of these PEEKimides were in the range of 0.23 to 0.40 dL/g in DMF, indicating formation of moderate to high molecular weights. The incorporation of ether and ketone groups greatly affected polyimide properties such as solubility in common organic polar solvents, glass transition temperature and thermal stability. These poly(ether ether ketone imide)s showed good solubility in polar aprotic solvents such as N,N-Dimethyl acetamide (DMAc), N-Methyl 2-pyrrolidone (NMP), N, N, Dimethyl formamide (DMF), and Dimethyl sulphoxide (DMSO) and had glass transition temperatures; as determined by DSC, in the range of 245 to 279 0 C. Poly(ether ether ketone imide)s showed no weight loss below 282 0 C and temperatures for 10% weight loss (T 10) were in the range of 518-648 0 C, indicating that their good thermal stability. All these poly(ether ether ketone imide)s were amorphous in nature, as per pattern of WXRD which exhibited broad halo at (2θ =~10- 30 °) and it was reflected in their good solubility in common organic solvents.

Keywords: 1,3-bis-4-(4"-aminophenoxy benzoyl) benzene, Soluble aromatic poly(ether ether ketone imide), glass transition temperature, thermal stability.

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PA-59

A FACILE UREA-ASSISTED THERMAL DECOMPOSITION PROCESS OF TIO_2/ZNO NANOCOMPOSITES AND THEIR PHOTOCATALYTIC ACTIVITY

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Abstract

The Photocatalyst is more important technology that helpful for the removal of detoxification of organic material. The facile Combustion method was suggested to prepare the TiO_2/ZnO photocatalysts. For that, the nanocomposites of TiO_2/ZnO were prepared with different amounts of zinc and oxide precursors. The products prepared were characterised by UV–vis DRS, XRD, TEM, BET, FT-Raman and EIS techniques. The prepared nanocomposites show photocatalytic response of TiO_2/ZnO was studied for the degradation of the organic dyes Methyl Orange (MO) under UV light irradiation. As an outcome of increased low charge transfer resistance, surface area, reduced band gap and rod-like morphology. A precursor consisting of titanium oxysulphate, zinc acetate dihydrate and urea was mixed together then grinding with different molar ratios. They were then calcined, crystallized by heat treatment and analysed by thermogravimetric-differential thermal analysis (TG-DTA), X-ray diffractometer (XRD), field emission scanning electron microscope (FE-SEM) and the composite of TiO_2/ZnO with an optimum level of zinc acetate (0.250gm) and titanium oxysulphate (0.750gm) contents showed enhanced photocatalytic activity in degrading the dyes MO. Composites have among the used methods to increase the efficiency of photocatalysts. Titanium dioxide and zinc oxide nanocomposites have widely used materials for photocatalysts and the degradation of toxic materials. We observed the photocatalytic performance of the samples and compared them according to the photodegradation of methyl orange. The methyl orange concentration decreased to 0.005- 1.525 after 90 minutes, the comparing starting concentration with different metal oxide structures.

Keywords: TiO_2, ZnO, nanocomposite, methyl orange degradation.

PA-60

Photocatalytic Activity of Hydrothermally Prepared Molybdenum Disulfide for Degradation of Rhodamine-B

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Abstract

In the present work, molybdenum disulfide (MoS_2) nanoparticles were prepared by simple and inexpensive hydrothermal technique. The structural and morphological properties were investigated using XRD and SEM techniques. FTIR spectra was recorded to study stretching and bending vibrations of as prepared MoS2. UV-Vis absorption spectroscopy shows absorption mainly in visible region and band gap of as-prepared MoS2 calculated from Tauc plot is found to be 2.31eV. Further, using MoS_2 as catalyst, photocatalytic degradation of Rhodamine-B (Rh-B) has been evaluated. The rate constant k was calculated as a function of initial concentration and found to be 1.13 × 10-4 s-1.

Keywords: Molybdenum disulfide, Hydrothermal method, Photocatalysis, Dye degradation.

PA-61

Effect of RPM on Polyaniline samples prepared by Chemical Bath Deposition and their capacitive behavior

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Abstract

Synthesis of PAni electrode by chemical bath deposition (CBD) method. In this synthesis Aniline, aqueous solution of $(NH_4)_2S_2O_8$ and Sulpuric acid are used. Ammonium per sulphate act as a oxidizing agent. The synthesis of PAni electrodes at variation of RPM that is 500,750, 1000,1250 and 1500 RPMs. In XRD pattern no peaks, it shows PAni is amrophous in a nature. All contact angle is less than 90, it shows PAni is hydrophilic in nature. The formation of PAni was confirmed by FT-IR spectroscopic. The morphological and elemental compositions study by using FE-SEM and EDX. In cyclic voltammetric study the first CVs shows 100 mV/S scan rate and the another optimised sample CVs shows at various scan rate from 5 mV/s to 100 mV/s in 1 M KOH electrolyte. Observed maximum specific capacitance was 1227 F/g at 2 mV/s scan rate of 500 RPM PAni electrode.

PA-62

Thermo-Physical Properties of Carbon Based Nanofluids (CBNFs)

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Abstract

The suspension of nanoparticles (1-100nm) in conventional fluids used in heat exchangers are known as nanofluids (NFs). The NFs are promising to improve the efficiency of heat transfer systems owing to their high thermal conductivity. Research in NFs is focused on thermophysical properties of carbon nanoparticles (CNPs). CNPs have high thermal conductivity, large aspect ratio, lower density, higher stability as compared to other nanomaterials. In this work, dispersion of carbon nanoparticles in a base fluids viz. water and ethylene glycol with aid of surfactant sodium dodecyl sulfate (SDS) were investigated. The concentration of nanoparticles (NPs) was varied from 0.02 Wt% to 0.1Wt% to prepare NFs by two step method. The thermophysical properties of CBNFs were studied. The dispersion stability of NFs was analysed by dynamic light scattering. The effect of concentration of CNPs on density, ultrasonic velocity, thermal conductivity, compressibility thereby was studied. The stability and thermophysical properties of CBNFs as a function of concentration of NPs, base fluids and surfactant is presented in this paper.

Keywords: Carbon nanoparticles, nanofluids, ultrasonic interferometer, thermal conductivity, heat transfer systems

Acknowledgement: The authors are very thankful to Department of Technology, Shivaji University Kolhapur for providing research facilities.

PA-63

Improved Pt & SiO_2 doped SnO_2 sensor to sense NH_3 gas

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Abstract

In the present work, powder nano SnO_2 was prepared by chemical precipitation method. 2 wt % Pt and 3 wt % SiO_2 were doped in SnO_2. On alumina tube, Pt and SiO_2 doped SnO_2 layers were developed and Au electrodes and Platinum wires were used. Each sensor was calcinated at about 600°C for 1h in ambient environment. To improve stability and repeatability, fabricated sensors were kept in N_2 environment for 2 h at about 160°C and then in air for about 1.5 h. X-ray diffraction technique was used for the phase characterization study of the prepared materials and SEM (scanning electron microscopy) was used for porosity measurement. The resistance measurement of the prepared sensors was done with the help of voltage drop method and then sensitivity was determined. Sensitivity of sensor was checked at different concentration of ammonia. Sensitivity was noted and maximum (18.7) at about 60 ppm of NH_3 gas concentration for Pt and SiO_2 doped SnO_2 sensor. Also stability of the sensor was checked and found to be most stable. XRD, SEM and IR spectrum supported in increasing the sensitivity.

Keywords: Pt and SiO_2 doped SnO_2 sensor, chemical precipitation method, sensitivity, stability

PA-64

Measurement of acoustic parameters of highly viscous polymer solution using pulse echo technique

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Abstract

The ultrasonic technique provides an effective and reliable tool to investigate properties of polymer solutions in the light of phase separation studies. Acoustical studies in polymer solutions and in solid polymers have been the subject of research in recent years. In order to perform the polymerization process, it is necessary to measure viscosity. In case of highly viscous fluid, viscosity starts to be dependent of the vibration and rotation frequency of the sensing element. The propagation of ultrasonic waves and the measurement of their velocity, density and viscosity in solution form an important tool for the evaluation of various acoustical and thermo- dynamical parameters which gives an insight into the nature of miscibility/compatibility and molecular interactions in polymer solution. The phenomenon polymer- solvent miscibility may arises due to any specific molecular interactions such as hydrogen bonding, dipole- dipole interactions and charge transfer complexes for homogeneous polymer- solvent mixture. Miscibility is an important phenomenon in polymer solution to achieve mechanical integrity, better adhesion and better processing. In ultrasonic pulse-echo systems, polymers like PAA (Polyacrylamide) is often used for flocculate formation in waste water treatment. In present research work we have chosen polyacrylamide solution as a highly viscous fluid and present a method for measuring ultrasonic and acoustic parameters such as ultrasonic velocity, density and viscosity and other related acoustic parameters in the temperature range 288 K to 308 K for 5MHz ultrasonic frequency.

PA-65

Polymer based superhydrophobic coating for self-cleaning applications

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Abstract

The lotus leaf is an icon of self-cleaning behavior in nature. The rolling water droplets on lotus leaf are easily carried out dust particles, such phenomenon is known as the lotus effect or self-cleaning effect. The notable contact angle and sliding angle of lotus leaf have attracted mind of students, researchers, and industrialists from the last two decades. In daily life surfaces of many objects are polluted by various type of dust contamination. Traditional cleaning methods can damage the surface of an object and reduces shine. The self-cleaning superhydrophobic coating is one of the well-known option to protect the surface of objects and enhance life span. In the present work, the superhydrophobic coating was prepared by applying a hydrophobic polypropylene layer on the glass substrate through the dip coat technique. The prepared superhydrophobic coating has revealed a water contact angle of 156 ± 4° along with a sliding angle of 6 ± 2°. Such type coating has been applicable for windows glass, vehicle, solar panel, blade of wind turbine, and so on.

Keywords: Superhydrophobic, self-cleaning, polymer coating, and lotus effect.

PA-66

Investigations on the spray deposited tin sulfide thin films

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Abstract

Tin sulfide (SnxSy) thin films have been spray deposited with different Sn:S ratios at constant substrate temperature of 200°C. The structural, morphological and optical properties of tin sulfide thin films have been studied through X-ray diffraction (XRD), Field emission scanning electron microscopy (FESEM) and UV-Vis spectroscopy. XRD studies revealed the polycrystalline nature of tin sulfide thin films with orthorhombic crystal structure. The crystalline sizes are found to be in the range of 17-21 nm with increasing Sn:S ratios. Lattice strain of tin sulfide thin films decreased with increasing Sn:S ratios. Dislocation density is observed to be in the range of 2.25-5.10 nm-2. FESEM images show Sn:S ratio dependent surface morphology with formation of needles and fine spherical shaped grains with smooth surface. The optical band gap of tin sulfide thin film varies from 1.43 to 2.0 eV with increase in Sn:S ratios. The structural and optical properties tin sulfide thin films indicate that these films can be utilized in thin film solar cells.

Keywords: SnS, thin films, X-ray Diffraction, FESEM, UV-Vis Spectroscopy.

PA-67

STRUCTURAL AND DIELECTRIC PROPERTIES IN PVDF/CLAY NANOCOMPOSITES

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Abstract

The work presents describes the study of the ferroelectric phase and dielectric properties of PVDF and organically modified clay nanocomposites. The PVDF/Clay nanocomposites were prepared by simple melt mixing method. The prepared nanocomposites were characterized for structural and dielectric properties. The structural characterization done using X-ray diffraction techniques indicates the formation of ferroelectric □ phase in nanocomposites. The dielectric permittivity study shows the significant enhancement in permittivity in the low frequency region. The enhancement in the permittivity is explained on the basis interfacial polarization. The dielectric loss spectra of PVDF shows two relaxations corresponding to the glass transition temperature and crystalline relaxation. However, in case of PVDF/Clay nanocomposites, the dielectric relaxation corresponding to the crystalline relaxation completely disappears which is attributed to dielectric manifestation of ferroelectric □ phase in nanocomposites. Further, the activation energy study of crystalline dielectric relaxation peak shows a Arrhenius type of behavior whereas the glass transition dielectric relaxation peak shows non-Arrhenius type of behavior.

Keywords: PVDF, Dielectric Permittivity, Dielectric Relaxation, Ferroelectric Phase, Polymer Nanocomposites.

PA-68

Structural, morphological and dielectric evaluation of Co2+ doped zinc ferrite aluminate

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Abstract

Cobalt substituted zinc ferrite aluminate with composition Zn1-xCoxFeAlO4 (x =0.0, 0.2, 0.4, and 0.6) was prepared by chemical sol–gel synthesis. The prepared samples were characterized by X-Ray diffraction (XRD), Transmission electron microscope (TEM) technique. The cubic spinel single phase was confirmed from X-ray and selected area electron diffraction (SAED) pattern. The true values of lattice constant were obtained from Nelson–Riley extrapolation plot and lattice strain also conformed with the help of Williamsons-Hall equation. The TEM image confirmed average crystallite size of 31nm. The dielectric study confirms dielectric constant and loss tangent decreases with the increasing frequency of applied field.

PA-69

Spray Pyrolysis Synthesized Zinc ferrite Thin Film for Supercapacitor Application

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Abstract

Zinc ferrite film deposited on nickel foam by using simple and inexpensive Spray Pyrolysis technique for electrochemical supercapacitor application. The structural, morphological, and optical properties of synthesized zinc ferrite film were investigated by X-ray diffraction, scanning electron microscope, UV-visible, and FT-IR spectroscopy respectively. The electrochemical measurement of the as-prepared film was carried out by using cyclic voltammetry and galvanostatic charge-discharge techniques. The specific capacitance of zinc ferrite material was measured in a potential range of 0 to 0.6 V, gives capacitance of 382.50 F/g at a scan rate of 10 mV/s. which makes it a plausible candidate for supercapacitor electrode material.

Keywords: Zinc ferrite, Spray Pyrolysis Technique, Supercapacitor, Cyclic Voltammetry and Specific Capacitance.

