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

Fourth International Conference on Advances in Materials Science (ICAMS- 2020)

20th – 21st January 2020

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

Post-Graduate Department of Physics,

Raje Ramrao Mahavidyalaya, Jath,

Dist: Sangli, Maharashtra, India

Dr. Sanjay S. Latthe	Dr. A. K. Bhosale	Dr. S. R. Kokare	Dr. V. S. Dhekale
Convenor	Co-Convenor	Secretary	Principal

Message from Chairman,

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Prin. Abhaykumar Salunkhe

।। ज्ञान, विज्ञान आणि सुसंस्कार यासाठी शिक्षण प्रसार ।। - शिक्षणमहर्षी डॉ. बापूजी साळुंखे

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

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

2130, 'E' Tarabai Park, Tal. Karveer, Dist. Kolhapur - 416 003 (Maharashtra State)
Phone No. : (0231) - 2654653, 2652720, 2650871 Fax : 0231-2666763

Shikshanmaharshi Late Dr. Bapuji Salunkhe	Hon. Chandrakant (Dada) Patil	Prin. Abhaykumar Salunkhe	Prin. Miss Shubhangi M. Gawade
Promoter-Founder B.A.B.T. D. Lit	President Minister for, Revenue, Relief and Rehabilitation, Public Works	Chairman M.A.	Secretary M.Sc.B.Ed.

Ref. No.: Date :

I am delighted to hear that the Post-Graduate Department of Physics, Raje Ramrao Mahavidyalaya, Jath has organized the Fourth International Conference on Advances in Materials Science (ICAMS-2020) during 20-21 January 2020. Now a days, Materials Science is a booming field of research. Majority of the well-known and popular research in 20th century is 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 scientists from Turkey, Qatar, and South Korea have agreed to participate and share their ideas in the conference. I am sure that the theme of conference will provide 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 International Conference 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 Gavade

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

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Ref. No.: Date :

I am very happy to know that the Post-Graduate Department of Physics, Raje Ramrao Mahavidyalaya, Jath has organized the Fourth International Conference on Advances in Materials Science (ICAMS-2020) during 20-21 January 2020. I appreciate the endeavor of the college to shoulder the responsibility of organizing an International Conference. The presence of scientists from Turkey, Qatar, and South Korea is an excellent opportunity to the delegates participating in this International Conference.

New materials are practically needed in all domains of life. Design and synthesis of new materials is one of the most important and interesting part of the materials sciences. 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.

(Prin. Mrs. Shubhangi Gavade)
Secretary,
Shri Swami Vivekanand Shikshan Sanshta,
Kolhapur

Message from Pro-Vice-Chancellor, Shivaji University, Kolhapur

Prof. (Dr.) D. T. Shirke

प्रा. (डॉ.) डी. टी. शिर्के
एम.एस्सी., पीएच्.डी
प्र-कुलगुरू

Prof. (Dr.) D. T. Shirke
M.Sc., Ph.D.
Pro-Vice-Chancellor

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

दूरध्वनी : कार्यालय - (०२३१) २६०९०७०
फॅक्स : ००९१-२३१-२६९३२९४, २६९१५३३

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Message.....

I am glad to know that the Fourth International Conference on Advances in Materials Science (ICAMS-2020) is being organized by Post – Graduate Department of Physics, Raje Ramrao College, Jath, Dist.: Sangli during 20-21 January, 2020. ICAMS – 2020 will be a platform to gather and disseminate the latest knowledge in recent advancements in emerging areas of diversified research fields. The editors of reputed and peer-reviewed Macromolecular Symposia (Wiley Publication) have agreed to publish the conference papers.

Academicians, Scientist, Researchers will be able to share and discuss new findings and applications of materials science. I hope that participants will enjoy the conference and have memorable experience at Jath. It is envisaged that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally.

I wish the ICAMS-2020 a grant success.

(Prof. D. T. Shirke)
Pro-Vice-Chancellor

Message from Principal, Raje Ramrao Mahavidyalaya, Jath

Dr. V. S. Dhekale

Jr. College Recog. No. H.S.C./1077/31029/XII/HS dt.10/06/1977
Jr. College Code No. 22-02-001

Estd : June 1969

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

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

RAJE RAMRAO MAHAVIDYALAYA, JATH

Dist. Sangli (Maharashtra) 416 404

U.G.C. Recognition under 2 F & 12 (B) UGC Act 1956
(Affiliated to Shivaji University, Kolhapur)
NAAC Reaccredited : "B" (Third Cycle)

Shikshanmaharshi Dr. Bapuji Salunkhe Birth Centenary Year 2018-19

GOLDEN JUBILEE YEAR 2018-19
50 Years of Knowledge, Science & Culture

Office. : (02344) 246251, Fax : (02344) 246015, Resi.: (02344) 247251 E-mail : rajeramrao@gmail.com, Website : www.rrcollege.org

Founder	President	Chairman	Secretary	I/c Principal
Dr. Bapuji Salunkhe D. Lit.	Hon. Chandrakant Dada Patil Minister of Revenue, Relief & Rehabilitation, Public Works, Govt. of Maharashtra	Prin. Abhaykumar Salunkhe M.A.	Prin. Mrs. Shubhangi Gawade M.Sc., B.Ed	Dr. V. S. Dhekale M.Com., M.B.A., M. Phil., Ph.D.

Ref No. RRMJ/ Date :

It is a matter of great pride that the Post-Graduate Department of Physics of our college has organized the Fourth International Conference on Advances in Materials Science (ICAMS-2020) during 20-21 January 2020. This is consecutive fourth year of International Conference organized by the faculty of Physics Department. I am very happy to place before you the proceedings of this seminar.

I express my sincere thanks to Prin. Abhaykumar Salunkhe, Chiarman, Shri Swami Vivekanand Shikshan Sanstha, who inspired and guided us all the way in organizing this wonderful event. I am also thankful to Prin. Mrs. Shubhangi Gavade, Secretary, Shri Swami Vivekanand Shikshan Sanstha, for her valuable guidance and motivation to undertake this activity successfully. My thanks are due to the resource person, authors of research papers and participants for their valuable contribution in the ICAMS-2020.

Dr. V. S. Dhekale
I/c Principal
Raje Ramrao Mahavidyalaya
Jath, Dist. Sangali.

Message from Prof. Shanhu Liu, Henan University, China

HENAN UNIVERSITY
河 南 大 學
Add: Jin Ming Avenue, Kaifeng,
Henan, China / Zip Code: 475004
Tel: +86-0371-22868833
Website: http://www.henu.edu.cn/

Date: 15th January 2020

Dear Convener,
ICAMS – 2020

I am very glad to receive a news of organization of Fourth International Conference on Advances in Materials Science (ICAMS-2020) by Post-Graduate Department of Physics, Raje Ramrao College, Jath during 20-21 January 2020. The topics of conference will cover fundamental physics and chemistry, modeling and computations, experimental techniques, and industrial applications.

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 ICAMS-2020 will encourage these activities in the best possible manner.

Grand success to ICAMS-2020.

Sincerely yours,

Prof. Shanhu Liu
January 15th 2020

Message from HOD Physics, Shivaji University, Kolhapur

Prof. P. S. Patil

Department of Physics
Shivaji University, Kolhapur, M.S., India

Dr. Pramod S. Patil
M.Sc., Ph.D., FinstP (UK)
Professor,
In-Charge Dean, Science & Technology
Head, Department of Physics,
Founder Director, School of Nanoscience and Technology,
Former Coordinator, Energy Technology

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Date: 13/01/2020

I am very glad to hear the organization of consecutive Fourth International Conference on Advances in Materials Science (ICAMS-2020) by Post-Graduate Department of Physics, Raje Ramrao College, Jath during 20-21 January 2020. This event dedicated to materials science will provide a highly interactive platform for relevant experts from the academic and industrial areas to exchange education and research face to face.

The field of Materials Science is rapidly growing, and several new discoveries calls for renewed attention of involved researchers. The conference includes Keynote lectures and invited talks by eminent personalities from around the world in addition to contributed papers both oral and poster presentations. This gathering under ICAMS - 2020 will stimulate the scientific discussion between the researchers, promote new international collaborations, provide a friendly platform to share the scientific knowledge, and prioritize the future efforts that are needed to revolutionize the field of materials science.

I wish success to ICAMS-2020.

Prof. P. S. Patil
HOD, Dept. of Physics,
Shivaji University,
Kolhapur

From the Desk of Convenor, ICAMS - 2020

Dr. Sanjay S. Latthe

It is matter of great pleasure to welcome and thank you all for gathering in Fourth International Conference on Advances in Materials Science (ICAMS-2020) 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 third edition. The scientists and researchers from various countries (Turkey, Qatar, South Korea, China) are participating in ICAMS-2020. 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 136 abstracts and 47 research papers which will be published in Macromolecular Symposia (Wiley Publications). We hope that you find the ICAMS proceeding rewarding.

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

Once again welcome to ICAMS-2020.

FOURTH INTERNATIONAL CONFERENCE ON

ADVANCES IN MATERIALS SCIENCE

20th - 21st JANUARY 2020

From the Desk of Co – Convenor, ICAMS - 2020

Dr. A. K. Bhosale

Heartily welcome to ICAMS-2020. Post-Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli has organized the Fourth International Conference on Advances in Materials Science (ICAMS-20120) during 20 – 21 January 2020. 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.