PA-70

ZnO nano size particles to minimize the toxicity as antimicrobial agents-A review

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Abstract

Zinc oxide nanosizeparticles (NPs),are one of the most significant metal oxide nanoparticles, widelyused in various fields.Because ofstrong UV absorption properties,ZnO is used health care products,cosmetics and sunscreen lotions. In addition, ZnO NPs have superior antibacterial, antimicrobial and excellent UV-blocking properties. Zinc oxide can also be used in other branches of industry, including photo-catalysis, electronics, electro-technology etc.It is generally known that zinc as an essential trace element extensively exists in all body tissues, including the bone, skin and so on. As the main component of various enzyme systems, zinc takes part in body's metabolism and plays crucial roles in proteins, nucleic acid synthesis and neurogenesis. It is evident that the reduced size of ZnO particles to nanoscale, makes zinc more simply to be absorbed by the body. Thereforenano-ZnO is commonly used as a food additive. Moreover, ZnO is graded as a "GRAS" (generally recognized as safe) substance by the US Food and Drug Administration (FDA). With these properties, ZnO NPs have received more attention in biomedical applications. Compared with other metal oxide NPs, ZnO NPs are inexpensive.In this paper,we put forth a review on effect of ZnOnano size particles to minimize the toxicity as antimicrobial agents.

Keywords: ZnO, GRAS, NPs, UV-absorption.

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PA-71

THERMAL AND SPECTROSCOPIC INVESTIGATIONS OF MOLYBDENUM TRIOXIDE THIN FILMS

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Abstract

Thin films of molybdenum trioxide were deposited onto glass by ultra-spray pyrolysis technique. The effect of concentration (0.5M, 0.125M, 0.M) and temperature on the structural and morphologicalproperties of MoO3 thin films were studied.Molybdenum oxide (MoO3), among the other transition metal oxides, exhibits interesting structural,chemical, electrical, and optical properties [1–2].The samples were prepared at different temperatures of 150◦C, 250 ◦C and 350 ◦C using spray concentration varying between 0.5M to and 0.125M while the other spray operating parameters are fixed at their optimum values.The crystalline nature and crystallite size of the films were investigated by X-ray diffraction.The X-ray diffraction patterns prove that the films deposited at substrate temperature of 150 ◦Cand are amorphous while the films deposited at 350 ◦C and arecrystalline with only a-phase. The particle size distribution for the prepared samples are found to be inthe range from 30 to 50 nm. The particle size distribution tends to be narrow as the temperature increaseswhich indicates the improvement in homogeneity of the samples. Thin films prepared by ultra-spray pyrolysis technique were also characterized by UV-Visible spectroscopy, FT-IR and FE-SEM.

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PA-72

SULFUR INDUCED MODIFICATION IN PHOTO-CONDUCTING PROPERTIES OF NANO-CRYSTALLINE LEAD SULFIDE THIN FILM

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Abstract

In this work, we report the effect of sulfur concentration on the photo-conducting properties of nano-crystalline lead sulfide (PbS) thin film synthesized using spray pyrolysis technique on glass substrate at 250 OC. To vary the sulfur concentration in the film, molar ratio of S/Pb was varied in the range from 0.2 to 1.8. Structural and morphological analysis of the film confirms the nano-crystalline nature of PbS thin film with crystallite size of ~ 50 nm uniformly coated on glass substrate. Photo-conducting properties of the film was measured using silver electrodes with channel length of 2 mm. Photo-conducting property of PbS thin film under visible light illumination were measured at various intensities and the linear I-V measurement performed in dark and under light illumination shows low resistive contact between silver electrode and PbS. The PbS thin film show enhancement in the photo-conducting properties with increasing S/Pb ratio and high photocurrent (320 µA) was observed in the film with highest S/Pb ratio of 1.8. Moreover, the estimated photo-sensitivity of this PbS thin film was ~ 180 at 30 V. The optimized film can effectively be used to fabricate extremely low cost and highly efficient visible light photo-detector.

Keywords: Nano-crystalline, PbS; spray coating, photo-detector, fast response and decay time.

PA-73

Nanoporous Network of Nickel Oxide for Sensitive and Selective Detection of Toxic NO_2 Gas

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Abstract

The nanoporous network of nickel oxide (NiO) thin films have been synthesized by a facile hydrothermal route with various precursor concentrations. The X-ray diffraction (XRD) patterns of annealed NiO films revealed low intense peaks, confirming nanocrystalline nature with cubic structure. The scanning electron microscopy (SEM) images exhibited well-defined and nanoporous interconnected network. The gas sensing properties of NiO thin films for NO2 gas were investigated. The measurements revealed that the sample deposited at concentration 0.2M (Ni20) exhibit better gas sensing performance, due to its high surface area and maximum pore-volume available for gas adsorption.

Keywords: Nickel oxide, Nanoporous, Gas sensor.

PA-74

Structural and induced strain properties of Yttrium doped 0.5(Ba0.7Ca0.3Ti)O3 – 0.5(BaZr0.15Ti0.85)O3 electroceramics via composition design strategy

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Abstract

The 0.5(Ba0.7Ca0.3Ti)O3-0.5(BaZr0.15Ti0.85)O3 electroceramics with weight percent Yttrium substitution (0 wt, %1 wt %, 3 wt %) were synthesized at 1350 °C for 5 hrs. via conventional solid state reaction method. All prepared compositions crystallized in the pure polycrystalline perovskite phase without trace of any secondary phase formation suggest that Ca2+, Zr4+ and Yttrium are well diffused in the host lattice. The c/a ratio of prepared ceramics are shows decreasing trend having values 1.0141, 1.0060, 1.0020, which indicates shrinkage in unit cell results the induced strain having the values 0.0006, 0.0016, 0.0011 for 0 wt, %1 wt %, 3 wt % substituted BCT-BZT respectively, calculated by W-H plot via linear fitting method. The scanning electron surface morphology of synthesized ceramics shows inhomogeneous grain distribution with pores present in the material. Which have additional evidence from the density measurement by Archimedes principle that, with the increasing concentration (in wt %) of Yttrium in the BCT-BZT the density of material decreases with increase in the porosity. The polarization with respect to applied electric field shows typical hysteresis loop, which confirms the ferroelectric nature of all synthesized compositions. The temperature dependent dielectric constant measurements show the decrease in Curie temperature with increasing the Yttrium concentration. Also, the broadening of dielectric maxima peak indicates the relaxor behavior of material with increasing the Yttrium concentration. Thus, this study reveals the structural and induced strain information of weight percent substitution of Yttrium in 0.5(Ba0.7Ca0.3Ti)O3-0.5(BaZr0.15Ti0.85)O3 via composition design strategy.

Keywords: Lead-free, BaTiO3, Curie temperature, W-H plot.

PA-75

ELECTRODEPOSITION OF COPPER DISCHARGE ELECTRODE FOR ELECTROSTATIC AIR CLEANER (EAC)

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Abstract

The electrosynthesis of Cu coatings were obtained from cyanide-free electrolytes containing $CuSO_4.5H_2O$, Triethanolamine (TEA) and NaOH with different concentrations of cations. The Electrochemical analyses we reperformed using cyclic voltammetry and potentiostatic polarization in order to investigate the effect of TEA as a complexing agent of Cu2+. The obtained voltammograms for single metal deposition exhibits several electrodeposition steps. In the case of copper, the first step does not lead to metal deposition and is attributed to the Cu(II)→Cu(I) transformation. Rest of the steps result in the Cu(0). The morphology and analysis of copper are reported. From the results of this work, a promising and environmentally friendly alternative to the electroplating bath can be developed. From this bath a Cu can be electrodeposited using a non-cyanide electrolyte. These copper plated electrodes are further used as a discharge electrode in Electrostatic Air Cleaner (EAC) for removing dust and smogs

Keywords: Electrodeposition, Triethanolamine, copper, Electrostatic Air Cleaner.

PA-76

Green synthesis of magnetite nanoparticles (Fe_3O_4 NPs) using Acacia concinna fruit extract and their antibacterial activity

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Abstract

Here in, we report the green synthesis and characterization of magnetite nanoparticles (Fe_3O_4 NPs) using Acacia concinna fruit for the first time. The synthesized NPs were characterized using UV-visible spectrophotometer (UV-Vis-NIR), Fourier transform infra-red spectroscopy (FTIR), X-ray diffraction (XRD) and Scanning electron microscope (SEM). The crystallite size of obtained NPs was found to be 28 nm with quasi-spherical morphology which was determined by XRD and SEM techniques. The synthesized Fe3O4 NPs showed distinctive antibacterial activity against gram-negative E. Coli and Psedomonas aeruginosa microorganism.

Keywords: Green synthesis, Fe3O4 NPs, Acacia concinna fruit extract, Characterization, Antibacterial activity.

PA-77

STUDY THE ACOUSTICAL PROPERTIES OF LEAD OXIDE NANOPARTICLE AT 305 K USING NANOFLUID INTERFEROMETER

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Abstract

In the present paper, study the of acoustical properties of lead oxide nanoparticles through the measurement of ultrasonic velocity and density of lead oxide nanoparticles as a ligand in 70% dioxane water mixture-based solution, this measurement is important for understanding the particle-particle, particle-solvent and molecular interaction. The lead oxide nanoparticles compound is reported [1] But the acoustical properties of lead oxide nanoparticles are attracting attentions of many researchers and due to this, we have to focus on the study of acoustical parameters like adiabatic compressibility (β) [2], acoustic impedance (Z) [3], free length [4] and relative association [5] by using the nanofluid interferometer. These measurements were carried out at frequency 2 MHz and temperature 305 K. The obtained results have been compared with the reported data and observed the behaviour of ultrasonic velocity and acoustic properties at different concentrations range of ligand such as 0.01 M, 0.05 M, 0.10 M, and 0.15 M reveals the presence of molecular interaction between particle-particle, particle and solvent and this aacoustical study provide the much important information about the lead oxide nanoparticle and solvent interaction [5].

Keywords: Lead Oxide Nanoparticles, Ultrasonic velocity, Density, Acoustical properties, Particle-solvent interaction.

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PA-78

HYDROTHERMALLY GROWN POROUS NETWORK OF NIO NANOFLAKES FOR SUPERCAPACITOR APPLICATION

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Abstract

Supercapacitor has been emerged as an efficient energy storage device that exhibits electrochemical performance equivalent to the batteries. Metal oxides have been proved to be effective electrode materials in supercapacitors. Nickel Oxide (NiO) is one of those suitable metal oxides which are used as electrode material in supercapacitor. In the present work, hydrothermally grown NiO exhibits the evolution of nanoflake like morphology. The unmatured nanoflakes found at low concentration turns to matured nanoflakes at higher concentration and these nanoflakes change to wider nanoflakes at still higher concentration. The NiO nanoflakes show pseudo capacitive nature. However the width of NiO nanoflakes affects the electrochemical behaviour significantly. The highest specific capacitance shown by NiO nanoflakes is 376 Fg-1 and energy density is 13 W h Kg-1. The improved performance can be attributed to the network of nanoflakes which provides active sites for the fast ion diffusion.

PA-79

Fabrication, microstructure and biological activities of Cu-Zn manganite nanoparticles for thrombotic applications

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Abstract

Copper substituted zinc manganites Zn(1-x)CuxMn2O4 (BCZMO) NPs were produced by co-precipitation method at ambient temperature. BCZMO NPs were studied by XRD, SEM and FTIR spectra for microstructure characterizations. XRD study confirms the tetragon structure of BCZMO NPs and effect of copper on BZMO NPs. SEM images showed highly porous, algae like grains. The FTIR spectra of BCZMO NPs support the confirmation of tetragon structure. The BCZMO NPs showed coagulant activity by enhancing the coagulation time of citrated plasma of human being and inhibited the platelet aggregation. BCZMO -NPs did not show hemolytic activity in RBC cells intimate its non-toxic nature. Finally, BCZMO-NPs were non-toxic and known to exhibit blood clotting and antiplatelet activities, which can be used in the field of biomedical applications especially as antithrombotic agents.

Keywords: Cu-Zn manganites, coagulant, antiplatelet.

PA-80

Synthesis and Characterization of Graphene Oxide, and Reduced Graphene oxide composites with Conducting Polymer

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Abstract

The synthesis of Graphene oxide (GO) from commercially available graphite powder is demonstrated in this research paper. Via chemical reduction using hydrazine hydrate, the prepared GO is converted to reduced graphene oxide (RGO). Graphene oxide-polyaniline (GO-PANI) and reduced graphene oxide-polyaniline (RGO-PANI) nanocomposites have also been prepared in order to increase the conductivity of GO and RGO. Conducting Polymer-polyaniline was prepared by electrolyte-hydrochloric acid oxidative polymerization and ammonium persulphate was used as an oxidant. The synthesized products were characterized by UV- spectroscopy, Energy-dispersive X-ray spectroscopy (EDXS), Field Emission Scanning Electron Microscope (FESEM) and thermogravimetric analysis (TGA).

Keywords: Graphene oxide (GO), Reduced Graphene Oxide (RGO), Graphene oxide-polyaniline (GO-PANI), reduced graphene oxide-polyaniline (RGO-PANI).

PA-81

EQCM study of manganese oxide and its electrochemical performance

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Abstract

The influence of precursor concentrations on the electrodeposition of manganese oxide was investigated by Electrochemical Quartz Crystal Microbalance (EQCM) and cyclic voltammetry study. The Massograms of MnSO4 at various concentrations clearly shows the oxidation and reduction of manganese species and reveals that, as a precursor concentration increases the deposited mass is increased at potention ~0.89 V vs SCE. Morphology and chemical composition of Manganese oxide deposited at various precursor concentrations were analyzed by scanning electron microscopy (SEM) and energy dispersion spectroscopy (EDS). The results shows that formation of nano wire stuctured manganese oxide. An electrochemcial studied were investigated using cyclic voltammetry, galvanostatic charge discharge and maximum specific capacitance 243 F.g-1 was found for sample prepared in 0.1 M MnSO4 at 0.1 M Na2SO4 electrolyte.

Keywords: Manganese dioxide, EQCM, electrodeposition, thin films.

PA-82

Surface Functionalized Superparamagnetic Zn-Mg Ferrite Nanoparticles for Magnetic Hyperthermia Application towards Non-invasive Cancer Treatment

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Abstract

Surface functionalized superparamagnetic Zn-Mg ferrite (Zn0.4Mg0.6Fe2O4) nanoparticles was prepared by sol-gel auto-combustion route. The pristine and surface modified Zn-Mg Ferrite nanoparticles were characterized by standard techniques. XRD patterns of both the samples ensured the nanocrystalline single phasic cubic spinel structure. FT-IR spectra revealed the presence of vibrational frequency-modes belonging to spinel structure and successful coating of oleic acid (OA) over Zn-Mg Ferrite. The nano-size spherical grains with some agglomeration and OA coating over Zn-Mg Ferrite were visualized in FE-SEM images. The hydrophobic-to-hydrophilic surface-transition of Zn-Mg Ferrite was confirmed by water contact-angle measurements. The BET surface-area and distribution of pore-radius was evaluated by recording N2-isotherms. The M-H plots confirmed the superparamagnetic nature of both the samples. The colloidal stability and distribution of particle sizes were estimated by Zeta potential and DLS measurements. Magnetic hyperthermia studies were carried out for different concentrations (2, 4 and 6 mg/mL) of both the samples. The biocompatible nature of both the samples was studied by cell-viability studies. All these results ensure the implementation of OA coated Zn-Mg Ferrite nanoparticles with minimum dose rate (6 mg/mL) in magnetic hyperthermia therapies for non-invasive cancer treatment.

PA-83

Magnetically Retrievable Fe-doped TiO_2 Nanoparticles for Photo-induced Toxic Dye Removal Applications

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Abstract

In light of this, we have made an attempt to fabricate the Fe-doped TiO_2 nano-photocatalyst via simple and cost effective sol-gel auto ignition route by following the green synthesis approach. The prepared nano-photocatalyst samples were characterized by means of X-ray diffraction (XRD), scanning electron microscopy (SEM), BET and UV-Vis spectroscopy in order to study the structural, morphological, surface and optical properties. XRD analysis validated the anatase phase formation and nanoscale structure of the prepared nano-photocatalyst. The spherical shaped grain morphology with some agglomeration was visualized in SEM image. The high specific surface area values were observed from the N_2-adsorption/desorption curves of the prepared samples. Further, the photocatalytic performance of the prepared nano-catalyst samples was evaluated by measuring the percentage degradation of toxic dyes (Methylene Blue and Rhodamine B) under UV light radiation. The degradation rates as 98.7% and 98.2% in 120 min and 130 min was observed in the case of Methylene Blue and Rhodamine B respectively. The reusability of the prepared nanoparticles was evaluated for 5 cycles and it shows negligible changes in dye degradation. All these outputs shows that prepared Fe-doped TiO_2 nanocatalyst are promising for industrial wastewater purification treatments.

PA-84

Study on effect Gamma Irradiation on Superhydrophobic SiO_2-PMMA Nano-composite Coating

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Abstract

In the present work, Lotus leaf inspired superhydrophobic surface was prepared by simple dip coat technique using methyltrimethoxysilane (MTMS) – polymethylmethacrylate (PMMA) nanocomposite on glass substrate. The effect of gamma irradiation on wettability and surface structure of superhydrophobic coating were studied systematically. Prepared coating has showed water contact angle 160°. The rough microstructure was observed in surface analysis. When 5, 10 KGy dose of gamma irradiation with 1.25 MeV average energy (Co-60) applied on superhydrophobic coating, the wettability decreased to 144° and vanishes microstructure of coating surface. The chemical bonding on coating surface were examined by FTIR. Such type of coating may be applicable in industrial use.

Keywords: Superhydrophobic, lotus leaf, and gamma irradiation.

PA-85

STRUCTURAL AND ELECTRICAL PROPERTIES OF NANO COPPER OXIDE DOPED WITH TIRUNELVELICA SANJAPPA LEAVES

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Abstract

An upsurge in research for medicinal plants is observed globally. Tirunelvelica Sanjappa (TS) leaves have the great potential to act as a source of positive drug because of presence of a variety of secondary metabolites such as alkaloids, flavonoids, phenol, terpenoids, saponin and carbohydrates. The dried leaf powder was subjected to solvent extraction for preliminary secondary metabolites analysis. These phyto constituents seemed to be the potential to act as a source of functional drugs and also in the improvement of the physical condition of the patients as a result of the presence of various compounds that are fundamental role for good health. Further nano copper oxide was doped with tirunelvelica sanjappa dried leaves and made in to fine powder for characterization. The powder was characterized by UV-Visible Spectroscopy and FTIR. The D.C. conductivity measurements were performed using Two probe method. At room temperature, D.C. conductivity was found to be 87μS/cm.

Keywords: Tirunelvelica Sanjappa leaves, UV-Visible Spectroscopy, FTIR and D.C. conductivity.

PA-86

TEOS-based Hydrophobic Coating on Glass Substrate for Self-Cleaning Application

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Abstract

Superhydrophobic coatings are attracting huge attentions of common people due to its self-cleaning applications. In the present work, we have prepared hydrophobic coatings on glass substrates using dip coating method and post surface modification by trimethylchlorosilane (TMCS). In the first part, silica sol was obtained through Stober process, where tetraethylorthosilicate (TEOS) was used as precursor. The prepared silica sol was coated as first layer on glass substrate by dip coating method. After heat treatment, the prepared glass substrate was surface-modified by TMCS using dip and chemical vapor deposition (CVD) methods. The dip-coated coating exhibited water contact angle ~ 142º, whereas CVD modified coating showed water contact angle ~ 135º. Hence, dip coated coating was more hydrophobic than CVD. We are currently working on controlling the thickness of the coating, other sol-gel parameters, wettability, durability and self-cleaning properties of the coating.

Keywords: Stober process; Superhydrophobic; Lotus effect; Self-cleaning, Sol-gel.

PA-87

Preparation & PL analytical study of red and blue emitting KCaPO4 phosphor for lighting industry

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Abstract

Because of the ability to join trivalent cerium particles into a wide range of host materials and the good spectroscopic properties of Ce3+, trivalent cerium-actuated materials have gotten reestablished interest for some applications. The compounds KCaPO4:Ce3+ was orchestrated by altered wet chemical synthesis strategy and actuated by alkaline earth Ce3+ ion, changes from 1 to 10 mol % concerning the relating host material. The prepared compound characterized by XRD, SEM, PL and CIE coordinates. A wide absorption band in the scope of 280 to 380 nm because of the 4f–5d change of Ce3+ ions topping at 332 nm is noticed shows a blue emission band focused at 442 nm. KCaPO4:Eu3+ phosphor presented several emission peaks, which corresponded to the 5D0→7FJ (J=0, 1, 2, 3, 4) transition of Eu3+, respectively. And the highest emission located at 613 nm. Monitored at 613 nm emission, the excitation spectrum contained 200~350 nm and 350~450 nm two excitation bands, which corresponded to a weak charge transition broad band absorption CTS and a strong f-f transition absorption of Eu3+, respectively. And the highest excitation peak located at 397 nm.

Keywords: Photoluminescence, XRD, SEM, CIE,

PA-88

Studies on Structural Properties of Ytterbium (Yb3+) Substituted Mg-Cu-Zn Nano-ferrites

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Abstract

Nano-ferrites with composition Mg0.55Cu0.05Zn0.4YbxFe2-xO4 (where x = 0.0, 0.01, 0.02 and 0.03) were prepared by chemical method. The ferrites samples were characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy (SEM) techniques. The single phase cubic spinel structure ferrite formation was confirmed from XRD analysis. The lattice constant and crystallite size of Mg-Cu-Zn ferrites found to be decreases with increasing concentration of Yb3+ content. The two major absorption bands appear in the range 432.16 to 441.55 cm-1 and 568.25 to 578.56 cm-1 corresponding to octahedral and tetrahedral sites in the FTIR spectra suggest formation of ferrites. Morphological study shows the formation of nano-ferrites. The EDX analysis approves the formation of required ferrites in desired stoichiometric ratio without any impurity phase.

Keywords: Mg-Cu-Yb-Zn nano-ferrites, chemical method, XRD, FTIR, FESEM, EDX.

PA-89

Utilization of Fe_2O_3 Nanoparticles in Arsenic Adsorption from the Contaminated Water by Novel ASH Supported Method

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Abstract

Arsenic in the water is posing detrimental ramifications to the human health in general and aquatic wildlife in particular. The present article portrays the impact, concentration and the treatment time of synthesized iron oxide nanoparticles in expelling arsenic from water. The fundamental fascination of this article is, it is novel, swift, extremely simple and involves financially savvy synthesis process of iron oxide nanoparticles called as ASH Supported method. Simulated sample of As (III) of known concentration is prepared in the laboratory. The comprehensive study of treatment process of iron oxide nanoparticles at different concentration and treatment time was addressed on simulated water samples. This paper delineates the percentage removal of arsenic from arsenic contaminated water using iron oxide nanoparticles. The results designates that α-Fe_2O_3 concentration has a noteworthy arsenic adsorption capacity. And the striking point is the impact in adsorption is significant (99%) when arsenic contaminated water is treated for very less time with very low concentration of nanoparticles. This article also renders that the arsenic removal is phase induced rather than size induced.

Keywords: ASH Supported Method, Iron oxides Nanoparticles, Angle dispersive X- ray diffraction, TXRF.

PA-90

Photodegradation of Dye Pollutants on Nanocrystalline Co Doped Li0.5Fe2.5O4 under UV-Visible Light Irradiation

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Abstract

The Co doped Li0.5Fe2.5O4 ferrites were successfully prepared by using sol-gel synthetic process. The resulting nanosample has been characterized by using XRD and SEM techniques. The X-Ray diffraction (XRD) analysis studies clearly suggest the formation of single phase nanomaterials. The SEM analysis indicates the formation of uniform and fine grains like morphology in mixed-metal oxides. The results of combustion synthesis elucidate that the fuel to oxidizer ratio is the most effective factor for the formation and surface morphology of mixed-metal oxides. The synthesized Co doped Li0.5Fe2.5O4 ferrite has been used for the adsorption studies of Methyl orange dye by batch experiments. It is found from the adsorption studies that the removal percentage of Methyl orange is much better. Li0.5Fe2.5O4 particles are good adsorbent materials for removal of Methyl Orange dyes as compare to the Co doped Li0.5Fe2.5O4 nanopowder. However, the adsorption capacity of Li0.5Fe2.5O4 can be lower by doping with Cobalt.

Keywords: Sol-gel Chemistry, XRD, SEM, Photodegradation, Magnetic materials.

PA-91

X-RAY K-ABSORPTION STUDY OF NICKEL (II) COMPLEXES OF SCHIFF BASE LIGANDS

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Abstract

Three nickel (II) complexes of Schiff base ligands, L1 =(P-methoxy anilino)-P- methoxy phenyl acetonitrile, L2 = (P-methoxy anilino)- phenyl acetonitrile and L3 = (P- methoxy anilino) –P– chloro phenyl acetonitrile have been prepared by the condensation of P-methoxybenzaldehyde , benzaldehdye and P-chloro-benzaldehyde with P-anisidine respectively. The mentioned three ligands L1, L2 and L3 were used to prepare three nickel (II) complexes Ni-21 = [Ni2(p-Methoxy ben)(p-Ani)](NO3)2 , Ni-22 = [Ni2(ben) (p-Ani)](NO3)2 and Ni-23 = [Ni2(p-Chloro ben)(p-Ani)](NO3)2 respectively. X-ray k-Absorption Near Edge (XANES) spectra of these three complexes have been recorded at RRCAT (Raja Ramanna Center for Advance Technology), Indore, M.P, India by using Synchrotron radiation source. Various X-ray absorption parameters e.g., chemical shift, edge-width and shift of the principal absorption maximum have been obtained with the help of XANES spectra. Data analysis program Athena and the computer software Origin 6.0 professional have been used to processed the obtained data. The results of the study have been reported in this paper.

Keywords: Schiff base, XANES, RRCAT, Athena, Origin 6.0.

PA-92

SUPERCAPACITIVE BEHAVIOR OF NANOSTRUCTURED CuO THIN FILM: EFFECT OF ELECTROLYTE

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Abstract

nanostructured copper oxide (CuO) thin film have been synthesized by chemical bath deposition (CBD) method. The supercapacitive properrties of nanostructured CuO electrode is investigated using cyclic voltammetry (CV) curve, galvanostatic charge discharge (GCD) and electrochemical impedance spectroscopy (EIS). The significant impact of electrolyte on the supercapactive performance is investigated. Amongst different aqueous electrolytes (1M KOH, 1M NaOH and 1M Na2SO4), the CuO electrode have shown superior performance in 1M aqueous KOH electrolyte. The highest specific capacitance of 467 Fg−1 at a scan rate of 5 mVs−1 and 100% cyclic stability for 2000 cycles, in 1 M KOH electrolyte.

Keywords: Copper Oxide(CuO), Chemical Bath Deposition, Supercapacitor, Electrolyte.

PA-93

Calculation of Thermal Conductivity of Silicon Square Nanowire by Nonequilibrium Molecular Dynamics Simulation

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Abstract

Nowadays, Modelling and Simulation is evolving because it is a critical tool for researchers which allow optimizing designs without complication and the significant cost of nanofabrication processes. Nonequilibrium Molecular dynamics simulations (NEMD) are performed to explore the temperature dependent thermal conductivity in Silicon square nanowire (SiSqNw). SiSqNw is scalable thermoelectric material. In this paper, the Stillinger-Weber potential is used. In this paper,the length of the simulation cells is 293.618 A0. At 1K thermal conductivity of SiSqNw is 1.08637W/mK.

Keywords: Thermal Conductivity, Nonequilibrium Molecular Dynamics Simulation,Silicon Square Nanowire.

PA-94

CHARACTERIZATION OF TONER POWDER

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Abstract

This paper seeks to characterize and identify the compounds present in the toner sample using various techniques. Toners are black mixtures of thermoplastic base which is composed of alkenes, ethers, oximes and other additives. The properties of these compounds were examined using XRD, UV spectroscopy, Differential Scanning Calorimetry, Electron Paramagnetic Resonance and FTIR. The variation in the mean size of the toner particle was calculated using X-ray diffractometer. Qualitative, quantitative, structure elucidation of organic compounds and the detection of impurities are studied using UV-spectroscopy. FTIR examined the structural and functional information of the toner powder and a thermal analysis was done using DSC. This toner powder finds its application in laser printers for electro photography printing.

Keywords: Toner powder, XRD, UV spectroscopy, FTIR, DSC.

PA-95

Cobalt ferrite MNP's: An efficient and robust catalyst for synthesis of 1,3,5-trisubstituted pyrazolines.