First, Second and Third International Conference on Advances in Materials Science (ICAMS-2016, ICAMS-2017 and ICAMS-2018) were successfully organized by the Post-Graduate Department of Physics, Raje Ramrao College, Jath in December 2016, 2017 and 2018. In ICAMS-2016, 06 Japanese researchers were participated, in ICAMS-2017, 09 Japanese researchers were participated whereas in ICAMS-2018, 05 scientists from Qatar, Africa and Nepal have presented their research work. ICAMS-2020 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.

ICAMS-2020 will include keynote and invited talks, contributed oral & poster presentations. ICAMS-2020 will provide opportunities for young researchers to actively engage in research discussions, novel research ideas, and safety issues in nanotechnology. There will be best oral and poster presentation awards for research scholars. All presented papers will be considered for publication in Macromolecular Symposia (Wiley Publications).

Enjoy ICAMS-2020.

FOURTH INTERNATIONAL CONFERENCE ON

ADVANCES IN MATERIALS SCIENCE

20th - 21st JANUARY 2020

From the Desk of Secretary, ICAMS - 2020

Dr. Shrikant R. Kokare

After the grand success of First Second and Third International Conference on Advances in Materials Science (ICAMS-2016, ICAMS-2017 and ICAMS-2018) we welcome you back for the Fourth International Conference on Advances in Materials Science (ICAMS – 2020) organized by Post-Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli, Maharashtra, India.

ICAMS-2020 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 Turkey, Qatar, South Korea and different parts of India will be gathering in ICAMS – 2020. This conference will provide 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, oral and poster presentations. The research papers received for ICAMS-2020 will be considered for publication in Macromolecular Symposia (Wiley Publications).

Thank you all the participants for gatherring at Raje Ramrao College, Jath to share your expertise knowledge with global platform of Materials Science Community.

Enjoy the conference.

Technical Session of ICAMS-2020

Day and Date	Time	Programme
Monday, 20th January 2020	09.30 – 11.00	Welcome, Registration and Breakfast
	11.00 – 11.45	Inauguration (Main Hall)
		Group Photograph
	11.45 – 12.45	**Key Note Address** *Resource Person:* ***Prof. Levent A. Demirel*** Topic: Polymer Based Functional Coatings Chemistry Department, Koç University, Sarıyer 34450, Istanbul, **Turkey**
	12.45 – 01.30	Lunch
		Main Hall
	01.30 – 02.15	Technical Session I *Resource Person:* ***Dr. Pradip Sarawade*** Topic: Nanomaterials for Energy & Environmental Applications Department of Physics, University of Mumbai, Fort, Mumbai-400098, Maharashtra, **India**
	02.15 – 03.00	*Resource Person:* ***Dr. Annamaria MIKÓ*** Topic: Mesoporous Silica Particles with Hierarchical Morphology

		Chemistry Department, Koç University, Sarıyer 34450, Istanbul, **Turkey**
	03.00 – 03.15	Tea
	Main Hall	
	03.15 – 04.00	Technical Session II *Resource Person:* ***Dr. M. C. Rath*** Topic: Periodic Table of elements: Past, Present and Future Scientific Officer (G), Radiation & Photochemistry Division, Associate Professor, Homi Bhabha National Institute (HBNI), Bhabha Atomic Research Centre (BARC), Trombay, Mumbai 400 085, Maharashtra, India
	04.00 – 04.45	*Resource Person:* ***Dr. Kishor Kumar Sadasivuni*** Topic: Innovative Smart Sensor Solutions for Application in Daily Life Center for Advanced Materials, Building H10, Zone 6, Office E133, Qatar University, Qatar. Managing Editor, Emergent Materials, Springer.
	04.45 – 05.00	Tea
	05.00 – 06.30	Oral presentation Session – I (OP – 01 to OP – 25) in Main Hall
	06.30 – 07.30	Poster Presentation Session (PP – 01 to PP – 111)
	07.30 – 08.30	Cultural
	08.30 onwards	Dinner

Tuesday, 21st January 2020	08.30 – 09.00	Breakfast
	Main Hall	
	09.00 – 09.45	Technical Session III *Resource Person:* ***Dr. Murali Banavoth*** Topic: Strategies for Photoconversion Efficiency Enhancement in Highly Efficient Bulk Heterojunction Solar Cells Solar Cells and Photonics Research Laboratory, School of Chemistry, University of Hyderabad, Prof. C. R Rao Road, Central University P.O. Hyderabad – 500046, India.
	09.45 – 10.30	*Resource Person:* ***Dr. Raveendra M. Melavanki*** Topic: Photophysical Properties of Heterocyclic Compounds in Different Environments Department of Physics, M. S. Ramaiah Institute of Technology, Bengluru-560054, Karnataka, India.
	10.30 – 10.45	Tea
	Main Hall	
	10.45 – 11.30	Technical Session IV **(Prof. P. B. Joshi Memorial Lecture)** *Resource Person:* ***Prof. K. Y. Rajpure*** Topic: Thin Film Photocatalysis for Environmental Remediation Electrochemical Materials Laboratory, Professor in Physics, Coordinator, SAIF, Head, USIC/ USIC-CFC, Shivaji University, Kolhapur 416 004, Maharashtra, India.

	11.30 – 12.30	Valedictory Function
	12.30 onwards	Lunch

Technical Session of ICAMS-2020

Invited Talk (IT – 01 to IT – 08)

Oral Presentation (OP – 01 to OP – 25)

Sr. No.	Title of Paper	Author(s)	Paper Code	Page number
1	Magnetic Studies of La-Al co-doped YIG Nanoferrites Synthesized using Sol-Gel Technique	A.R. Bhalekar and L.N. Singh	OP – 1	47
2	Transparent Photoactive Self-cleaning TiO2 Thin Film by Dip Coating	Adarsh Patil, Suchitra Patil, Dhananjay D. Kumbhar, Aishwarya Patil, and Pramod J. Kasabe	OP – 2	48
3	Synthesis, Impedance and Current-Voltage Characteristics of Strontium-Manganese Titanate hybrid Nanoparticles	Anusha Suryavanshi, Vinayak Adimule, Gurumurthy Hegde, Santosh Mannopantar, and Vijay K. Kulkarni	OP – 3	49
4	A Study on the Complex Formation of PMMA, PVC and their Blend with LiClO4 using FTIR Spectroscopy	Patil Anitha Bhimarao Ranjana, D.Jebaraj Issac Kirubakaran and B.Sundaresan	OP – 4	51
5	Sol Gel Prepared Vanadium Oxide for Toxic Gas Sensing Application	B. M. Babar, A. A. Mohite, V. L. Patil, U. T. Pawar, L. D. Kadam, P. M. Kadam, P. S. Patil	OP – 5	52
6	Multifunctional ZnO Thin Film by Spray Pyrolysis Method	Dhananjay Kumbhar, Aishwarya Patil, Apurva Patil, Padma Dandge, Pramod Kasabe	OP – 6	53
7	Hydrothermally Derived Cu2ZnSnS4 Nanoparticles: Structural, Morphological and	Jitendra P. Sawant, Shweta S. Jambhale and Rohidas B. Kale	OP – 7	54

	Photocatalytic Properties			
8	Characterization of FTIR Spectra of PbxSr1-x(NO3)2 Mixed Crystals	K..Prathap, E.Venkateshwar Rao and K. A. Hussain	OP – 8	55
9	Studies on Impact of Copper on Structural and Magnetic Properties of NiZn Ferrites for Multi Layer Chip Inductor	C. M. Kanamadi	OP – 9	56
10	Cow Dung: A Bio Coating	Madhuja Manoj Katkar	OP – 10	57
11	Lithium Ion Conductivity of Polymer Blend Electrolyte - PMMA-PVC- LiClO4	More Amit Arvind Sunita and B.Sundaresan	OP – 11	58
12	A Study on the Optical Behavior of Dyx3+ ion Activated Sr(1-X)Y2O4 Nanophosphors for W-LED Application	Santosh P. Ghorpade, Raveendra Melavanki and N. R. Patil	OP – 12	59
13	Preparation and Characterizations of Cadmium Substituted Cobalt Ferrite Nanoparticles	Priyanka P. Kashid, Shridhar N. Mathad, Mahadev Shedam, Akshay B. Kulkarni	OP – 13	61
14	Network of Interconnected Mesoporous Iron Oxide Nanoparticles for Electrochemical Supercapacitor Application	Rahul S. Ingole, Snehal L.Kadam, Deepak S. Rajmane, Shrinivas B. Kulakarni and Balakrishna J. Lokhande	OP – 14	62
15	Influence of Iron Doped on Structural and Optical Absorption Studies of Calcium Borophosphate (CaBP) Nano Phosphors	M. Rajesh Yadav, P. Radha Krishna and R.V.S.S.N. Ravikumar	OP – 15	63
16	Studies on Synthesis and	S. B. Wategaonkar,	OP – 16	64