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Abstract

In the present article, a new strategy for synthesis of 1,3,5-trisubstituted-2-pyrazoline and its derivatives was designed via condensation of substituted chalcones and aryl hydrazine in presence of the magnetically separable cobalt ferrite nanoparticles (CoFe2O4 NPs) to get desired product with excellent yield in shorter reaction time. The formation of CoFe2O4 nanoparticles was confirmed by structural and morphological studies as X-ray diffraction (XRD) and scanning electron microscopy (SEM), The synthesized compounds were characterized and confirmed by spectral analysis. The ambient reaction conditions, ease of purification of the products and reusability of the catalyst up to five catalytic cycles with almost negligible loss of catalytic activity making the current protocol benign and promising for its synthetic applications.

Keywords: Chalcones, pyrazolines, Ferrite nanoparticles, benign, magnetically recoverable, green solvents.

PA-96

Preparation and characterization of nanocrystalline copper oxide thin films deposited by vaccum evaporation technique at room temperature

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Abstract

The copper oxide thin film samples have been prepared using two step method. In the first step the copper thin films were deposited by using vacuum evaporation technique on the glass and fluorine doped tin oxide coated glass substrates. In the second step, the as-deposited copper films were annealed at 200OC for 5h in ambient air to obtain pure Cu2O phase. The X-ray diffraction pattern confirms the formation of Cu2O the phase with preferred orientation along (110). Raman spectra of the Cu2O films in transparent state (yellow) show high intensity peaks centered at 561cm-1 and 646 cm-1, which shift toward higher wave numbers on insertion of Li+ ions with the coloration of the films (Brown). SEM images of the as deposited film show uniform distribution of copper grains of ~10-30 nm size, which increases to ~40-90 nm upon annealing. Tauc plot reveals a direct band gap of 2.06 eV.

Keywords: Electrochromism, Copper Oxide, Thin films, Raman spectrum.

PA-97

STRUCTURAL PROPERTIES OF CO-PRECIPITATED TIN OXIDE NANOPOWDERS

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Abstract

Nanocrystalline tin oxide (SnO2) was synthesized using stannic chloride pentahydrate (SnCl4.5H2O) as a precursor in aqueous medium by chemical co-precipitation method. The influence of sintering temperature on the crystalline structure was studied. X-ray diffraction studies reveal that all powders exhibit tetragonal crystal structure. It is observed that crystallinity and crystallite size increases with sintering temperature. Various absorption bonds viz. Sn-O, O-Sn-O and O-H are observed from the FTIR study. The compositional analysis of SnO2 nanoparticles is studied using X-ray photoelectron spectroscopy (XPS). The symmetric spin orbit splitting of Sn 3d5/2 ground state and Sn 3d3/2 excited states is observed in XPS with sintering temperature while O 1s is recognized with O-2 state.

Keywords: Chemical co-precipitation, Tin oxide, XRD, crystallite size, FTIR, XPS.

PA-98

EVOLUTION OF SUPERCAPACITIVE CuO NANOSTRUCTURES BY ROOM TEMPERATURE SURFACE OXIDATION OF Cu FOIL: EFFECT OF IMMERSION TIME

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Abstract

The copper oxide nanostructures are synthesized via facile oxidation of Cu foil in aqueous KOH solution at room temperature. The Cu foil immersed in aqueous KOH solution for different time periods (36 to 72 h) systematically converts surface Cu layer into CuO nanostructures. The impact of immersion time on the supercapacitive performance is studied. The CuO nanostructure synthesized at 60 h shows maximum specific capacitance of 302 F/g at scan rate 2 mV/s. The capacitance retention reaches upto 87% after 2000 cycles.

Keywords: CuO nanostructures, X- ray diffraction, Surface Oxidation, Supercapacitor.

PA-99

Synthesis, Characterization and Hyperthermic Evaluation of PEGylated Superparamagnetic $MnFe_2O_4$ Ferrite Nanoparticles for Cancer Therapeutics Applications

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Abstract

Poly(ethylene glycol) (PEG)-coated superparamagnetic $MnFe_2O_4$ ferrite nanoparticles are of great interest for application in magnetic fluid hyperthermia (MFH) due to their heat generation capability in an external alternating magnetic field, besides biocompatibility, and surface properties. MFH has emerged as a promisor therapeutic approach for cancer treatment and is based in controlled heating tumor tissue through the accumulation of $MnFe_2O_4$ ferritenanoparticles within cancer cells. In the present work, we have synthesized $MnFe_2O_4$superparamagnetic ferrite nanoparticles via chemical co-precipitation method. The preparation of PEGylated $MnFe_2O_4$ ferrite nanoparticles, which involves the attachment of such molecules at the surface, without the need for coupling agents or prior modification on the species involved. The size of $MnFe_2O_4$ ferrite nanoparticles cores obtained by transmission electron microscopy was about 9 nm. The conjugation of folate onto $MnFe_2O_4$ ferrite nanoparticles was confirmed by FTIR spectroscopy. The $MnFe_2O_4$ ferrite nanoparticles were colloidal stable. The obtained targeted PEGylated $MnFe_2O_4$ ferrite nanoparticles showed superparamagnetic behavior with a saturation magnetization of 78.68 emu·g−1 at 300 K. Their specific absorption rate (SAR) ranged from 43.2 to 19.5 W g−1 in an alternating magnetic field of 5–20 kA m−1 and frequency of 450–250 kHz. The heat generated was sufficient to raise the sample temperature to the therapeutic range used in MFH establishing this system as promising candidates for use in MFH treatment.

PA-100

Low-cost Fabrication of Zn doped MnFe2O4 (Mn0.5Zn0.5Fe2O4) Film for H2S Gas Sensing Applications

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Abstract

Multicomponent spinel ferrites are essential to be used in high-performance gas-sensing materials. In the present work, Mn0.5Zn0.5Fe2O4spinel ferrite thin film prepared via spray printing technique. The prepared film can be easily retrieved and utilized for multiple cycles due to their magnetic properties. The morphology, composition, and crystal structure of Mn0.5Zn0.5Fe2O4spinel ferrite thin film were examined using scanning electron microscopy, infrared spectroscopy, and X-ray diffraction. The produced films are in the range of around 20 nm and manifest spinel cubic structure. The prepared filmwas tested for their sensitivity to NO2, NH3, H2 and H2S gases, and the Mn0.5Zn0.5Fe2O4spinel ferrite thin film were found the most sensitive and selective to H2S gas. The prepared Mn0.5Zn0.5Fe2O4 spinel ferrite thin film shows enhanced sensing performance functional at low temperatures, and consequently, they need low operational power. They are also simple to fabricate with appropriate cost.

PA-101

Investigation of Super-Capacitive Properties of Nanocrystalline Copper-Zinc ($Cu_{0.5}Zn_{0.5}Fe_2O_4$) Ferrite Nanoparticles

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Abstract

A comparative study was made between the structure and electrochemical properties of Copper-Zinc ($Cu_{0.5}Zn_{0.5}Fe_2O_4$) ferrite nanoparticles prepared by chemical co-precipitation. The obtained ferrites were characterized by FT-IR, XRD, BET, and SEM techniques. A spinel crystal structure was observed for all samples with morphological structures, surface textural properties, and particle sizes hanging on the synthesis process and set in the range of 9-12 nm. The sample prepared in the presence of gelatin shows well-dispersed nanospheres particles. The electrochemical properties of obtained ferrites were studied using cyclic voltammetry, charge–discharge, and electrochemical impedance spectroscopy. The as-synthesized $Cu_{0.5}Zn_{0.5}Fe_2O_4$ sample acts as excellent electrode material in supercapacitor with a high specific capacitance of 162F g−1, an energy density of 21.2Wh kg−1, and a power density of 480 Wkg−1 at 1 Ag−1 and good retention value of 91.25% after 500 cycles at 1Ag−1.

PA-102

CATALYTIC ACTIVITY OF POLYETHYLENE GLYCOLS ON OXIDATION OF BIOMOLECULES UNDER CONVENTIONAL AND NON CONVENTIONAL CONDITIONS

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Abstract

Catalytic activity of Polyethylene glycols on oxidation of Xanthine alkaloids have been studied with various one and two electron oxidizing agents. The reaction is too sluggish in solution phase, but moderately fast in presence of Polyethylene glycols. However, the reactions are dramatically enhanced under microwave irradiations. Present protocol has several advantages, such as solvent-free conditions, during work-up, fast reaction times, high yields, eco-friendly operational and experimental simplicity, readily available additives as catalysts. Dramatic rate accelerations followed by an increase in the product yield were observed in all these reactions encouraged by the striking features and applications of Polyethylene glycols. Microwave irradiation in chemical processes and organic synthesis, coupled with zeal to employ atom economy eco-friendly reagents, proposes to take up oxidation of certain biologically important compounds such as xanthine(XAN) & derivatives of Xanthine alkaloids, using commonly available laboratory desktop eco friendly reagents such as Hydrogen peroxide(H_2O_2), Tetra Butyl Hydrogen Peroxide(TBHP), Potassium peroxy disulfate($K_2S_2O_8$), Potassium peroxy diphosphate($K_4P_2O_8$), Sodium perborate($NaBO_4$), Potassium periodate(KIO_4), Pyridinium chloro chromate(PCC) and Quinolonium chloro chromate (QCC). The proposed work is taken up in different stages (a) to conduct the reactions under and microwave conditions to save energy (b) to conduct the reactions in a mortar by grinding with a pestle under solvent-free conditions or by using microwave irradiation under solid phase conditions.

PA-103

Chemical synthesis of rare-earth co-doped NiO nanocomposite via co-precipitation method: Structural, functional, photocatalytic, and antibacterial studies

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Abstract

Numerous metal oxide nanocomposites produced by multiple doping approaches with a combination of rare earth metals tend to show improved performance in various areas such as electrochemical, photocatalytic, and biomedical. In this study, NiO-CYO-CSO [NiO-Ce0.9Y0.1O2-δ–Ce0.9Sm0.1O2-δ] nanocomposite was synthesized through co-precipitation route using rare earth-based metal precursors. The identification of fluorite cubic crystal structure with no secondary phases stabilized by metal-oxygen bonds was done by XRD and FTIR analysis, respectively. The composition of the spherical composite nanoparticles with size between 40-70 nm was determined by SEM withEDAX analysis. By impedance measurements, it was found out that the conductivity of NiO-CYO-CSO compacts is higher at a temperature between 400 and 600 °C. The photodegradation of Alizarin Red S (ARS) under sunlight irradiation showed 81% degradation activity at 120 min. At a concentration equal to 100 µg/mL, the antibacterial activity of the prepared NiO-CYO-CSO nanocomposite against Gram-negative (E. coli and V. cholerae) strains was found to be slightly lower than that of standard antibiotic (Streptomycin). The prepared multifunctional nanoocomposite will be useful in wastewater treatment and biomedical applications.

Keywords: C-TAB, Nanocompostie; ARS dye, Foodborne pathogens.

PA-104

Synthesis, characterization of network of CdO nanoparticles using Putranjiva roxburghii Wall plant extract

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Abstract

Putranjiva roxburghii plant has gained an importance in context to Ayurvedic medicinal properties. It shows anti-inflammatory, antipyretic, analgesic activities including anti-cancer properties. As its leaves contains flavonoids, glycosides, titerpenes and saponins, it is one of the best materials to synthesize various nanoparticles, which will be used for various biological and physical applications. In this work we have successfully synthesized network of CdO (Cadmium Oxide) nanoparticles using Putranjiva roxburghii leaf extract. The as prepared sample was characterized by UV-Vis spectroscopy, FESEM and EDX. The biological synthesis of CdO is the simplest method as compared to all other methods. The investigation of biological applications such as antibacterial activities and anti-cancerous activities would be interesting in future work.

Keywords: CdO nanoparticles, Putranjiva roxburghii, biological synthesis.

References:

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PA-105

Synthesis of Cu2O nanorice structure using wheat-grass (*Triticum aestivum* L.) and investigation of its optical properties

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Abstract

The Cu_2O nanorice has been synthesized successfully by using a simple biological synthesis method. Wheat-grass (Triticum aestivum L.) which can be easily grown, was used for the synthesis of Cu_2O nanoparticles. Due to required functional group for reducing and stabilizing the nanoparticles, wheat-grass extract was selected for the synthesis of Cu_2O NPs. The experimental conditions for synthesis of Cu2O nanoparticles was optimized by variation in the ratio of extract solution and $CuSO_4$ solution. After filtration, the brown colour residue the Cu_2O thin film was prepared using doctor blade method. The as prepared sample was characterized by XRD, FESEM and TEM. The optical properties of the sample was done using UV-VIS spectroscopy and Photo Luminescence. As wheat-grass is herbal medium and having pharmacological and medicinal properties, by investigation of functional group attached to Cu_2O nanorice the antimicrobial activity of the sample will be useful in future

Keywords: Cu_2O nanoparticles, nanorice, Wheat-grass (Triticum aestivum L.), biological synthesis.

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PA-106

Self-cleaning Photocatalytic TiO_2 Coating on Marbles

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Abstract

Mostly white marbles are prone to damage by air and water pollution. The continuous degradation of monuments due to organic pollutants may soon become irreversible. A transformation of surface wettability of TiO_2 film into superhydrophilic state and subsequent decomposition of organic pollutants by UV exposure leads to self-cleaning phenomena. Herein, photocatalytic, superhydrophilic self-cleaning TiO_2 films were applied on white marbles through dip coat technique. A silica sol was prepared by sol-gel processing of TEOS using nitric acid as catalyst. The TiO_2 nanoparticles (20 to 100 mg) were dispersed in silica sol and the marble piece were dip coated with different deposition times (1 to 10 min). The silica-titania films exhibited smooth surface morphology with contact angle less than 10° after 2 hr of UV irradiation confirming excellent photocatalytic activity.

Keywords: Self-cleaning, TiO_2 coating and photocatalytic

Acknowledgement: The authors are grateful to the Sakura Exchange Program in Science, Japan Science and Technology Agency (JST), S. S. Latthe is grateful to the Department of Science and Technology (DST).

PA-107

Dielectrics Properties of $BaTiO_3$ at Microwave Frequencies

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Abstract

The dielectric properties of $BaTiO_3$ have been carried out at the X-band microwave frequency. The composite material was prepared by using solid state reaction method. The dielectric constant (ε'), dielectric loss (ε″), quality factor Q = 1/tan , relaxation time (τ) and conductivity (σ) of BT having particle sizes 500, 250, 176.5 and 125 microns have been studied at different temperatures i.e. -100,+100,+300 and +500c. The experimental dielectric values have been verified by using correlation formulae's of Landau-Lifshitz-Looyenga and Bottcher. It founds the good agreement with experimental values.

Keywords: Relative Permittivity, Ferroelectric, Relaxation Time, Dielectric Constant, Quality Factor.

PA-108

Synthesis, Characterization of ZnO/CdO thin film for catalytic degradation of Rhodamine B under natural sunlight

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Abstract

In the present study, we report the synthesis of ZnO/CdO thin films for the photo degradation of Rhodamine-B under natural sunlight. ZnO/CdO thin films were synthesized by chemical bath deposition method. The synthesized ZnO/CdO thin film were characterized by using X-ray diffraction (XRD),Scanning Electron microscopy (SEM), Energy Dispersive x-ray analysis(EDX)for their structural, morphological and elemental studies respectively. The XRD results revealed that the hexagonal and cubic crystal structure of ZnO and CdO respectively. As synthesized ZnO/CdO composite thin films shows excellent photocatalytic degradation activity as compared to pure ZnO and CdO under natural sunlight the increased in photocatalytic activity is due to higher surface area and reduced electron –hole pair recombination rate. As compared with other methods, this method is very simple, fast and cost effective.

Keywords: Zinc oxide, Cadmium oxide, Thin films, Photocatalytic activity, Rhodamine-B.

PA-109

Analysis of HOMO, LUMO structures and Optical Characterization of Chalcone derivatives-3DPP and 5PPD thin Films for Photonic Applications

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Abstract

In the present study the analysis of HOMO, LUMO and optical properties of chalcone and Propanol thin films prepared via spin coating method are reported. The newly synthesized chalcone derivatives namely 3-(2,4-dichlorophenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3DPP) and 5-phenyl-1-(pyridin-2-yl)penta-2,4-dien-1-one(5PPD) have been doped with different concentrations of propanol. The prepared films are transparent so they are studied for applications in photonics. Optical characterization of the samples is done through different spectroscopy techniques to study the linear optical properties of the films. The optical parameters such as refractive index, extinction coefficient, and band gap energies are calculated from the absorption spectra. Loading the chalcone with different concentration of Propanol has resulted in shifting the absorption edge of chalcone to the visible region and has decreased the energy band gap. The molecular reactivity and stability of 3DPP and 5PPD are also studied by frontier molecular orbital analysis using DFT method. The doping effect is observed on emission spectra and FTIR spectra of the doped films and compared with the pure compound to notice changes in the peak values and intensity of the peaks. The results from the present work reveals the application of samples in photonics [1-2].

Keywords: 3DPP, 5PPD, Spin coating, Thin films, DFT studies.

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[1] J.R. Lakowicz,Principles of fluorescence spectroscopy,Springer, Boston, MA, 1983 (pp. 257-301).

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PA-110

PHYSICAL INVESTIGATIONS ON NANO CRYSTALLINE Ti:ZnO THIN FILMS FOR ACETONE SENSING

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Abstract

The ZnO and Ti:ZnO thin films were deposited on ordinary glass, quartz glass, substrates by sol-gel spin coating. The atomic percent (at.%) of titanium (Ti) in ZnO is varied from 3 to 9. The structure of the films is determined by Grazing Incidence X-ray diffraction (GIXRD) and is observed to be Hexagonal wurtzite with (020) orientation. Along with (020) orientation another two predominant orientations were observed at 2ϴ value of 32o and 36.64o. The observed three crystallographic orientations (100), (002) and (101) louses their intensity for 3 at.% of titanium and become completely broad increasing Ti at. % to 9. The grain size of Ti:ZnO films is 20 nm and is decreasing to 10 nm with increasing Ti at.%. The microstructure of the films is studied by High Resolution Scanning Electron Microscopy (HRSEM). The HRSEM images of Ti (6%):ZnO and Ti (9%):ZnO thin films reveals that the films contains nano flakes of uniform size. These flakes contains spherical nano particles of uniform size. The observed cracks in the film were may be due to lattice mismatch between quartz glass and film when annealed at 400 oC. The grain size is around 20 nm. These type of morphologies proves to be more sensitive when exposed to acetone. The samples were tested for their sensitivity for 300 and 600 ppm of acetone and is maximum for films contain 3 at. % of Titanium.

Keywords: Ti:ZnO thin films, GIXRD, HRSEM, Acetone sensing.

PA-111

ENHANCED LPG SENSING PROPERTIES OF NANOGRAINED ZnO FILMS: EFFECT OF Pd SENSITIZATION

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Abstract

Nanograined zinc oxide (ZnO) thin films have been synthesized by successive ionic layer adsorption and reaction (SILAR) method. The structural analysis reveals synthesized films show phase pure ZnO with wurtzite crystal structure. The deposited ZnO thin films have shown interconnected nanograins with porous morphology. The ZnO films have exposed to LPG as and have shown gas response of 18 % under the exposure of 2600 ppm LPG at 673 K. The Pd sensitization significantly improves the LPG sensing properties. The palladium sensitization improves gas response up to 80 % under exposure of 5200 ppm at 498 K.

Keywords: ZnO, SILAR, LPG sensor, XRD, Pd-sensitization.

PA-112

HEXAGONAL ZINC OXIDE NANORODS PREPARED BY NOVEL REFLUX TECHNIQUE FOR ETHANOL GAS SENSING

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Abstract

To study chemiresistance properties of semiconducting material, zinc oxide (ZnO) hexagonal nanorods were deposited on glass substrate by Reflux method. In Reflux method reaction period affected the structural, morphological and optical properties of ZnO thin films. Structural analysis is done by X-ray diffraction which showed hexagonal wurtzite crystal structure of ZnO thin film. The scanning electron micrographs (SEM) showed hexagonal nanorods shaped morphology whereas optical properties are studied by UV-Visible spectrophotometer which declined the optical band gap of 3.0 eV. The water wettability test gave a contact angle of 150.30 for ZnO thin films, and it showed hydrophobic nature. The hexagonal ZnOnanorod plays important role in many solid state devices such as gas sensor, DSSC, LED etc. In present work we studied gas sensing performance of ZnO nanorods by using different reducing gases (ethanol, propanol, xylene, TMA, and NH3) and its sensitivity and response for ethanol gas by using different electrical resistance measurements which showed promising future of ZnO sensor for ethanol gas sensing in medical and environmental application.

Keywords: Zinc oxide, Reflux method, Characterization technique, Ethanol gas sensor.

PA-113

Synthesis of n-maltosylated Hepta-O-benzoyl-β-D-maltosyl isocyanate compound using magnetically controlled $MnFe_2O_4$ nanocatalyst

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Abstract

In the present work, Manganese ferrite nanoparticles ($MnFe_2O_4$) Nanoparticles were synthesized by the chemical co-precipitation method. Prepared sample were characterized by TGA/DTA for thermal analysis, X-ray diffraction and Raman for structural analysis, FTIR for chemical compositional analysis, FE-SEM for morphological analysis, VSM for magnetic analysis, DLS and Zeta Potential for the colloidal analysis of the prepared $MnFe_2O_4$ ferrite nanoparticles. Further, prepared samples were used to preparation of n-maltosylated Hepta-O-benzoyl-β-D-maltosyl isocyanate compounds as an nanocatalyst. N-Maltosylated compounds show great potential in biological processes and medicinal chemistry. From the applicative point of view, this catalyst maybe useful in industrial application because of its high stability, greater catalytic efficiency and cost effectiveness.

PA-114

Preparation and Optical characterization of Polyethersulfone thin films for photonic applications

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Abstract

In the present study the analysis of Polyethersulfone optical properties and iso propanol thin films prepared via spin coating method are reported. The newly synthesized Polyethersulfone have been doped with different concentrations of iso propanol. The prepared films are transparent so they are studied for applications in photonics. Optical characterization of the samples is done through different spectroscopy techniques to study the linear optical properties of the films. The optical parameters such as refractive index, extinction coefficient, and band gap energies are calculated from the absorption spectra. Loading the chalcone with different concentration of iso propanol has resulted in shifting the absorption edge of chalcone to the visible region and has decreased the energy band gap. The doping effect is observed on emission spectra and FTIR spectra of the doped films and compared with the pure compound to notice changes in the peak values and intensity of the peaks. The results from the present work reveals the application of samples in photonics [1-2].

Keywords: Polymer, Spin coating, Thin films.

References:

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PA-115

Synthesis of Nickel Oxide Nano Material by Electrodeposition for Electrochemical Capacitive Analysis.

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Abstract

Electrodeposition techniques is used for the deposition of nickel oxide thin film electrodes. In the present work, we report electrodeposition of nickel oxide thin film on the conducting stainless steel (SS) substrates for the application of electrochemical supercapacitor using 30 ml solution of 0.5M nickel nitrate at room temperature. X-ray diffraction confirms simple cubic crystal structure with polycrystalline nature of the deposited NiO sample. NiO sample exhibits hydrophilic nature as confirmed from the wettability study. The Scanning Electron Microscope (SEM) observed dense with cracks morphology of NiO. UV spectrum exhibits 3.55eV band gap of samples. The capacitive characteristics of the deposited thin film are investigated in 1M KOH electrolyte using cyclic voltammetry (CV). The supercapacitive properties of NiO are strongly affected by the scan rate. The maximum specific capacitance obtained is 162 F/g at 2 mV/s scan rate.

Keywords: Electrodeposition, Nickel oxide, Electrochemical supercapacitor, Hydrophilic, UV spectrum.

PA-116

Synthesis and Photocatalytic property of nanoflower-like NiO

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Abstract

The sustainable development of pollution-free technologies for environmental remediation has concerned significant attraction due to rapid growth of industrialization. Herein, we report synthesis of nanoflower-like NiO porous nanostructures prepared from different nickel precursors by solvothermal method in combination with calcination treatment. The obtained porous NiO-Ac and NiO-S nanostructures were characterized by X-ray diffraction (XRD), scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), and BET for their structure, morphology, and surface area. Photocatalytic measurement of NiO-Ac and NiO-S demonstrates that, these nanostructures show excellent photo degradation behavior towards methylene blue (MB) under ultraviolet radiation. Compared with NiO-Ac, the porous NiO-S nanoflowers exhibit higher catalytic activity due to their large surface area.

PA-117

Comparison properties of Fluorescence Quenching Studies of Nitroaromatics, employing sulphoic acid Doped Polyaniline

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Abstract

Polyaniline (PANI) was synthesized by chemical oxidation method in the presence of ammoniumpersulfate as oxidant and para toluene sulfonic acid (PTSA) and csa as dopant. In this study, fluorescencecharacteristics of polyaniline doped with PTSAanid csa in Dimethyl sulfoxide (DMSO) solvent isundertaken. The successful demonstration through fluorescence quenching of PTSA-PANI) and csa pani with NACs is envisaged with Dimethyl sulfoxide (DMSO) as solvent. Quenching efficiency has been estimated by Stern−Volmer equation. The detection of quencher met dinitrobenzene and Para nitro aniline is studied through the observed intense quenching of fluorescence signals in the emission spectra of the PTSA-PANI ad csa pani solution.

Keywords: Polyaniline, Fluorescence quenching, sulfonic acids, Nitro aromatics.

PA-118

Studies on Structural Properties of Ytterbium (Yb3+) Substituted Mg-Cu-Zn Nano-ferrites

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Abstract

. Nano-ferrites with composition Mg0.55Cu0.05Zn0.4YbxFe$_2$-xO$_4$ (where x = 0.0, 0.01, 0.02 and 0.03) were prepared by chemical method. The ferrites samples were characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy (SEM) techniques. The single phase cubic spinel structure ferrite formation was confirmed from XRD analysis. The lattice constant and crystallite size of Mg-Cu-Zn ferrites found to be decreases with increasing concentration of Yb3+ content. The two major absorption bands appear in the range 432.16 to 441.55 cm-1 and 568.25 to 578.56 cm-1 corresponding to octahedral and tetrahedral sites in the FTIR spectra suggest formation of ferrites. Morphological study shows the formation of nano-ferrites. The EDX analysis approves the formation of required ferrites in desired stoichiometric ratio without any impurity phase.

Keywords: Mg-Cu-Yb-Zn nano-ferrites, chemical method, XRD, FTIR, FESEM, EDX.

PA-119

Complete micro-structural analysis and elastic properties of Sm3+ doped Ni-Mn-Zn mixed spinel ferrite nanoparticles

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Abstract

A series of Ni-Mn-Zn mixed spinel ferrite doped with Sm3+ ions was prepared by using sol-gel auto-combustion technique. Structure of the samples was characterized by using X-ray diffraction (XRD) technique and Infrared spectra (IR). Single phase cubic spinel structure of all the samples was confirmed by using XRD analysis. Williamson – Hall (W-H) and strain size plot (SSP) methods were employed for the complete microstructural analysis of the samples. Incorporation of Sm3+ ions in Ni-Mn-Zn-Fe-O crystal lattice increases the lattice parameter from 8.4105 to 8.4134 Å. W-H and SSP analysis confirms the tensile type strain induced in the crystal lattice which increases with the addition of Sm3+ ions. Average crystallite size estimated from Scherrer equation is found in the range 21.7 to 24.9 nm which in good agreement with the results obtained from W-H and SSP analysis. Specific surface area decreases from 58.9 to 55.1 m2/gm with the increasing concentration of Sm3+ ions. Infrared spectra recorded in the wavenumber range 350 to 800 cm-1 reveals the characteristic features of spinel ferrites. Higher frequency band n1 is observed near 580 cm-1 and lower frequency band n2 is observed near 380 cm-1. By using the IR data, elastic constant (stiffness constant) and elastic moduli (Young's modulus, bulk modulus and rigidity modulus) were evaluated. Debye temperature obtained from Anderson formula ranging from 535 to 562 K and from Waldron equation ranging from 676 to 713 K with the substitution of Sm3+ ions.

Keywords: Sol-gel technique, W-H analysis, strain-size plots, elastic properties, Debye temperature.