	Characterisation of Titanium Dioxide Thin Films for DSSC	R.P.Pawar, D.P.Nade, V.G.Parale, B. M. Sargar, R.K.Mane		
17	Facile Sol-Gel Synthesis of Nickel Oxide Nanoclusters for Pseudocapacitors Application as an Efficient Electrode Material	S. D. Dhas, P. S. Maldar, M.D. Patil, R. V. Khandekar, U. V. Shembde, S. A. Mane, K. M. Hubali, A.V. Moholkar	OP – 17	65
18	Synthesis and Characterization of Successive Ionic Layer Adsorption and Reaction (SILAR) Deposited Mns Thin Film at Room Temperature on Stainless Steel Substrate for Supercapacitor Application	S. S. Kumbhar, S. K. Chougule, G. N. Padasare, A. A. Admuthe, M. M. Tonape	OP – 18	66
19	Characterization of Cs3 (PMo12O40) by Hydrothermal Technique for Optostructural and Electrical Properties	S. N. Nadaf, S. S. Patil, P. N. Bhosale, V. A. Kalantre and S. R. Mane	OP – 19	67
20	Influence of Selenisation Temperature on the Growth of (Cu, Ag)0.5InSe2 Thin films by Two – stage Process	Shaik Babujani, G. Hema Chandra, Mukul Gupta	OP – 20	68
21	Synthesis and Structural Studies of Zn0.95 Cu0.05Mn2O4 Ceramics	Shashidhargowda, Akshay Kulkarni,Shridhar Mathad	OP – 21	69
22	Effect of Copper Doping on Structural, Optical and Electrical Properties of ZnO Thin Film	T.S. Bhadrashetti, A. S. Gore, V. D. Mote	OP – 22	71
23	Electrochemical Synthesis of Polyaniline Thin Films for Electrical Energy Storage	U. M. Chougale, M. C. Rath, V. J. Fulari	OP – 23	72

	Application			
24	Influence of Various Sol-Gel Parameters on the Properties of Sulfuric Acid Chelated Zirconia Aerogels Dried at Ambient Pressure	Uzma K.H. Bangi, V. M. Prakshale, Bhushan Patil, Rajendra C. Pawar, Hyung-Ho Park	OP – 24	73
25	A Facile Synthesis of Poly (3-Octyl Thiophene): Ni 0.4 Sr 0.6 TiO3 Hybrid Nanocomposites for Solar Cell Applications	Vinayak Adimule, Anusha Suryavanshi, Gurumurthy Hegde, B. C. Yallur, Vijay K. Kulkarni , Santosh S Nandi	OP – 25	74

Poster Presentation (PP – 01 to PP – 111)

Sr. No.	Title of Paper	Author(s)	Paper Code	Page number
1	Measurement of Mass Attenuation Coefficient and Effective Atomic Number for Ayurvedic Drugs	A Ashwini, A Manjunath, S S Teerthe and B R Kerur	PP – 1	76
2	Preparation of Transparent Superhydrophobic Coating by TiO2/ Polyethylene nano-composite Using Dip CoatingTechnique	A. S. Nalavade, S. S. Latthe	PP – 2	77
3	Fabrication of Hydrophobic CZTS Thin Films by Sequential Growth Technique	A. M. More, R.K. Shaikh, G. A. Randive, K. A. Adhye, A. P. Sabale	PP – 3	78
4	Influence of Cadmium Doping on Structural and Mechanical Properties Co-Ni Nano Ferrites	Akshay B. Kulkarni, S. N. Mathad, N. D. Hegde, Shashidharagowda H., Priyanka Kashid	PP – 4	79
5	Polyaniline/CdO Nanocomposites in Potential Applications	Kulkarni.Anandrao Sureshrao, S.N. Bajantri, S. D. Tontapur, Aravind Dyama, Shivaraj M. Hiremath	PP – 5	80
6	AIE Emission of SDS Capped Diphenylanthracene Nanoparticles for Selective Recognition and Estimation of Al3+ ion in Aqueous Medium Based on Enhancement Effect and Analytical Application	Sonali B. Suryawanshi, Gunvant R. Deshmukh, Anita J. Bodake and Shivajirao R. Patil	PP – 6	81

7	Synthesis and Characterization of New Organosoluble and Thermally Stable Aromatic Polyamides Containing Flexible Ether and Aliphatic Spacer Linkages	A. V. Diwate, S. D. Ghodake, A. B. Tamboli, K. S. Patil, M. B. Gurame and N. N. Maldar	PP – 7	83
8	Effect of Concentration on NO2 Gas Sensing as Deposited Cadmium Oxide Thin Films Prepared by Reflux Method on Glass Substrate	B. A. Kalbhor, B. A. Jekab, R. D. Pawar, P. A. Desai, M. M. Tonape	PP – 8	84
9	Complex Optical Studies on Conducting Polypyrrole Doped With ZnO Nanoparticles	B. Bharati, M. A. Sharanabasamma, M. V. N. AmbikaPrasad, D. Mahalesh, G. M. Pushapajali	PP – 9	85
10	Dielectric and Impedance Study of LSM Thin Films as Cathode for SOFC	B. S. Kamble, V. J. Fulari, R. K. Nimat	PP – 10	86
11	Synthesis of SnO2 Nanoparticle using Mushroom Extract by Soln Gel Method	Kalbhor B.A., Pawar R. D., Patil N.T.	PP – 11	87
12	Photocatalytic Environmental Remediation of Cassiterite-Titania Nanocomposite	C. B. Mane, R. P. Patil, S. B. Patil, R. P. Pawar	PP – 12	88
13	Antimicrobial Efficacy of Commercially Available Swarna Bhasms and Bio-Synthesized Gold using Cow Urine	C. A. Pawar, A. K. Sharma, and N. R. Prasad	PP – 13	89
14	A. C. Electrical Properties of Nanoparticle Sized CuxCo1-xFe2-	D. H. Bobade, T.R.Mane, C.R.Bobade, V.V.Awati	PP – 14	90

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15	Structural and Microstructural Properties of La3+ doped Mg-Zn Nano-ferrite Synthesized by Co-Precipitation Route	T. R. Mane, D. H. Bobade	PP – 15	92
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104	Overview of Applications of Superhydrophobic Surfaces	L. B. Mane, N. B. Mane, S. S. Mane, J. D. Mote, S. S. Powar, S. R. Shinde, T. R. Yadhav, M. R. Mujawar, B.T. Khogare	PP – 104	200
105	Synthesis of Zno Nanoparticles using Plant Extract for their Antimicrobial Activity Applications	P. P. Aiwale, V. C. Birajdar, P. P. Chougule, K. D. Ghongade, A. P. Halkude, P. R. Hande, A. R. Karajange, R. D. Kodag, R. B. Sawant, V. C. Mali	PP – 105	201
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110	Spray Deposited Bi2WO6 Thin Films for Photocatalytic Application	R. S. Pedanekar, A. D. Dhok, K. Y. Rajpure	PP – 110	206
111	Superhydrophobic Nanocomposite Coatings of Hydrophobic Silica Nanoparticles and Poly (Methyl Methacrylate) with Notable Self-Cleaning Property	Rajaram S. Sutar, Sanjay S. Latthe, S. B. Deshmukh, L. P. Saptal, R. L. Kalal, S. P. Pattanshetti, S. B. Pawar, Appasaheb K. Bhosale	PP – 111	207

Key-Note Talk

Polymer Based Functional Coatings

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Abstract

Various design criteria for functional coatings based on particle filled polymer composites and layer-by-layer (LbL) assembly of macromolecules will be discussed and potential applications as water-repellent surfaces, anti-fogging surfaces, anti-icing surfaces and antimicrobial surfaces will be presented.

The surface roughness and surface hydrophobicity of silica nanoparticle/polystyrene nanocomposites will be discussed as a function of the nanoparticle content and nanoparticle surface chemistry. The use of water microdroplets as optical microsphere microcavities due to their nearly spherical shapes on superhydrophobic surfaces and the anti-fogging applications of superhydrophilic surfaces will be presented.

Anti-icing agent releasing porous silica particle/SBS (styrene-butadiene-styrene copolymer) composites will be introduced as anti-icing coatings. The effectiveness of macroporous diatemoceous earth particles and mesoporous silica particles as carriers of anti-icing agents in the polymer matrix will be compared.

The antimicrobial properties of PEOX (Poly(2-ethyl-2-oxazoline)) stabilized Ag-Nanoparticle/Tannic Acid (TA) and Nisin/Polyanion based LbL coatings will be presented.

IT-1

Nanomaterials for Energy and Environmental Applications

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Abstract

Recently, Nanomaterials has become a decisive topic in science, as it gives a new way to meet the global challenges of sustainable energy which is a main concern of today's global vision and for the world economy. Global warming being the main concern of mankind in this century has made researchers to think in terms of "green chemistry" for adopting a sustainable approach to technological development. It has become a leitmotif in all projects dealing with this strategic domain of science. The concept of green chemistry, which makes the nanomaterials even more creative, has become an integral part of sustainability.

Nanomaterials are becoming one of those discoveries that takes material science based approach to nanotechnology. The term "nano" in nanotechnology refers to very minute particles on the nanometer scale. In our daily life huge varieties of nanoparticles have emerged, in every field from medical, electronics, healthcare, and much more are now emerging in the field of nanotechnology. Because nanoparticles have a large surface-to-volume ratio compared to bulk materials, they offer an attractive alternative to conventional application.

This talk will cover simple and sustainable green approach to synthesis various Nanomaterials with a specific shape, size and controlled textural properties by sol-gel and solvothermal methods and their applications for energy and environmental related problems, such as global warming.

IT-2

Mesoporous Silica Particles with Hierarchical Morphology

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Abstract

Mesoporous silica is the central point of many investigations mostly to gain control over both the specific surface area and the morphology. This control is especially important in emerging applications like thermal insulation, catalysis, sensing, filtering or drug delivery systems.