PA-120

Photoluminescence study of $Sr_2Mg(BO_3)_2$:Ce3+blue emitting phosphor for solid state lighting

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Abstract

Because of the favourable spectroscopic properties of Ce3+ and the ability to incorporate trivalent cerium ion into many different host materials trivalent cerium-activated materials have received renewed interest for many applications. With the assist of customized step wise combustion synthesis method $Sr_2Mg(BO_3)_2$:Ce3+: Ce3+ phosphors were synthesize along with the luminescent proprieties. SEM, chromaticity coordinates with effect of emission intensity with related with the corresponding concentration were studied. The emission spectrum of $Sr_2Mg(BO_3)_2$:Ce3+ (x= 1 to 10 mol %) constructive reaction among the ability to combine the Ce3+ ions in various inorganic host substance doped with Ce3+ shows emission at 331 nm owing to the 4f–5d changeover of Ce3+ ions exhibit blue emission posse located at 443 nm. Generally, Ce3+ ion within ground state is split in two level such as., 2F5/2 with 2F 7/2. This study suggest that $Sr_2Mg(BO_3)_2$:Ce3+ phosphor be a prominent material as a blue constituent for phosphor- transformed W-LEDs for SSL.

Keywords: Photoluminescence, XRD, SEM, CIE.

PA-121

SYNTHESIS AND CHARACTERISATION OF POLYANILINE PREPARED IN PRESENCE OF POTASSIUM FERRICYNIDE

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Abstract

Organic electronics represents not only a scientific term but also an emerging area of research aimed at identifying compounds of natural origin and establishing economically efficient routes for the production of synthetic materials that have applicability in environmentally safe (biodegradable) and biocompatible devices. Researching into the emerging organic electronics may help to fulfill not only the original promise of organic electronics that is to deliver low-cost and energy efficient materials and devices but also achieve unimaginable functionalities for electronics. Conductive polymers are lighter, more flexible, and less expensive than inorganic conductors. This makes them a desirable alternative in many applications. It also creates the possibility of new applications that would be impossible using copper or silicon. Organic electronics not only includes organic semiconductors, but also dielectrics, conductors and light emitters. New applications include smart windows and electronic paper. Conductive polymers are expected to play an important role in the emerging science of molecular computers. Among all the conducting polymers, polyanilene holds a special position, due to its unique properties such as low cost of monomers (aniline), distinguishable electrical properties, excellent redox reversibility, high environmental stability and can be easily polymerized in labs either by chemical or electrochemical methods. The electrical properties of polyanilene pretty much depend upon the doping agents, protonation of the constituent units in the chain backbone, and water content. Conductive nature of polyanilene makes it a versatile conducting polymer for variety of applications such as gas sensors, super capacitors, lithium ion batteries and photovoltaic cells. The objective of this paper is to provide basic concept of polyanilene synthesis and its doping mechanism. We synthesized the polyaniline by oxidation of aniline using sulphuric acid and potassium ferricynide which forms an emeraldine salt which shows excellent optical and electrical properties. These properties were characterized by XRD and UV-Visible Spectrophotometer.

Keywords: Polyanilene, Organic electronics, Conducting Polymer, Polymerization.

PA-122

Study on Sensing properties of nano SnO_2 –TiO_2 composites with effect of PPy porous layer for sensing NH_3 gas

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Abstract

Ammonia gas detection is an important issue for a lot of applications: leak detection in industry, agriculture, cooling systems, and medical diagnosis (breath biomarker for non-invasive diagnostic of renal disease). For this, sensor had been prepared with the thick film on cleaned glass plate with Al_2O_3 as highly porous substrate. SnO_2/TiO_2 composite layers were grown on the substrate with the help of screen printing technique to form uniform layers. PPy layer was deposited on this SnO_2/TiO_2 composite layer. The sensor was tested for with and without PPy layer to sense NH3 gas. Five sensors S1, S2, S3, S4 and S5 were fabricated for different SnO_2/TiO_2 composites. It was found that S5 sensor was best among the prepared sensors to sense ammonia gas at room temperature. The maximum reported value of sensitivity of S5 sensor is 0.93 at 140 mm and remains constant for higher ammonia concentration (upto 200 ppm).

Keywords: SnO_2-TiO_2 composites thick layer, PPy, Al_2O_3, Screen Printing Technique, sensitivity.

PA-123

SYNTHESIS AND CHARACTERIZATION OF GRAPHITIC CARBON NITRIDE FOR DEGRADATION OF DYE

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Abstract

Graphitic carbon nitride has received considerable attention due to its electronic band structure which improves photocatalytic performance under visible-light. In the present work, graphitic carbon nitride was prepared by direct pyrolysis using N-rich precursor melamine. The pyrolysis was carried out at different temperatures in open air condition in a crucible with cover. The prepared samples were characterized by using x-ray diffraction (XRD), fourier transform infrared (FTIR), thermogravimetric analysis(TGA),U. V. visible spectrometer, photoluminescence. The photocatalytic activity was studied bydegradation of dye.

Keywords: Graphitic carbon nitride, melamine.

PA-124

Bioengineered TiO_2 nanoparticles using Andrographis alata leaf extract and their antibacterial and anticancer activities

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Abstract

Breast cancer is one of the major causes of increased death more and it is focused on researchers across the world. Bacteria are harmful to create human diseases like cholera, jaundice, etc. It is needful to control the growth of harmful bacteria. Andrographis alata is rarely presented, widely used in tribal people, and also it is useful to many diseases. These studies were focused on the control the growth of (gram-positive and negative) bacteria, and evaluate the anticancer activity against the MCF-7 cell line using TiO_2 nanoparticles (NPs). To synthesis of TiO_2 NPs using Andrographis alata leaf extract. The synthesized TiO_2 NPs were characterized by Fourier Transform Infrared Spectroscopy (FTIR), X-ray diffraction (XRD), and Transmission Electron Microscope (TEM). Antibacterial activity was carried out used by disc diffusion method. The anti-breast cancer activity (MCF-7 cell line) was determined by MTT assay. The antibacterial activities of TiO_2 NPs were tested against the Gram-positive (Streptococcus pneumonia, Bacillus cereus) and Gram-negative (Pseudomonas aeruginosa, Escherichia coli). The maximum zone of inhibition was noticed in B. cereus (15 mm) and E. coli (18 mm) at 50 µL. In-vitro anticancer efficiency (IC50) of synthesized TiO_2 NPs showed good anticancer activity against MCF-7 cancer cell line. The prepared nanoparticles showed potent antibacterial (foodborne pathogens) and anticancer (MCF-7) activities, so TiO_2 NPs will be useful in biomedical applications.

Keywords: TiO2 NPs, FTIR, XRD, TEM, foodborne diseases, MCF-7.

PA-125

SYNTHESIS AND CHARACTERISATION OF MANGANESE FERRITE NANOPARTICLES

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Abstract

Spinel structured nanoferrites have been proven to possess potential applications in nanoscience and technology due to their interesting structural, electrical and magnetic properties. Here an attempt has been made to synthesize Manganese ferrite nanoparticles bearing the chemical formula $MnFe_2O_4$ by the traditional method of chemical coprecipitation. Manganese Chloride and Ferric Chloride were used as precursors and NaOH was used as the precipitating agent during the synthesis. Synthesized nanoparticles were analysed with XRD spectrometry for structural properties which revealed the crystalline phase formation with cubic spinel structure. The average crystalline size was calculated to be 29 nm. Morphological pattern obtained using SEM analysis revealed the microstructure of grains of the sample. The EDS spectrum of $MnFe_2O_4$ showed prominent peaks of O, Mn and Fe proving the purity of the sample. The composition of the constituent elements was obtained in the expected quantities of 2:1 ratio of Fe:Mn. The FT-IR study was performed in the range 4000 – 400 cm^{-1} and prominent peaks observed at 618.30 cm^{-1} and 589 cm^{-1} reveals the absorption band due to metal oxygen vibrations in the tetrahedral and octahedral sites. A band gap of 4.65 eV was determined by UV-Vis spectroscopy.

Keywords: Manganese Ferrite, Coprecipitation, XRD, SEM, FT-IR.

PA-126

Characterization of Yttrium Substituted Ni-Zn Ferrites Prepared by Co-precipitation Method

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Abstract

Nanocrystalline yttrium substituted Ni-Zn ferrites with chemical formula Ni0.6 Zn0.4YxFe2-xO_4 (where x = 0.01, 0.02 & 0.03) were prepared by oxalate co-precipitation method. X- ray diffraction, infrared spectroscopy and scanning electron microscopy techniques were used to characterize the ferrite samples. X- ray diffraction and FTIR study shows the formation of single phase cubic spinal structure. The lattice constant of Ni-Zn ferrites increases with increase in Y3+ content. This can be explained on the basis of relative ionic radii of Fe3+ and Y3+ ions. Average crystallite size of ferrites was determined from the (311) peak, using the Debye-Scherrer method increases with increasing Y3+ content. The presence of two major absorption bands corresponding to tetrahedral (ν2) and octahedral sites (ν1) indicates the well formation of ferrites. It is also observed that the absorption band υ2 is slightly shifted to lower frequency side with increase in Y3+ content. This suggests that Y3+ ions occupy B-sites. Grain size of the Ni-Zn ferrites decreases with increase in Y3+ content.

Keywords: Ni-Y-Zn ferrites, Oxalate co-precipitation method, XRD, FTIR, SEM.

PA-127

Preparation and Optical characterization of PMMA thin films for photonic applications of newly synthesized Chalcone doped derivative (C1)

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Abstract

Here we report, thin films of PMMA (poly methylmethacrylate) and chalcones prepared via drop casting method. A newly synthesized Chalcone derivative namely 1-(3-Methoxy-phenyl)-3-(4-napthalen-yl)-propenone (C1) were used for doping films with different concentrations. Films prepared were transparent and so they were considered for analysis in photonic applications. Different spectroscopic techniques were used for optical characterization of the samples. With the help of a UV-Vis spectrophotometer, absorption spectra were obtained for both the samples. From the absorption spectra, some significant optical parameters were determined like band gap energies, refractive index and extinction coefficient. The way these parameters were affected by doping concentration was studied and plotted graphically. The doping effect was also analyzed on emission spectra which was obtained through a fluorescence spectrophotometer. Also, FTIR spectra for doped films was determined and compared with that of the pure compound to notice alterations in the peak values so as to note the change in intensities. The present work was done to study the doping effect on optical properties and figure out photonic applications of samples[1-2].

Keywords: PMMA, drop casting method, C1, refractive index, extinction coefficient, band gap energy, absorption and emission spectra, FTIR spectra.

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PA-128

EVOLUTION OF SUPERCAPACITIVE CuO NANOSTRUCTURES BY ROOM TEMPERATURE SURFACE OXIDATION OF Cu FOIL:EFFECT OF IMMERSION TIME

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Abstract

The copper oxide nanostructures are synthesized via facile oxidation of Cu foil in aqueous KOH solution at room temperature. The Cu foil immersed in aqueous KOH solution for different time periods (36 to 72 h) systematically converts surface Cu layer into CuO nanostructures. The impact of immersion time on the supercapacitive performance is studied. The CuO nanostructure synthesized at 60 h shows maximum specific capacitance of 302 F/g at scan rate 2 mV/s. The capacitance retention reaches upto 87% after 2000 cycles.

Keywords: CuO nanostructures, X- ray diffraction, Surface Oxidation, Supercapacitor.

PA-129

UV- excited blue emitting $Ba_3Gd1\text{-}x(BO_3)_3$: X Ce3+ [$0.01 \leq X \leq 0.06$] phosphor

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Abstract

The polycrystalline powder sample of Ce3+ activated strontium yttrium borate phosphors $Ba_3Gd_1\text{-}x(BO_3)_3$: X Ce3+($0.01 \leq X \leq 0.06$ mole %) are prepared by solution combustion technique. Formation of phosphor in desired crystalline phase is confirmed by powder XRD characterization & FTIR. SEM images of the synthesized phosphor shows the irregular grains with average particle size 2.5μm. Luminescence properties of the synthesized phosphor are investigated at room temperature. The excitation spectrum consists of a single broad absorption band from 200 to 400 nm with the prominent excitation peak at 343 nm [2F5/2 to 5D1 of Ce3+ ions]. Strongest emission peak of 488nm [5D1→ 2F5/2] and weak of 501nm [5D1→ 2F7/2] wavelength which is of blue light is observed at 343nm UV light excitation. $Ba3Gd1\text{-}x(BO_3)_3$: X Ce3+ phosphor emits blue light under UV excitation. Maximum PL emission takes place at 5 mole percentage of cerium ion. Concentration quenching for Ce3+ ions is studied. Hence $Ba_3Gd_1\text{-}x(BO_3)_3$: X Ce3+ is new UV excited blue emitting phosphor useful for UV/Blue chip WLEDs

Keywords: borate phosphor, photoluminescence, red emission, white light LED.

PA-130

TIO_2 NANOTUBE-HYDROXYAPATITE NANO-COMPOSITE AS METHANOL SENSOR

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Abstract

In the present work, we have successfully demonstrated utilization of TiO_2 nanotube and Hydroxyapatite nano-composite films for sensing methanol at lower temperature and lower concentrations. The 2 wt.% TiO_2 nanotube-hydroxyapatite nano-composite film exhibits pronounced sensing behaviour for the detection of alcohol vapour even at 10 ppm. The operating temperature was observed to be 300C for methanol, whereas, for the same nano-composite material fast response and recovery time are 100 and 30 seconds, respectively, as compared with pure hydroxyapatite, TiO_2 nanotube. These results concluded that nano-composite of TiO_2 nanotube and hydroxyapatite is capable to sense alcohol vapours with their existence in ambient as low as 10 ppm concentration.

Keywords: Hydroxyapatite, TiO_2 nanotubes, alcohol, sensing, low concentration

PA-131

SYNTHESIS AND CHARACTERIZATION OF NI_7S_6 FILMS BY USING ELECTRODEPOSITION TECHNIQUE

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Abstract

In the present work, Ni-S films were prepared by electrodeposition method. Sprayed SnO_2: F films on glass to be used as electrodes. Characterization was done by XRD analysis and TGA analysis. The observed 'd' values were compared with standard ASTM data. Good matching was observed in data and observed values. The bulk X-ray diffractogram was used to calculate grain size. The thermo gravimetric studies of sample gave us the information regarding the thermal properties of a material. The thermo gravimetric studies of sample gave us the information regarding the thermal properties of a material. TGA & DTA data supports to the information of Nickel sulphide with Nickel having plus two (II) oxidation state (Ni_7S_6).

Keywords: Electrodeposition, Electodes, XRD, TGA, Ni-S.

PA-132

THERMOELECTRIC INVESTIGATIONS ON WS_2 THIN FILMS PREPARED BY VAN DER WAAL'S RHEOTAXY PROCESS

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Abstract

Thermoelectric (TE) materials, which can generate electricity from waste heat could play an important role in a global sustainable energy solution. Research in thermoelectrics is attracting recently because the limits of conventional energy sources are rapidly approaching and it is necessary to find new ways to utilize the energy available. In this sense, TE application is highly beneficial because it can tap into the huge amounts of energy which is otherwise being lost or wasted and convert it into useful electricity. However, the large-scale use of TE convertors relies on cost-effective and eco-friendly TE materials with decent efficiency. 2D materials have gained great attention as promising TE materials. Particularly, Transition Metal Dichalcogenides (TMD), namely, MX_2 (where M is a transition metal and X is a chalcogen), are perspective TE materials which have a great interest for applications. In this work the Tungsten disulfide (WS_2) thin films were prepared by sulfurization of tungsten trioxide thin films on FTO coated conducting glass substrate. The X- Ray Diffraction (XRD) studies decipits the formation of WS_2 thin films with a mixed type-I and type-II texture. In this paper the TE and transport properties of WS_2 TFs were studied by measuring the thermopower, thermal conductivity, electrical conductivity and Hall parameters at room temperature.

Keywords: Tungsten disulphide, Transition Metal Dichalcogenide, van der Waal's Rheotaxy, X- Ray Diffraction.

PA-133

Fabrication and Analysis of Electrochemical Performance of MnO_2 Supercapacitor Electrodes

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Abstract

The manganese oxide (MnO_2) thin films were electrodeposited potentiostatically on stainless steel substrate with potential 1.7V for various times of deposition ranging from 10 min to 50 min. The obtained thin films were annealed at 500°C to form MnO_2. The synthesized thin film was characterized by X-ray diffraction (XRD) and Field emission scanning electron microscopy (FESEM) to illustrate the crystal structure and morphology. The XRD result demonstrates orthorhombic crystal structure with 17.11 nm crystallite size. The SEM shows nanoflake morphology. The MnO_2 films with various deposition times were employed for Cyclic Voltammetry (CV) study. The study revealed that the 20 min thin film show better specific capacitance of 107.26 F/g compared to other thin films. The cyclic voltammetry of MnO_2 thin film for fixed potential window of 1.2 V, with increasing scan rate was also recorded and analysed.

Keywords: MnO_2 thin films, electrodeposition, XRD; Cyclic Voltammtry.

PA-134

Study of susceptibility properties of chromium substituted Mg-Cd ferrites

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Abstract

Susceptibility properties of polycrystalline ferrites with general formula Cdx Mg_1-x Fe_2-y Cry O_4 (x = 0, 0.2, 0.4, 0.6, 0.8, 1.0; y = 0, 0.05 and 0.10) were studied. Samples were prepared by ceramic method and powder samples were characterized by X-ray and IR spectroscopy. Study reveals that the saturation magnetization and magnetic moment were found to decrease with the increase of Cr3+ contents, which is attributed to the dilution of B-B site interaction. Temperature dependence normalized AC susceptibility study reveals that $MgFe_2O_4$ exibits single domain(SD) structure. On substitution of Cd2+ , single to multi domain transition takes place. Curie temperature decreases with Cd2+,was attributed to decrease in A-B intraction. On substitution of Cr3+ , peak obtained in $MgFe_2O_4$ was supressed which is attributed to decrease in grain size and further decrease in Curie temperature is attributed to the decrease in B-B interaction.This is because Fe-Fe interaction is greater than Cr-Fe interaction at B-site.

Keywords: Susceptibility, chromium substitution, magnesium Cadmium ferrites.

PA-135

COMPARATIVE STUDIES ON SYNTHETIC STRATEGIES FOR THE GROWTH OF CuO NANOSTRUCTURES AND THEIR SIGNIFICANT IMPACT ON SUPERCAPACITIVE PERFORMANCE

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Abstract

Metal oxide nanostructures are synthesized by various chemical methods. The morphology of metal oxide nanostructures depends on the synthetic strategy. The electrochemical behavior primarily depends on the morphology of the electrode. The significant impact of synthetic strategy on the structural, morphological and subsequently on the supercapacitive performance of nanostructured CuO thin films is studied. The single bath chemical deposition (CBD) leads to well defined growth of 1-D nanostructures, while intermittent growth process (SILAR) leads to nanoparticulate morphology. CuO nanorods have shown comparatively higher capacitance of 432 F/g than CuO nanoparticles (302 F/g) at scan rate 2 mV/s.

Keywords: CuO nanostructures, CBD, SILAR, Supercapacitor.

PA-136

SIZE DEPENDENT CHEMICAL SYNTHESIS OF DEFECTIVE In_2O_3 MICROCUBES AS NO_2 SENSOR

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Abstract

Indium oxide (In_2O_3) microcubes (IMCs) have been systematically synthesized by the hydrothermal method. The size of IMCs is systematically controlled by varying urea concentration (0.05 M to 0.25 M) in the bath. The phase pure cubic In_2O_3 having (222) preferred orientation is observed. The size of IMCs changes from 0.1 mm to 1mm by varying urea concentration. The urea concentration-dependent plausible growth mechanism of IMCs is proposed. The defective IMCs are effectively used as NO_2 sensors and have shown a gas response of 180 under the exposure of 80 ppm NO_2 gas at 100 ℃.

Keywords: In_2O_3 Microcubes, Hydrothermal, Growth mechanism, NO_2 sensor.

PA-137

SYNTHESIS AND STRUCTURAL PROPERTIES OF NANO NICKEL FERRITE

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Abstract

The spinel nano $NiFe_2O_4$ ferrite has been synthesized by Co- precipitation method. X-ray diffraction (XRD) pattern confirms the formation of single phase cubic spinel structure with lattice constant 8.347Å. Structural properties like X ray density, average crystalline size,bond length,dislocation density and microstrain have been studied. The Fourier transform infrared spectroscopy (FTIR) spectrum of $NiFe_2O_4$ ferrite under investigation reveals the formation of a single phase cubic spinel structure showing two significant absorption bands,around 530/cm and around 410/cm corresponding to high frequency band $\boldsymbol{v}1$ and low frequency band $\boldsymbol{v}2$ arising from tetrahedral (A) and octahedral (B) interstitial sites respectively.

Keywords: Nano nickel ferrite, XRD, FTIR.

PA-138

Green Synthesis of Bismuth Oxide [Bi_2O_3] Nanoparticles using Aloe Vera Plant Extract

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Abstract

In current years, green synthesis of nanoparticles has attracted an exceptional attention due to medicine and biological applications. The present work delineates the novel approach of the synthesis of bismuth oxide nanoparticles using green synthesis method. Aloe Vera extract was used as the biological reduction agent for synthesizing bismuth oxide nanoparticles from bismuth nitrate $Bi(NO_3)_3$. Aloe Vera extract was prepared one with only gel and other with skin and gel. For the first time bismuth oxide nanoparticle using aloe vera has been reported. The resultant nano powder was characterized using X-ray diffraction technique and also Raman spectra has been performed to study vibrational modes of prepared nanoparticles. Structural studies emphasizes that obtained NP's are Bi_2O_3. Particle size obtained with skin and gel is around 3 nm which is quite appreciable.

Keywords: Green synthesis, Bismuth oxide nanoparticles, Aloe Vera plant extract, XRD

PA-139

Facile synthesis and morphology dependent photocatalytic activity of ZnO nanostructures

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Abstract

Water contamination turn out to be serious issue due to increased growth of textile industries and huge amount of toxic effluents are being discharged to water bodies. This work reports a cost-effective and sustainable protocol for the synthesis of two different shapes of ZnO nanostructures. Scanning electron microscopy (FE-SEM), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) techniques were employed to determine the morphology and structure of the prepared ZnO nanostructures. It is observed that, two different shapes of ZnO can be synthesized simply by changing the zinc precursor. The photocatalytic degradation of methylene blue (MB) has been investigated in aqueous heterogenous suspension using ZnO nanostructures. These results suggest that ZnO photocatalyst may be useful for treatment of diluted waste waters in textile industries.

PA-140

Candle Wax/Candle Soot Composite Coated Superhydrophobic Stainless steel Mesh for Oil-Water Separation Application

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Abstract

Lotus leaf-inspired superhydrophobic coating has been used in various industrial applications. Among them, separation of oil-water mixture is one of the most important application of superhydrophobic coating. Intensively increasing pollution of water by frequently occurred oil spills accidents and industrial oily waste water. The superhydrophobic/superoleophilic coated mesh can be separate easily oil from oil-water mixture. The present work describe, facile method of preparation of superhydrophobic stainless steel mesh. The layer of candle soot particles deposited on mesh by holding in the middle part of candle flame for 20 minutes. Meanwhile, 0.22 gm candle wax dissolved in 10 ml chloroform by constant stirring. The candle soot deposited mesh immersed in prepared wax solution for 1 minute. The mesh were dried at 70°C. temperature for 1 hr. The candle wax/candle soot composite coated stainless steel mesh revealed water contact angle of 152° and oil contact angle nearly 0°. The prepared superhydrophobic/superoleophilic stainless steel mesh was efficiently separate oil-water mixture. Such type of superhydrophobic/superoleophilic stainless steel mesh may be used in industries for oil-water separation application.

Keywords: Candle soot, superhydrophobic, stainless steel mesh, and oil-water separation.

PA-141

SYNTHESIS AND CHARACTERIZATION OF NOVEL POLYESTERS FROM BISPHENOL CONTAINING ETHER- AMIDE LINKAGE

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Abstract

A novel bisphenol containing ether-amide linkage, N, N'-Bis (4-hydroxyphenoxyphenylene) isophthalamide was synthesized and characterized by FT-IR, 1H and 13C NMR and Mass Spectrometry. A series of new aromatic polyesters was prepared by interfacial polymerization from N, N'-Bis (4-hydroxyphenoxyphenylene)isophthalamide and isophthaloyl chloride and / or terephthaloyl chloride in different mole % proportions. These polymers were characterized by FT-IR, viscosity measurement, solubility, TGA, DSC and XRD. The polymers had moderate to high molecular weights as evidenced by the inherent viscosities in the range 0.67– 0.78 dL/g and the polymers readily dissolved in DMAc, DMSO, NMP, m-cresol and conc.H_2SO_4. Polymers did not show any weight loss below 301oC and retained 39 to 48 % weight at 900oC (Char yield) when investigated by TGA under nitrogen atmosphere demonstrating good thermal stability. The DSC curves of polyesters showed glass transition temperatures in the range of 194 to 269oC. Wide angle X – ray diffraction (WXRD) analyses showed that the polymers were semi crystalline in nature.

Keywords: N, N'-Bis (4-hydroxyphenoxyphenylene) isophthalamide, inherent viscosities, XRD, solubility, thermal properties.

PA-142

Structural, morphological and optical investigation of Ag-doped TiO_2/rGO nanocomposite synthesized by ex-situ route

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Abstract:

In the present paper we studied modified properties of widely used TiO_2 material by forming its Ag-doped TiO_2/rGO nanocomposite. The structural investigation by X-ray diffraction (XRD) reveals the formation single anatase phase that not altered even in composite with decrement in size from 12 nm to 8 nm. The SEM micrographs confirm nanosheets formation of rGO while uniform grain particle nature of TiO_2 nanoparticles (NPs). Fourier transformed infrared spectroscopy (FTIR) remarkably deduce the individual bands and its difference. UV–Vis's spectroscopy exposes absorption shift towards visible by effect of silver and rGO utilization. Also, the energy band gap show reduction from 3.26 eV to 3.18 eV confirmed in Tauc plots. So, the properties TiO_2 tuned successfully that open the new path to utilize it in various forthcoming optoelectronic devices.

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Keywords: Sol-gel; nanocomposite; band gap.

PA-143

Enhanced Characteristics of Ammonia Sensing at Ambient Temperature by Plasma Polymerized Thiophene

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Abstract

Ammonia is one of the most commonly used chemicals in manufacturing industry. Around 80% of ammonia is used for soil fertilizers and 20% is manufactured for pharmaceuticals, cleaning products, explosives, and refrigeration. Given the common use and harmful effects on human body and environment, need of enhanced NH3 sensing materials and sensors is underlined. In present study, we have explored possibility of Plasma Polymerized Thiophene (PPTh) as NH3 sensors, studied temperature stability of these thin films and degradation after exposure to open air for period of 60 days. Polymers synthesized through plasma polymerization differ in structural and electrical properties from that of chemically polymerized polymers. Thin films were fabricated using Plasma Polymerization of Thiophene monomer vapors at room temperature. Glass substrate was chosen as it does not chemically react with deposited materials or exposed gases and it is stable at higher temperatures. Distance between the electrodes of Plasma Polymerization system was kept constant at 8cm, optimized from previous experiments. Pulsed plasma was used for polymerization instead of continuous plasma. Variation in duty cycle was employed to fabricate number of samples. PPTh films were then doped with Iodine to their saturation to enhance conductivity of PPTh. These samples then studied to find optimized parameters for maximizing conductivity and sensing response of PPTh films. Roughness and thickness measurements of thin films were done by LASER microscope. Scanning electron microscope was used for morphological studies of PPTh films. Orientation of the functional group and elemental analysis was studied by FTIR spectroscopy. Keithley 2400 sourcemeter and four probe based homemade gas sensing system was used to record conductivity measurement of PPTh films at room temperature in air and in presence of gas. Commonly used volatile compounds in manufacturing industry like Ammonia, Acetone, Benzene, Toluene, Dichloromethane were studied for their sensing response to PPTh thin films. Temperature stability studies were done for temperatures ranging between 30°C to 70°C with 5°C step. Film degradation study was carried out over the period of 60 days. It was observed that Iodine doped Plasma Polymerized Thiophene thin films have sensitivity of ~1200 for Ammonia vapors at ambient temperature. While response time for Ammonia was ~400sec, recovery time was recorded below ~20sec. Number of cycles were recorded to check repeatability of the material. PPTh films were found to be highly stable for any temperature

changes in the surrounding environment. Degradation studies showed minor changes in sensitivity after 5 days of exposure to air in 60-day study making them durable for longer period of time. Iodine doped PPTh films showed negligible sensitivity towards other volatile compounds under study. Highest sensitivity among other volatile compounds was recorded at ~60 for Acetone making PPTh thin films highly selective for Ammonia sensing.