The most common approach for the preparation of porous materials has been the template-directed synthesis method. Non-ionic surfactant templates such as poly(ethylene oxide)-based triblock copolymers of poly(ethylene oxide)-poly(propylene oxide) (also called Pluronic) are commonly used for the synthesis of highly ordered mesoporous silica. The synthesis process is well established, however requires strict control over the various synthesis parameters. Our goal was to design a system with cost effective simple method which requires less strict regulation but results in morphologically controlled synthesis of silica with high surface area.

We present a new approach which targets the production of micron sized spherical silica particles with mesoporous structure and uses the combination of two different approaches: i) controlls the formation of silica primary particles and their agglomeration to produce spherical morphology and ii) uses cooperative self-assembly of silica with Pluronic to form mesopores within the primary particles.

The samples were synthesized at room temperature in acidic TetraEthylOrtoSilica (TEOS) - Pluronic system. This new hierarchical morphology of spherical silica particles consisting of assembly of mesoporous primary particles exhibited high surface area of 200-740 m^2/g.

The results are important to understand how the structure of mesoporous silica evolves during synthesis process and to design new silica materials with tailored morphology and mesoporous structure. It was found that the shape of silica can be tuned in the investigated region with the proper choice of the catalyst concentration as it pre-dominantly determines the kinetics of

primary particle formation and agglomeration. The acid catalyst concentration also had significant effect on the mesophase structure.

The samples can be utilized in applications and in manufacturing environments due to easier and safer handling of the micron sized mesoporous particles.

IT-3

Periodic Table of Elements: Past, Present and Future

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Abstract

Periodic table of elements, which are discovered till date shows three columns along with two separate rows for lanthanides and actinides, called lanthanide and actinide series respectively. The newly discovered element, Oganesson (Og) with atomic number 118, is the last p block element. After the discovery two more new elements with atomic numbers 119 and 120, the further new elements with atomic numbers ≥ 121, will have to enter to a completely new block i.e. g-block series, as per their electronic orbital configuration, 7s2 5f14 6d10 7p6 8s2 5gn. Therefore, in the present form of the periodic table, such new elements have to be written separately as the 'g-block series' below the actinide series, which will create crowd and confusion for the students as well as researchers. So, in order to avoid such situation and also to incorporate the visibility of the 'concept of inner orbitals like d, f, g, etc., new forms of the periodic table have been designed. These tables are expected to accommodate all the new elements of higher atomic numbers of future years and also give instant information on the electronic orbital structure of an element.

IT-4

Innovative Smart Sensor Solutions for Application in Daily Life

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Abstract

The smart nanosolutions research group is mainly concentrated on developing polymer nanocomposites relevant in various fields. Wide ranges of polymer nanocomposites are utilized to fabricate stronger, lighter and high performance multi functional materials which can have remarkable potentials in the technological field. Our team is concentrating on finding solutions to the most critical issues faced by the society through research and innovation. Diabetes is a life style disease that is prevalent all over the world and is a big threat to a healthy society. Detection and treatment of diabetes is a much sort after research field, focusing on a complete control over the situation. We implemented a non-invasive diabetic sensor by detecting the acetone content in breath. There are many research works, investigating the possibility of acetone being a biomarker in detecting diabetes. The key concern is the sensitivity and the selectivity of the technique, with a lower cost. We study polymer nanocomposites using calorimetric and optical spectroscopy lessons to understand the efficiency of the exposure. The Carbon dioxide content in our atmosphere is a growing threat to our ecosystem. Harvesting the CO_2 and converting them into fuels is a major step towards energy management. Our team worked on the conversion of CO_2 to fuels using the electrochemical method. We have fabricated resistive transducers using two kinds of waste materials, plastic and industrial waste. Plastic waste is the most common type of waste in the world. The usage of aluminum is also increasing rapidly every day, but the production of aluminum generates a harmful material which is carbon black waste that harms our environment. We have fabricated plastic and carbon black nanocomposites into an efficient sensor that could be used in various projects and industries. 3D printing technology was used to print the piezoresistive sensor from nanocomposites, prepared using the waste materials from the industry. The sensor demonstrated good sensitivity and this prototype can be used in our daily

life. Water absorbent polymer composites are used as hydrogels for agricultural application to sense the water requirement of plants and enable safer release systems for the fertilizers. The electrical properties of the hydrogel changes with the water content. The hydrogel sensor for agriculture applications is lower in cost and highly selective towards water. The hydrogel device can be used as a water reservoir and a sensor (dual-purpose). A hydrogel is connected to the sensor which will help in controlling and regulating the amount of water in the soil. This sensor has many advantages over the commercially available sensors. Finally, the group will present a review on the current advanced sensor fabrication procedures.

IT-5

Strategies for Photoconversion Efficiency Enhancement in Highly Efficient Bulk Heterojunction Solar Cells

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Abstract

Inexhaustible solar energy, which provides a clean, economical and green energy, seems to be an alternative solution, for current and future terawatt level energy demands. The challenges imposed and the quest for more affordable and efficient clean energy production to find a cheaper alternative led to the development organic bulk heterojunction based solar cells. The unrivaled potential of cost-effective solar absorber materials to achieve high power conversion efficiency (PCE) using the effective ways of fabrication have captured tremendous attention and are the current research interests. The planning, conducting and dissemination of research undertaken will address the most preliminary issues by investigating the role of grain alignment of transparent conducting oxides by sputter depositions will be detailed in accomplishing high photoconversion efficiencies.

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IT-6

Photophysical Properties of Heterocyclic Compounds in Different Environments

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Abstract

Spectroscopy is the branch of physics which deals with light and matter interaction and it involves the varied assortment of methods based on molecular level, emission and/or absorption and electrical and /or magnetic properties. Fluorescence is a spectroscopic method where fluorescent molecules are irradiated with specific wavelength and emission is observed in longer wavelength side. This shift in absorption and emission wavelength is popularly called Stoke's shift. Fluorescence provides ways for both qualitative and quantitative methods of analysis. Photo physics of organic molecules is the study of photo excitation and consequent de-excitation process of molecules, which helps in exploring various phenomenon's taking place in the system. These studies cater to various fields of application ranging from biological, medical, environmental, and industrial [1-3] category. Among many different molecules which exhibit fluorescence, heterocycles are more favored due to their π-extended conjugation and high rigidity. Here heterocyclic rings induce rigidity and heteroatom contributes in the conjugation. The aromatic heterocyclic compounds are those which have a heteroatom in the ring and behave in a manner similar to benzene in some of their properties. They are an important class of compounds, making up more than half of all known organic compounds. Heterocycles are present in a wide variety of drugs, most vitamins, many natural products, biomolecules, and biologically active compounds, including antitumor, antibiotic, anti-inflammatory, antidepressant, antimalarial, anti-HIV, antimicrobial, antibacterial, antifungal, antiviral, anti-diabetic, herbicidal, fungicidal, and insecticidal agents. Substituted heterocycles offering high

degree of diversity and with all the important applications, exploring various photophysical properties of the newer molecules and their interaction with other molecules is a requisite. This work/thesis therefore addresses along with quantum chemical structural analysis, some of the significant photophysical properties like dipole moments, preferential solvation, fluorescence quenching, fluorescence life times and binding affinities of four heterocyclic organic molecules.

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IT-7

Thin Film Photocatalysis for Environmental Remediation

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Abstract

One of the most persistent problems bothering people worldwide is inadequate access to clean water. Over one billion people are exposed to unsafe drinking water due to poor source water quality and lack of adequate water treatment, a problem expected to grow worse in the coming decades.

Photocatalysis is the acceleration of a photo-reaction in the presence of a catalyst. Heterogeneous photocatalysis involve the acceleration of photoreaction in presence of semiconductor photocatalyst; particularly metal oxides. This reaction could be degradation various organic species existing in water into relatively less toxic chemicals. It is based on the double aptitude of the photocatalyst to simultaneously adsorb both reactants and to absorb efficient photons. In mobile catalysis, there is difficulty in separating and recycling the catalyst and other few issues which needs to be addressed. Photoelectrocatalysis is the process wherein, in addition to illumination of radiation for photo-reaction, a separate electrical bias is applied between counter electrode and photo-catalyst (immobile) for effective improvement in IPCE of photoelectrochemical cell so formed due to impure water.

TiO_2 and ZnO are well studied catalysts for this purpose, which utilize the UV light due to their wide band gap energies. New catalysts, with appropriate band gap (e.g. Fe_2O_3, WO_3), which would be useful for harnessing the visible part of light spectrum are been investigated. The focus

is been to develop cost-effective visible light nano-composite thin films obeying the principles of green chemistry.

Use of an efficient reactor for purification of domestic water using solar energy is revealed. The anti-bacterial activity of the reactor are also tested. It has been investigated that the reactor is effective in treating chemical and sugarcane factory wastewater and even the sea water.

The underlying principles and the influence of the main parameters governing the kinetics are described. The current research activities that concentrate on the role of hydroxyl radicals in heterogeneous photocatalysis by transition metal oxides have been discussed.

Keywords: Metal oxide, Photoelectrocatalysis, Organic species, Sunlight

OP-01

Magnetic Studies of La-Al co-doped YIG Nanoferrites Synthesized using Sol-Gel Technique

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Abstract

Nanoparticles of $Y_{2.8}La_{0.2}Fe_{5-x}Al_xO_{12}$ $(0.0 \leq x \leq 0.2)$ have been synthesized using the sol-gel method. X-ray diffraction studies revealed the formation of pure garnet phase and decrease in lattice constant from 12.4075 to 12.4013 Å. Intense bands in FTIR spectra in the range 400 to 800 cm^{-1} confirmed the garnet phase. The SEM analysis has shown agglomerated particles with an average particle size of 200 nm. Saturation magnetization (M_s) have been observed to decrease from 30.91 emu/g to 26.68 emu/g due to weakening of superexchange interaction. For sample $Y_{2.8}La_{0.2}Fe_{4.9}Al_{0.1}O_{12}$, M_s has been found larger than YIG due to presence of La^{3+} ions. Magnetic parameters obtained in this study will lead to some potential applications in microwave devices.

OP-02

Transparent Photoactive Self-cleaning TiO_2 Thin Film by Dip Coating

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Abstract

Titanium oxide (TiO_2) is one of the semiconductor materials which are widely been used as a photo catalyst in the form of a thin films. In the current study, uniform, transparent and adhesive TiO_2 was successfully coated using sol-gel dip coating method for self-cleaning and photocatalytic applications. This procedure resulted in uniform and crack-free TiO2 films. The titanium oxide sol-gel had layered on a glass slides and dried at 40°C before the deposition of next layers after final calcination at 500 °C resulted in a uniform film with good photocatalytic activity. More than 75% of the transmission of the visible light has observed. In addition, it has shown a strong absorption around 370 nm, which attributed to have its band gap absorption. The current research work has provided a pilot scale study for an easy, less time consuming and cost effective method for development of transparent, photoactive and self-cleaning TiO_2 thin films.

Keywords: TiO_2, Thin film, semiconducting, self-cleaning, photo catalytic, hydrophilic.

OP-03

Synthesis, Impedance and Current-Voltage Characteristics of Strontium-Manganese Titanate Hybrid Nanoparticles

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Abstract

A Poly crystalline hybrid nanocomposites of Srontium-Manganease titanate powders prepared by co precipitation technique using CTAB (cetyl trimethyl ammonium bromide) as capping compound. Formation of the nanocomposite powders in desired phase was confirmed by powdered X-ray diffraction characterization. The barrier oxidation and reduction potentials and band gap of the crystalline nanocomposites measured by CV (cyclic voltammetry). SEM (scanning electron microscopy) images of the materials show irregular grains with an average size is 5.2 µm. The absorption maxima of the nanocomposites measured at 580nm using UV-

Visible spectrophometer. Electrical properties like impedance and current-voltage characteristics of Sr-$MnTiO_3$ powders investigated as a real part of impedance which decreases with increasing the filler loading of the strontium. The I-V Characteristics show variable conductivity with increase in the impedance of the nanocomposites. The dielectric response was investigated over a wide range of frequencies from $10\text{-}10^{-6}$ Hz with highest for 50% Sr loadings. The filler loading up to 50 % I-V characteristics was linear and the 40% it shows non linearity in the I-V characteristics which shows the ohmic nature of the nanocomposites and the electrodes. The impedance decreases as we increase the applied voltage. The current-voltage behaviour of nanocomposites depends largely on the Sr content in the NCs of titanate. The NCs of 40% filler loaded TiO_3 showed better efficiency than the rest other nanocomposites. The FF (fill factor) increases with increase in the doping of Sr to the Manganese titanate matrix.

Key words: Nanocomposites, Impedance, Current-Voltage, Co-Precipitation, Fill Factor

OP-04

A Study on the Complex Formation of PMMA, PVC and their Blend with LiClO4 using FTIR Spectroscopy

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Abstract

FTIR spectrum of the polymer-salt complexes of PMMA and PVC with LiClO4 were recorded. The functional group analysis revealed that polymers PMMA and PVC were formed stable complexes with LiClO4. In order to prepare polymer blend-salt complexes with good complexation, polymers PMMA and PVC were blended in the ratio 50:25, 37.5:37.5, 25:50 and their complexes with LiClO4. A systematic analysis of the FTIR spectrum of the polymer blend-salt complexes brought out the inference that the system with equal composition of PMMA and PVC,37.5:37.5 was found to show a beter complex formation with LiClO4. The peak positional change of C=O group of PMMA was analysed critically to identify the complex forming behavior of polymer blend.

Keywords: FTIR, PMMA, PVC, LiClO4, complex

OP-05

Sol Gel Prepared Vanadium Oxide for Toxic Gas Sensing Application

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Abstract

High-quality self-assembled Vanadium Oxide (V_2O_5) nanostructures have been prepared via a simple and direct sol-gel method using ammonium metavanadate as a vanadium precursors with the presence of ammonia as a complexing agent. The structure, morphological chemical bonding and optical properties of V_2O_5 nanostructure have been investigated through different characterization techniques like XRD, FTIR, FESEM and UV studies respectively.The structural analysis revealed that orthorhombic V_2O_5 phase formation grown along the c-axis direction. The sensor based on V_2O_5 nanostructues exhibited good sensitivity fast response–recovery time, good selectivity and stable repeatability for the toxic gases. The gas sensing mechanisms of V_2O_5 nanostrucures and toxic gases is based on the chemisorptions process is proposed. The superior sensing features indicate the present V_2O_5 nanostrucures are promising for gas sensors technology.

Keywords: Sol-gel method; Thin film; Vanadium oxide; Gas sensor;

OP-06

Multifunctional ZnO Thin Film by Spray Pyrolysis Method

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Abstract

Multifunctional zinc oxide (ZnO) thin films have deposited by a simple and cost effective spray pyrolysis technique (SPT). The material had deposited onto the glass and steel substrates at 723K from an aqueous zinc acetate, precursor solution. The films were highly transparent with average transmittance of about 85%. The spectrum showed sharp absorption band edge at 381 nm, corresponding to optical gap of 3.25 eV. The samples showed the contact angle of about 36°, which is best suitable for hydrophobic surfaces. The hydrophobicity coupled with high transmittance is of great importance in commercial application. The futuristic smart materials developed through the current study are transparent, self-cleaning surfaces having anti-microbial properties to the glass substrates. It also has shown a great importance for uniform and adherent ZnO thin film on a steel substrate for its anti-corrosion, anti-fouling and scratch resistant applications.

Keywords: ZnO thin film, spray pyrolysis, transparent, antimicrobial, anti-corrosion, scratch resistant

OP-07

Hydrothermally Derived Cu_2ZnSnS_4 Nanoparticles: Structural, Morphological and Photocatalytic Properties

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Abstract

Copper zinc tin sulfide (CZTS) is a promising light absorbing material for solar energy conversion through photovoltaic and photocatalytic processes. Herein, an environmental friendly hydrothermal rout to synthesize a kesterite phase CZTS nanoparticle is presented. The CZTS nanoparticles were synthesized using various zinc salts in the precursor solution. The crystal structure, morphology and chemical composition of hydrothermal derived CZTS nanoparticles were studied using different characterization technique. Single phase solid compact microspheres and flower like superstructures were evident from scanning electron microscopic images (SEM). X-ray diffraction (XRD) and Raman spectroscopic study leads the kesterite phase CZTS nanoparticles. The electron dispersive spectroscopic (EDS) analysis showed the desired composition of elements of CZTS. The direct energy band gap of CZTS nanoparticles was estimated to be 1.51 eV, which is optimal for application in photovoltaic device. Hydrothermally derived CZTS nanoparticles were used as a photocatalyst for studying the degradation reaction of Rhodamine B (RhB) dye. Under visible light illumination, CZTS photocatalyst demonstrates 65% of decolorization showing the potential use of CZTS as photocatalyst for waste water treatment.

Keywords: Photocatalysis, Photovoltaics, Absorption, Hydrothermal Synthesis.

OP-08

Characterization of FTIR spectra of $Pb_xSr_{1-x}(NO_3)_2$ Mixed Crystals

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Abstract

A series of $Pb_xSr_{1-x}(NO_3)_2$ mixed crystals have been grown by solution growth slow evaporation technique with different initial mole percentages (X = 0, 0.23, 0.47, 0.75, 0.8 and 1.00) (x is composition of lead).All the grown crystals are in the sizes (16x16x4) mm^3 have been characterized in NCCCM-BARC using ICP-AES Technique for its composition and for its phase formation by Powder X-Ray Diffraction method. XRD studies of these mixed crystals reveals the single crystalline phase with cubic structure. The TG/DT analysis shows that the crystals has good thermal stability with high melting points between 470 to 570 °C. $Pb(NO_3)_2$ and $Sr(NO_3)_2$ belong to a family of isomorphous alkaline earth nitrates with cubic structure. Single phase mixed crystals were formed. In view of ever growing applications of these nitrate crystals in (SRS) Stimulated Raman Scattering Laser shifters , optical filters and birefringence, numerous investigations were carried out on their various physical properties. $Sr(NO_3)_2$ crystal is a promising crystal for coupled intra-cavity Raman Laser. From Fourier Transform Infrared spectroscopy (FTIR) Raman spectra of different parts of these crystals at room temperatures in the ranges of 1038-1070 cm-1 and 650- 750 cm-1 were investigated. The results indicated that lead shifts the Raman dominating peaks to the lower frequency and broaden the full width at half maximum. Furthermore lead is anticipated to improve the properties of $Sr(NO_3)_2$

Keywords: Stimulated Raman studies, FTIR spectra, Nitrates

OP-09

Studies on Impact of Copper on Structural and Magnetic Properties of NiZn Ferrites for Multi Layer Chip Inductor

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Abstract

The impact of substitution of copper ions for zinc ions on structural, morphological and magnetic properties of $Ni_{0.5}(Zn_xCu_{0.5-x})Fe_2O_4$ (x = 0.4, 0.3 and 0.2) is studied. These materials are synthesized by standard solid state reaction method. The phase formation is confirmed by x-ray diffraction technique. The particle size is calculated by using scanning electron micrograph images. The crystallite size and lattice parameter increased as the concentration of Zn increased. The magnetic properties were studied by SQUID magnetometer. The saturation magnetization is found to be increased with increase in Zn concentration.