PA-144

SUPERCAPACITIVE BEHAVIOR OF MANGANESE DIOXIDE (MNO_2) THIN-FILM PREPARED BY ELECTRODEPOSITION TECHNIQUE AND CHARACTERIZATION

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Abstract

The work deals with fabrication of Manganese Dioxide (MnO_2) Thin-Film prepared by electrodeposition technique on stainless steel ($AISI_30_4$) substrate. In order to enhance the super-capacitive properties of the electrodes, we have deposited a thin layer of MnO_2 by electrodeposition method by adopting potentiostatic technique from an aqueous manganese sulphate monohydrated ($MnSO_4.H_20$). We studied the effect of Thickness on the electrochemical properties of the samples for 10, 15 and 20 min. Best performance for supercapacitor applications was obtained after annealing at 80 °C with a specific capacitance of 104 F g−1 at 10mV s−1 and a cycling stability of more than 1K cycles with excellent columbic efficiency and 73% capacitance retention. Surface morphology have characterized using field Scanning Electron microscope(FE-SEM) for 10min,15min,20 min. The electrochemical characterization have studied with the help of Cyclic Voltammogram from which maximum value of specific capacitance was estimated to be 104-Fg-1. In this Paper supercapacitive behavior has been studied using galvanostatics charging discharging technique, and Impedance technique.

Keywords: electrochemical properties, Cyclic Voltammogram and thermal annealing.

PA-145

Hybrids of Fluconazole: Synthesis and Antimicrobial Activity

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Abstract

Based on the structure of the active site of cytochrome P450 14α-demethylase (CYP51) a series of 1-(1-(substituted phenyl)-2-(1H-1,2,4-triazol-1-yl)ethylidene)-2-(1-(substututed phenyl)-2-(1H-1,2,4-triazol-1-yl)ethylidene)hydrazine of fluconazole analogs was synthesized. All compounds were characterized by IR, 1H-NMR, 13C-NMR, mass spectroscopy and elemental analysis. All the synthesized compounds were tested qualitative (Zone of inhibition) and quantitative (MIC) antimicrobial activities against four pathogenic bacteria B. subtilis, S. aureus, E. coli and P. aeruginosa and two pathogenic fungi C. albicans and A. niger. Of compounds screened, most of the synthesized compounds showed potent antimicrobial activity against gram positive and gram-negative bacteria as well as fungi species.

PA- 146

Synthesis of CdS thin films by green chemical dip method for sunlight driven photodegradation of Rhodamine-B dye water pollutants

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Abstract

The CdS nanosphere thin film material were synthesized by chemical dip method using lemon juice as a stabilizing/capping agent. This synthetic rout avoids the use of volatile ammonia solution. The CdS thin film materials were deposited on glass substrate in aqueous medium at room temperature. Lemon juice containing citric acid, flavonoids bio molecules stabilize the formation and controlled deposition of CdS thin film materials. XRD study indicates formation of face centered cubic phase predominantly. SEM analysis revealed the formation of CdS Nano spheres with average grain size of 50nm. The characteristics optical band gap energy was observed in the order of 2.37 eV which was interesting for optical studies. As synthesized CdS thin film was used for photodegradation of Rhodamine-B dye solution under natural sunlight irradiation. At the thin film surface, material harvest sunlight effectively to catalyze the degradation of Rhodamine B dye solution with 80% efficiency.

Keywords: Thin film; Nanoparticles; Sunlight; Photodegradation.

PA- 147

Biogenic capped Selenium nanoparticles in lemon extract exhibit antioxidant and anticancer potential along with selective peroxide sensing

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Abstract:

Background: Biogenic lemon extract stabilized selenium (0) nanoparticles weresynthesized by wet chemical route in negatively charged lemon precursors. These green synthesized nanoparticles with positive charges neutralized by lemon precursors had exhibited rod morphology, 17 nm. mean crystallite size on the basis of PXRD spectrometric and TEM analysis.

Method: The selective sensing of these nanoparticles to peroxide in presence of other cellular bio-cations have estimated on the basis of UV-Vis. spectrometric sensing. Furthermore this peroxide sensing activity of Se(0) nanoparticles was correlated for anticancer potential on MCF-7 cells using MTT cell line assay. The antioxidant potential of these nanoparticles was compared with Vit-C using SOD and DPPH radical assays.

Results: These Se(0) biogenic nanoparticles with plausible surface positive charge activity hadproved applications in bio-sensing and biomedical area. As these nanoparticles have shown 17 nm. rod crystallite size from PXRD analysis related to SEM and TEM images, which leached after peroxide sensing to spherical morphology with reduction in sizes for 25 µM minimum concentration of H_2O_2. Also, these biogenic nanoparticles are better antioxidant agent compared to Vit-C at 100 ppm. showing good anticancer activity compared to doxorubicin up to 78 percent apoptosis of MCF-7 cells on the basis of MTT assay. Hence these nanoparticles are better candidates for biomedical applications.

Keywords: Biogenic; Selenium; Lemon extract; Anticancer bioactivity.

PA- 148

Hybrids of Fluconazole: Synthesis and antimicrobial activity

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Abstract

Based on the structure of the active site of cytochrome P450 14α-demethylase (CYP51) a series of 1-(1-(substituted phenyl)-2-(1H-1,2,4-triazol-1-yl)ethylidene)-2-(1-(substututed phenyl)-2-(1H-1,2,4-triazol-1-yl)ethylidene)hydrazine of fluconazole analogs was synthesized. All compounds were characterized by IR, 1 H-NMR, 13 C-NMR, mass spectroscopy and elemental analysis. All the synthesized compounds were tested qualitative (Zone of inhibition) and quantitative (MIC) antimicrobial activities against four pathogenic bacteria B. subtilis, S. aureus, E. coli and P. aeruginosa and two pathogenic fungi C. albicans and A. niger. Of compounds screened, most of the synthesized compounds showed potent antimicrobial activity against gram positive and gram-negative bacteria as well as fungi species.

PA- 149

Structural, optical and elastic properties of $Fe_{3-x}Er_xO_4$ nanoparticles

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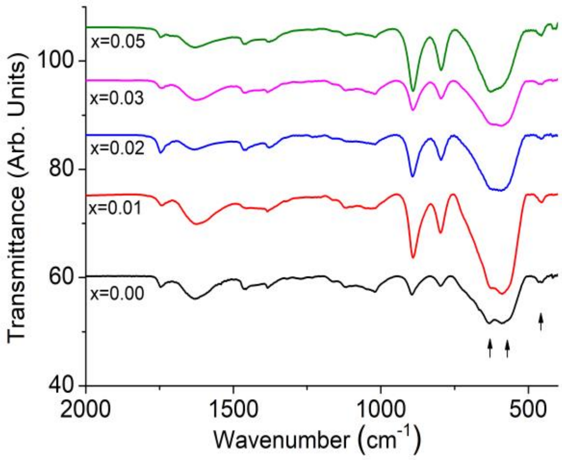
Abstract

Fe 3-x Er x O 4 (x =0.00, 0.01, 0.02, 0.03 and 0.05) nanoparticles were synthesized using co-precipitation method. Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) studies showed the formation of rod like structures along with round shaped particle after erbium doping. Lattice constant and X Ray density were determined using X-Ray Diffraction (XRD). Fourier-transform infrared spectroscopy (FTIR) results revealed the occupancy of erbium at the octahedral site. The force constants for tetrahedral and octahedral sites determined by FTIR analysis. Elastic constants were calculated using FTIR data. Young modulus, Bulk modulus, Rigidity modulus and Poisson's ratio were found to enhance with erbium doping. The increase of elastic constants with doping indicates strengthening of inter atomic bonding. Vibrating Sample Magnetometer (VSM) results showed that magnetization found to increase with erbium doping till a critical level. These nanoparticles have potential to use as a magnetoelastic sensors.

Graph:



PA- 150

Capacitive study of Ru Doped Copper Hydroxide electrodes prepared by electrodeposition via different non-aqueous media.

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Abstract:

Self-anodization of metal to form their hydroxides is a versatile technique. Very little work is found in the literature regarding the preparation of Ru doped copper hydroxide by this method. Here in Ru doped copper hydroxide thin films were prepared via a self-anodization of copper strips in 1 M NaOH of different non-aqueous baths, followed by the cathodization of these samples at 0.005M $RuCl_3$ non-aqueous baths. XRD study reveals polycrystalline nature of the samples. Granular rough surface morphology is observed in SEM. Sample exhibit hydrophilic nature. The cyclic voltammetry study was carried out in 1 M aqueous NaOH electrolyte. All prepared samples exhibited pseudo capacitive behavior. Sample deposited at 0.8V for 30 min using 0.005 M Ru doped copper hydroxide exhibit highest specific capacitance 8133.33 F/g at 2 mV/s in 1 M NaOH.

Keyword: Ruthenium doped Copper hydroxide, Electro-deposition, Cyclic Voltammetry, Capacitive study, Non-Aqueous.

PA- 151

Synthesis and Structural studies of Zn doped Mg ferrites synthesized by co-precipitation method

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Abstract:

Mg-Zn ferrites are a class of soft magnetic materials that have very good structural, electrical and magnetic properties. Mg-Zn ferrites were prepared by eco friendly co-precipitation method at relatively low temperature. Formation of spinel cubic ferrite was confirmed by using X-ray diffraction studies and lattice parameters of the samples ranging from 8.285A 0 - 8.305A 0. Detailed staple parameters like lattice constant, crystallite-size, x- ray density, bond length, inter-ionic distance was determined employing XRD data. The W-H plot and Size-Strain plots were extensively studied and the results have been compared. SEM analysis furnishes surface morphology and grain size (in the range 3.4µm - 4.3µm) of particles of Mg-Zn samples.

Keywords: Ferrites, Spinel cubic structure, XRD, SEM

PA- 152

Luminescent property of Erbium doped yttrium oxide: Morphology and effect of concentration

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Abstract:

Er 3+ doped Y_2O_3 nanophosphors were synthesized via combustion synthesis techniques in which urea is used as fuel and its photoluminescence properties were measured. Structural morphology and particle size were calculated using Transmission electron microscopy (TEM) along with the histogram showing the average particle size. Photoluminescence spectra of doped Y2O3:Er3+ phosphors were efficiently excited in the range of 200-400 nm and prepared phosphors under 356 nm excitation exhibit three major peaks located at 506 nm (green) and 522 nm (green) and 711 nm (red) corresponding to 2H11/2 → 4I15/2 transition and 4F9/2 → 4I15/2 transition respectively. The calculated Commission Internationale de I'Eclairage (CIE) chromaticity confirms that with Er3+ doping, the luminescence co-ordinates of Y_2O_3 phosphor shift to near white (0.291, 0.397) region which is very much close to the ideal white emission. Hence prepared phosphor may be used for UV-based LEDs and display devices.

Keywords: Nanophosphors, Photoluminescence, CIE.

PA- 153

PL analysis of $Sr_2M (BO_3)_2$:Tb 3+ green emitting phosphor for solid state lighting

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Abstract:

With the assist of customized step wise combustion synthesis method $Sr_2Mg(BO\ 3)_2$: Tb 3+ phosphors were synthesize along with the luminescent proprieties, XRD, chromaticity coordinates with effect of emission intensity with related with the corresponding concentration were studied. The emission spectrum of $Sr_2Mg(BO_3)_2$:Tb 3+ (x=0.2 to 2 mol %) excited by 353 nm exhibits a strong green emission among peak location at 546 nm is recognized to F-F transitions of Tb 3+ 5 D 4 - 7 F 5 ion. This study suggest that $Sr_2Mg(BO_3)_2$: Tb 3+ phosphor be a prominent material as a green constituent for phosphor- transformed W-LEDs for SSL.

Keywords: Photoluminescence, XRD, SEM, CIE

PA-154

Thermoluminescence properties of Y2O3:Er 3+ nanophosphor: Effect of doping concentration and UV radiation

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Abstract:

A series of Y_2O_3:Er 3+ phosphors have been synthesized via combustion synthesis method using urea as a fuel and its thermoluminescence properties were investigated. Crystal structure and particle size is determined using X-ray diffraction (XRD) whereas the presence of organic residua OH and CO in the samples were confirmed by FTIR. XRD confirms thatprepared sample exhibits body centered cubic Y_2O_3 structure with space group Ia3(206) and having a particle size of 17.58 nm for $2\theta = 29.21°$. Thermoluminescence study of UV irradiated Y_2O_3:Er3+(1-5mol%) phosphor were also performed and is recorded maximum at 10 min under UV irradiation (254 nm). The trapping parameters (μ, E, s) were estimated from Chen's glow peak shape method were discussed in detail for their possible usage in dosimetry applications. The TL Glow curve was also fitted in CGCD (computerized glow curve deconvolution) techniques and trapping parameters were calculated.

Keywords: Nanophosphors, X ray diffraction, Combustion synthesis, Thermoluminescence, CGCD

PA- 155

Synthesis & optical analysis study of red & blue emitting $KNaPO_4$ phosphor.

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Abstract

White light whether by mixing the basic colors or colors from UV-blue light extracted from LED by coating the relevant inorganic phosphors from LED lamps, LED' s inorganic converted phosphor, resulting in the production of appropriate phosphor products. W-LEDs are available with fewer colors, so they also rely on the mixing of a blue LED with yellow inorganic phosphor emitting. The photo-luminescent excitation spectrums and $KNaPO_4$: Ce 3+ emission spectra of phosphor show a broadly absorbed band between 280 and 380 nm due to the transformation 4f–5d of the Ce 3+ ion peak at 330 nm. Blue emission bands with a core of 442 nm the PL emission spectrum from $KNaPO_4$: Ce 3+ phosphor & in case of $KNaPO_4$: Eu 3+ phosphor presented several emission peaks, which corresponded to the 5 D 0 → 7 F J (J=0, 1, 2, 3, 4) transition of Eu 3+, respectively. Monitored at 620 nm emission, the excitation spectrum contained 200~350 nm and 350~450 nm two excitation bands, which corresponded to a weak charge transition broad band absorption CTS and a strong f-f transition absorption of Eu 3+, respectively. And the highest excitation peak located at 396 nm

Keywards: Phosphor, XRD, SEM, CIE