OP-10

Cow Dung: A Bio Coating

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Abstract

Surfaces are hypothetical to feel good to the touch and to look good for as long as possible, be care free, doesn't get spoiled by dirt, show good thixotropic behaviour, scratch and mar resistant, etc. A coating is a skin that is applied to the surface of any object for decoration, protection or for specific technical purposes. Paints are used for coloring and protecting many surfaces, including households, cars, road makings and underground storage vessels. Paints are used everywhere in our day today lives.

However, have you ever wondered the amount of environmental problems caused by the hazardous volatile organic compounds released by these synthetic paints? The World Health Organisation says that professional decorators are 40% more likely to contract lung cancer, so it is no great leap to wonder whether paint in the home is detrimental to those living there. These aspects promote us to think for a better, greener and sustainable solution. Bio-based paint is one of the greatest solution to this problem. Natural finishes are always like an icing on a piece of cake. Bio-based paints primarily make use of natural resources. They avoid toxic Volatile Organic Compounds (VOCs). It has now been proven from various studies that the greenhouse gasses emitted during the production of bio-based coatings are potentially lower in comparison with petrochemical-based paints. Bio paints are gaining importance because of their use in health nutrition, pharmaceutical, textile, and environmental applications. This research has presented the possibility of using Cow Dung as green filler to prepare a composite coating.

Keywords: Bio-based paints, Composite Coating, Volatile organic compounds (VOCs), Cow Dung

OP-11

Lithium Ion Conductivity of Polymer Blend Electrolyte - PMMA-PVC-$LiClO_4$

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Abstract

Lithium perchlorate is separately added with Poly(methyl methacrylate)-PMMA, Poly(vinyl chloride)-PVC and their blends. The complexes are prepared as films with thickness around 1mm using solution casting technique for which Tetrahydrofuran-THF is used as solvent. AC impedance of the samples is measured using a Phase Sensitive multimeter (Newton's 4th Ltd, UK) in the frequency range 1Hz to 10MHz using stainless steel electrodes. Ionic conductivity is calculated using the AC impedance plot by determining the bulk resistance calculated by extrapolating the curve to X axis. The intersection at X-axis gives the bulk resistance and it is substituted in the formula σ_{ac} = thickness /(area x Resistance) to calculate the ionic conductivity σ_{ac} of lithium ions. It is determined as 3.157 x 10^{-8} S cm^{-1} for PMMA-$LiClO_4$, 5 x 10^{-9} S cm^{-1} for PVC-$LiClO_4$ and 5 x 10^{-8} S cm^{-1} for PMMA-PVC- $LiClO_4$ systems. A slight increment in the room temperature ionic conductivity of PMMA-$LiClO_4$ is observed due to the blending of PVC with PMMA.

OP-12

A Study on the Optical Behavior of Dyx3+ ion Activated $Sr_{(1-X)}Y_2O_4$ Nanophosphors for W-LED Application

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Abstract

White light emitting voluminous powder of $Sr_{(1-x)}Y_2O_4$: Dy_x^{3+} nanophosphors were synthesized by solution combustion method using organic fuel as glycine. The doping agent Dy^{3+} ion was incorporated in the form of $[Dy(NO_3)_3.6(H_2O)]$ and Dy^{3+} ion varied as 0.01%, 0.03%, 0.05%, 0.07%, 0.09% and 0.11%. Further the sample calcinated at a temperature of 1300 °C for three hours. The structural and optical properties were investigated using XRD, FE-SEM, HR-TEM, PL, FTIR and Raman spectroscopic techniques. XRD spectra confirm the orthorhombic structure of SrY_2O_4: Dy_x^{3+} with *Pnam* space group and cell parameters of a=10.07 Å, b=11.91 Å, c=3.41 Å, the particle size is about 64 nm estimated from the Debye Scherer method. The morphology and particles size further confirmed by FE-SEM and HR-TEM. The PL emission spectra observed at the excitation wavelength of 354 nm and PL emission spectra indicate two distinctive blue ($^4F_{9/2} \rightarrow {}^6H_{15/2}$) and yellow ($^4F_{9/2} \rightarrow {}^6H_{13/2}$) peaks of Dy^{3+}. FTIR and room temperature Raman spectroscopy confirms the presence of various bonds. PL Emission correspondingly confirmed by the CIE diagram. All these analysis reveal $Sr_{(1-x)}Y_2O_4$: Dy_x^{3+} nanophosphor may be potential candidates for W-LED.

Keyword: Solution Combustion, Optical, Photoluminescence, White light

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OP-13

Preparation and Characterizations of Cadmium Substituted Cobalt Ferrite Nanoparticles

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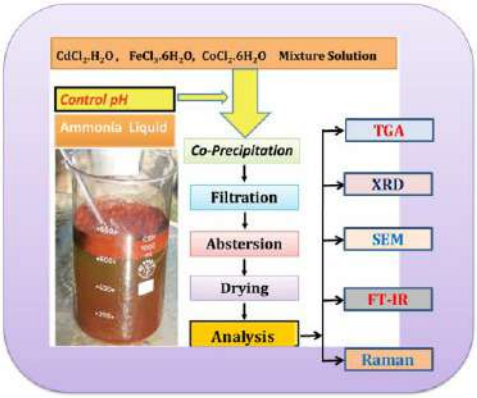
Abstract

The series of cadmium doped cobalt ferrite ($Co_{(1-x)}$ $Cd_{(x)}$ Fe_2O_4) with x = 0.08, 0.16, 0.24, 0.32, 0.40, 0.48 nanoparticles (NPs) have been successfully synthesized by simple, low cost coprecipitation method at room temperature. The structural analysis have been done by using X-ray diffraction spectroscopy, Fourier transform infrared spectroscopy, Scanning electron microscopy and RAMAN spectroscopy characterizations. The decomposition behaviour of salts and their degradation was carried out by TGA-DTA analysis. XRD measurement confirms that formation of particles of single phase spinal cubic structure. Scanning electron microscopy studied the surface morphology of samples. The detailed about material parameters such as crystallite size (D) , lattice constant (a), micro strain (Ɛ), X-ray density (Δx), hopping lengths (L_A and L_B), bond lengths (A-O and B-O) and mechanical properties were measured and comparatively analyzed.

Graphical Abstract



OP-14

Network of Interconnected Mesoporous Iron Oxide Nanoparticles for Electrochemical Supercapacitor Application

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Abstract

Electrochemically synthesized Iron oxide thin films were deposited on stainless steel (1.5x 5cm) by using 0.1 M aqueous ferric chloride as a precursor, the precursor solution prepared in double-distilled water. Electrochemically deposited samples were characterized for structural. Morphological, elemental and electrochemical analysis using X-ray diffraction, FE-SEM, EDAX, cyclic voltammetry, charge-discharge test, and electrochemical impedance spectroscopy. From XRD spectra prepared samples shows orthorhombic crystal structure with polycrystalline in nature of Fe2O3 and FE-SEM micrographs shows compact granular and mesoporous surface morphology. Prepared electrodes shows mixed capacitive behavior, the highest specific capacitance of Iron oxide (annealed at 300 oc for 1 hr) is 408.45 F/gm at 2 mV/sec scan rate in 1 M Na2SO4 respectively. Charge discharge behavior exhibits specific energy 8.41 Wh/kg, specific power 7.465 kW/kg and columbic efficiency 91.00 % of the Iron oxide electrode. Impedance spectroscopy carried in 1 mHz to 1 MHz frequency range reveals the capacitive behavior of the electrode and gives internal resistance is 2.35 ohm. From the above discussion, it is seen that electrochemically deposited iron oxide thin film electrode is a superlative and suitable electrode for decent physical and electrochemical properties for the supercapacitor applications.

Keywords: Electrochemical Deposition, Iron Oxide, Supercapacitor, Mesoporous, Electrochemical Impedance Spectroscopy, etc.

OP-15

Influence of Iron Doped on Structural and Optical Absorption Studies of Calcium Borophosphate (CaBP) Nano Phosphors

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Abstract

Novel inorganic phosphor luminescent materials are widely used in various optoelectronic devices such as field emission displays, plasma display panels, solid state lasers, cathode-ray tubes and tricolor white light emitting diodes. Structural and luminescence properties of calcium borophosphate phosphors with different Fe^{3+} concentrations using solid state reaction technique have been investigated. X-ray powder diffraction reveals that all samples exhibited a triclinic system of CaBP and lattice parameter analysis indicated the dopant ions may be substituted into the lattice position of the parent atom. The surface morphology of prepared nano phosphors was identified by SEM with EDS and TEM which shows spherical like chains in an irregular spatial distribution with less agglomeration. From optical ansorptin spectra gives the information about the site symmetry of dopant ions with host ligands.

Keywords: Calcium borophosphate, Nano phosphor, Solid state reaction method, Distorted octahedral and Optical absorption.

OP-16

Studies on Synthesis and Characterisation of Titanium Dioxide Thin Films for DSSC

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Abstract

This paper reports the synthesis and characterisation of TiO_2 thin film by a hydrothermal method. In this synthesis 1.1ml Titanium (IV) isopropoxide is used as the precursor and Fluorine doped tin oxide is used as substrate. The crystallite size, elemental composition, surface morphology and functional group analysis have been investigated by X-ray diffraction (XRD), Energy Dispersive Spectroscopy (EDS), Scanning Electron Microscopy (SEM) and Fourier Transform Infrared Spectroscopy. The XRD pattern shows the formation of tetragonal rutile phase TiO_2 having crystallite size is 19nm. SEM analysis shows the formation of 3D micro flowers grown on 1D Nanorods. Hierarchical formation of TiO_2 micro flowers provides a versatile and promising application towards the fabrication of dye sensitized solar cell.

Keywords: DSSC, hydrothermal method, TiO_2

OP-17

Facile Sol-Gel Synthesis of Nickel Oxide Nanoclusters for Pseudocapacitors Application as an Efficient Electrode Material

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Abstract

Nickel oxide (NiO) spherical cluster has been successfully fabricated by using a simple sol-gel method. NiO powder was characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), surface wettability study, optical properties. XRD study revealed the monoclinic phase of NiO. SEM analysis showed non-uniform large spherical clusters. Surface wettability study showed that contact angle was hydrophilic in nature. In KOH electrolyte NiO – carbon cloth electrode showed better performance, NiO electrode exhibited high specific capacitances 128 Fg^{-1} in KOH electrolyte at the scan rate 5 mVs^{-1}, and good cycling span (~79 % retention after 500 cycles) in a KOH with three-electrode system.

Keywords: NiO, carbon cloth, sol-gel, KOH electrolyte.

OP-18

Synthesis and Characterization of Successive Ionic Layer Adsorption and Reaction (SILAR) Deposited Mns Thin Film at Room Temperature on Stainless Steel Substrate for Supercapacitor Application

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Abstract

Manganese Sulfide (MnS) thin films were deposited by successive ionic layer adsorption and reaction method on stainless steel substrate. Manganese acetate and sodium sulfide were used as the source materials for the preparation of thin films. These films were characterized by X-Ray diffraction (XRD) which showed that the prepared MnS films are polycrystalline in nature which having crystallite size 0.2647 nm. It was determined from the broadenings of corresponding X-Ray diffraction peaks by using Debye Scherrer's formula. The wetability study of deposited MnS thin film which is hydrophilic in nature. To determine the functional groups present in MnS material and its chemical composition by FT-IR technique. Band gap of MnS thin films measured by UV- VIS Spectroscopy. It showed 2.6 eV. To study the supercapctive properties of manganese sulfide material used as electrode material for supercapacitor. The highest specific capacitance (Cs) of MnS 632.91 Fg^{-1} was obtained for 100 mV/S scan rate by using galvanostatic charge discharge technique.

Keywards: MnS thin films, XRD, UV Spectroscopy, FT-IR, Supercapacitor, Contact angle, etc.

OP-19

Characterization of Cs3 ($PMo_{12}O_{40}$) by Hydrothermal Technique for Optostructural and Electrical Properties

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Abstract

In the present research work, we have synthesized Cs_3 ($PMo_{12}O_{40}$) by hydrothermal technique. The optostructural and electrical properties of Cs_3 ($PMo_{12}O_{40}$) material have been investigated. Scanning electron microscopy (SEM) and X-ray diffraction (XRD) techniques were used to study the structural properties of the materials. Morphological study shows after doping Cs+ there is formation of spherical shaped grains of Cs3 (PMo12O40) heteropolyoxometalate . X-ray diffraction study revealed that, the material is polycrystalline in nature having simple cubic spinel structure. After doping Cs+ intensity of prominent peak (311) increases and other peaks are suppressed indicating intercalations of Cs+ in the octahedral lattice of phosphomolybdate anion without change in crystal structure. The optical absorption study revealed that, there is decrease in band gap (Eg) of material after doping Cs+. DC electrical conductivity measurement of the material shows semiconducting behavior at lower temperature. The TEP study shows, p-type semiconducting behavior. The TGA-DTA study revealed that, after doping Cs+, stability of Cs_3 ($PMo_{12}O_{40}$) material increases and the material is thermally stable up to 687.61^{O}C.

Keywords: Hydrothermal, heteropolyoxometalate, thin films, electrical conductivity.

OP-20

Influence of Selenisation Temperature on the Growth of (Cu, Ag)0.5InSe2 Thin films by Two – stage Process

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Abstract

In the present work, the effect of selenisation temperature on the growth of $(Cu,Ag)_{0.5}InSe_2$ thin films were studied systematically by using two – stage process and its structural, compositional, morphological and microstructural properties were reported. $(Cu,Ag)_{0.5}InSe_2$ thin films were grown onto the cleaned glass substrate kept at 100℃ using the sequential multi stacked precursor layers of $(In/Cu/Ag/Se_2)$ x 3 by electron beam evaporation in high vacuum, followed by selenisation at various temperatures (300℃ – 500℃) for 30 min. The diffraction pattern of the precursor selenised at 475 ℃ for 30 min indicates that films formed are polycrystalline CAISe single phase, crystallised in tetragonal chalcopyrite structure with the preferred orientation along (112) direction The unit cell parameters of selenised films were evaluated to be a = 5.945 Å, c = 11.738 Å. The compositional analysis of stacked layers selenised films at 475 ℃ for 30 min reveals that the films grown with atomic ratios of (Cu+Ag)/In = 0.96, In/(Cu+Ag) = 1.03 and Se/(Cu+Ag+In) = 1.02 are nearly stoichiometric. The surface morphology of CAISe films have shown densely packed grains with mean grain size of 583 nm. Room temperature Raman spectra confirms that the phonon modes obtained at 67 cm^{-1}, 171 cm^{-1} and 214 cm^{-1} are corresponding to CAISe single phase.

Keywords: $(Cu,Ag)_{0.5}InSe_2$ thin films, Two – stage process, Electron beam evaporation, Selenisation temperature.

OP-21

Synthesis and Structural Studies of Zn0.95 Cu0.05Mn2O4 Ceramics

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Abstract

Here we report the fabrication of $Zn_{0.95}$ $Cu_{0.05}Mn_2O_4$ ceramic material by simple chemical co precipitation route at 600˚C. The sample was characterized by XRD and SEM. The diffraction pattern in comparison with the JCPDS/ICDD card confirms the spinel tetragonal structure with lattice parameters a = 5.9365Å and c = 8.6422Å, unit cell volume of 304.573 $x10^{-3}m^3$. The other possible parameters like crystallite size, x-ray density, dislocation density, micro strain and texture co-efficient are reported using XRD analysis. The micro strain and crystallite size are correlated with the respective values got from Williamson-Hall and Size- strain analysis method. The SEM image showed the clouds like algae structure with grain size 3.934µm.The effect of copper doping on structure and morphology of Zinc manganite was evident from the result analysis with the literature.

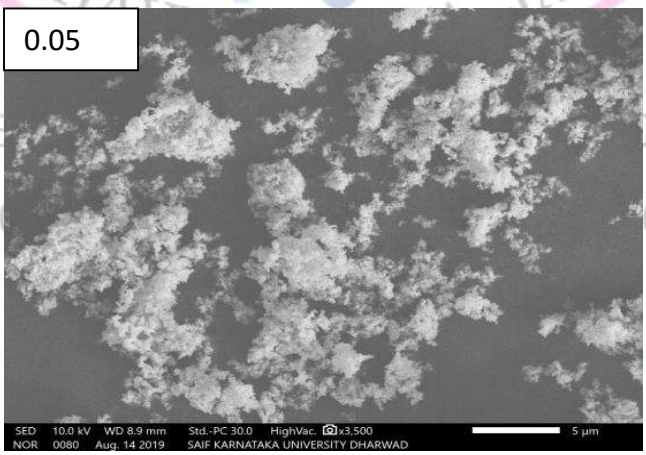

Fig.: SEM image of $Zn_{0.95}$ $Cu_{0.05}Mn_2O_4$ ceramic

Table.1 Calculated values Lattice parameters, Volume, Crystallite size, X-ray density, Dislocation density and micro strain for $Zn_{0.95}Cu_{0.05}Mn_2O_4$ ceramic	
Concentration (X)	**0.05**
Lattice parameter a (Å)	5.9365
Lattice parameter c (Å)	8.6422
Volume of unit cell V (e^{-30})	304.573
Crystallite size (nm)	24.0844
X ray density d_x gm/cm^3	5.2151
Dislocation Density ρ_D (m^{-2}) x10^{15}	1.724
Micro Strain ε	.001664

OP-22

Effect of Copper Doping on Structural, Optical and Electrical Properties of ZnO Thin Film

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Abstract

Undoped and Cu-Doped ZnO thin films were deposited on the glass substrate at constant temperature 400̊ C by spray pyrolysis technique. Structural properties of deposited film were investigated by using X-ray diffraction techniques. XRD confirmed the hexagonal wurtzite structure. It was observed that the lattice parameter decreased with increasing Cu-doping into ZnO. In addition volume, distortion parameter and bond length of deposited film were studied. The volume of unit cell decreased with increasing Cu doping, it confirmed that Cu incorporation in ZnO lattice host matrix. Optical study of deposited film was carried out by using UV-visible Spectrometer. The values of band gap were determined by Tau plot. It was observed that band gap decreased from 3.2013 to 3.1668 eV with increase in doping percentage of Cu . Electrical properties of thin film were studied by using two probe method.

Keywords: ZnO, Spray pyrolysis, Structural and Optical Analysis, Resistivity.

OP-23

Electrochemical Synthesis of Polyaniline Thin Films for Electrical Energy Storage Application

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Abstract

A novel conducting polymer polyaniline has been studied extensively due to the commercial availability of the monomer, easy synthesis, well-behaved electrochemistry, good environmental stability, high conductivity and multiple redox and protonation states. In the present work, the nucleation and growth mechanism for the electro polymerization of aniline in aqueous medium containing 0.5M H_2SO_4 was investigated. The synthesized polyaniline thin films were characterized by various physico-chemical techniques such as XRD, SEM, FT-IR spectroscopy and wettability. FT-IR study confirms the polymerization of aniline. SEM study explains the growth of thin films and suggests that electrochemical polymerization is best for synthesis of fibrous polyaniline thin films. The electrochemical properties of the polyaniline were studied with cyclic voltammetry, galvanostatic charge discharge and EIS etc. techniques. The aim of this paper is to study the effect of synthesis mode on polyaniline thin films which can be useful to understand the electrical properties and to propose its future utility in energy storage devices such as supercapacitors.

Keywords: Supercapacitor; polyaniline; electrodeposition; SEM; cyclic voltammetry etc.

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-24

Influence of Various Sol-Gel Parameters on the Properties of Sulfuric Acid Chelated Zirconia Aerogels Dried at Ambient Pressure

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Abstract

This work represents the influence of various sol-gel parameters on the properties of sulfuric acid (H_2SO_4) chelated zirconia aerogels dried at ambient pressure. Zirconia gels were prepared by the hydrolysis and condensation of zirconiumn-propoxide in n-propanol as a precursor catalyzed with deionized water and sulfuric acid (18.4 M) as a chelator. Aerogels were obtained by subsequent solvent exchange, silylation and ambient pressure drying. Influence of various sol-gel parameters such as precursor concentration, H_2SO_4 : precursor molar ratio as well as hydrolysis water : precursor molar ratio on various properties of aerogels was studied. The property characterizations of as synthesized zirconia aerogels were carried out using FESEM, XRD, BET analysis, FTIR spectroscopy and TGA-DSC analysis. The obtained zirconia aerogels have a large BET surface area ∼ 350 m^2/g and pore volume ∼ 0.102 cc/g. These aerogels can be applied as heterogeneous catalysts in many fields.

Keywords: Sol–gel process, Chelator, Ambient pressure drying, Zirconia aerogels, BET surface area

OP-25

A Facile Synthesis of Poly (3-Octyl Thiophene): Ni 0.4 Sr 0.6 TiO3 Hybrid Nanocomposites for Solar Cell Applications

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Abstract

The solar cell properties of poly(3-octyl thiophene) (P3OT) doped with Ni $_{0.4}$ Sr $_{0.6}$ TiO_3 (NST) nanocomposite films as a function of P3OT in different concentration were studied for photovoltaic characteristics. nickel nanoparticles (Ni^+) loaded with $SrTiO_3$ nanoparticles attempted to be synthesized by co precipitation method, CTAB (cetyl trimethyl ammonium bromide) used as capping agent and successfully converted into Ni-$SrTiO_3$ hybrid nanoparticles. The thin films were made by using different solvent systems in spin coating method, for low

concentration (10-30%) of P3OT the device performance was poor compared to pure Ni-$SrTiO_3$. Significant improvements were obtained with the increased (50% and 60%) of P3OT. The maximum absorbance in the thin film of UV spectrum lies in between 600-800 nm spectral region. Increased addition of P3OT the UV band shifts to visible spectral region while power conversion efficiency increases ~ 15 times. The increased solar cell efficiency strongly dependent not only on the P3OT concentration but also on the solvent used, changes in the film morphology. The optimal fabrication the external quantum efficiency of 15% and power conversion efficiency of 0.56 were obtained.

Key words: Hybrid Nanocomposites, Solar Cell, Quantum efficiency, Co precipitation, Photovoltaic,

PP-01

Measurement of Mass Attenuation Coefficient and Effective Atomic Number For Ayurvedic Drugs

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Abstract

The mass attenuation coefficients (MAC) of Ayurvedic drugs/medicines 'Godanti bhasma and Vanga bhasma' have been measured for four different manufacture/ formulation process. The measurement carried out non-destructively by employing NaI(Tl) detector. The measured values are compared with the values of theoretical calculation of μ/ρ, calculated by considering the weight fractions (wt %) of constituent elements of the Bhasma of each manufacturer drug by the WinXcom program data. The chemical element contents were obtained through multi-element analysis technique i.e., Field emission scanning electron microscopy attached with Energy dispersive spectroscopy (FESEM-EDS). As expected the mass attenuation coefficients of experimental and theoretical values are decreasing with increasing incident X-ray energy. The graph of μ/ρ versus photon energy showing linear relation in Godanti bhasma, whereas in Vanga bhasma the linearity is violated and showed edge effect. It reveals that the photon attenuation coefficients depend on the individual chemical element concentration in materials/compounds along with photon energy and atomic number of target elements, this fact impacts on the quantity of contents in sample which in turn effect on quality of any drugs.

Keywords: Ayurvedic Drug, Bragg's Additivity law, Mass Attenuation Coefficients, NaI(Tl) detector, X-ray, FESEM-EDS.

PP-02

Preparation of Transparent Superhydrophobic Coating by TiO2/ Polyethylene nano-composite Using Dip CoatingTechnique

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Abstract

Self cleaning effect has great importance in industry as well as in daily life.The ability of the surface to clean it by itself is known as the self cleaning effect .In this paper the TiO_2 nanoparticles are synthesized by using hydrothermal method. The superhydrophobic coating of TiO2/ Polyethylene nanocomposite coated on the glass substrate by using dip coating technique.The obtained paper was characterized by contact angle measurements and its static contact angle is about 82°.

Keywords: Superhydrophobic coating, TiO_2 nanoparticles, Contact angle.

PP-03

Fabrication of Hydrophobic CZTS Thin Films by Sequential Growth Technique

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Abstract

We have fabricated a sequential multilayer growth technique of Cu_2ZnSnS_4 (CZTS) based thin films onto the glass substrate at room temperature. These films were formed by depositing alternating layers of opposite charged materials of copper sulphate, tin chloride, zinc sulphate and sodium thiosulphate with wash steps by double distilled (DD) water in between. It is one of the most promising ways of depositing multilayer thin films precisely controlled composition, thickness and pinhole free architecture of nanometer scale. An aqueous solution containing Cu, Sn, and Zn were taken in one beaker and stirred for 15 min. The second beaker was used for DD followed by cationic precursor. The sequential steps were repeated for several times for the growth of CZTS thin films of desired thickness at room temperature. These films were characterized for structural and wettability property which shows tetragonal structure with hydrophobic nature with surface water contact angle of 132^0.

Keyword: Thin film, Sequential growth, Room Temperature, CZTS, Hydrophobic

Fig: Photograph of as-prepared CZTS thin films by sequential growth technique

Acknowledgement: This project work is partially financed by Professor. C.D. Lokhande Endowment Charitable Trust - 2018.

PP-04

Influence of Cadmium Doping on Structural and Mechanical Properties Co-Ni Nano Ferrites

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Abstract

The work had the objective of synthesis of cadmium doped cobalt zinc ferrite ($Co_{0.5}Ni_{0.5}Cd_xFe_{2-x}O_4$) series with x=0.0, 0.1, 0.2, 0.3, 0.4, 0.5 by Co-precipitation method and analysis of structural properties using XRD, FTIR, and SEM characterization. The XRD characterization of the samples confirms the cubic spinel structure. Grains in the samples are granular in nature as depicted by SEM images. The FTIR spectra of synthesized ferrites showed two strong absorption bands (ν_1 and ν_2) in the range 400–600 cm^{-1} belonging to tetrahedral (A) and octahedral (B) interstitial sites. W-H and SSP plot results show the variation in the grain size with change in doping concentration. Crystallite size (D), lattice constant (a), micro strain (ε), X-ray density (ΔX), dislocation density (ρ_D), hopping lengths(L_A and L_B), bond lengths (A-O and B-O), ionic radii (r_A and r_B), texture coefficients [TC(*hkl*)], and mechanical properties are also reported.

Keywords: Co-Ni Ferrite, TG/DTA/DSC, FTIR, XRD, SEM

PP-05

Polyaniline/CdO Nanocomposites in Potential Applications

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Abstract

The PANI/CdO-nanocomposites were prepared by Self Propagation Low temperature combustion method using Cadmium nitrate. It is a simple and low cost method to synthesis nanocomposite. The prepared samples were characterized by using Scanning Electron Microscope (SEM) and X-ray diffraction (XRD) to get surface morphology, idea of getting particles of Nano sized range so that further characterization can be done, to study the Dielectric Loss Behavior properties of synthesized nanocomposites.

Keywords: Metal Oxide nanoparticles, polyaniline, structural properties.

PP-06

AIE Emission of SDS Capped Diphenylanthracene Nanoparticles for Selective Recognition and Estimation of Al3+ ion in Aqueous Medium Based on Enhancement Effect and Analytical Application

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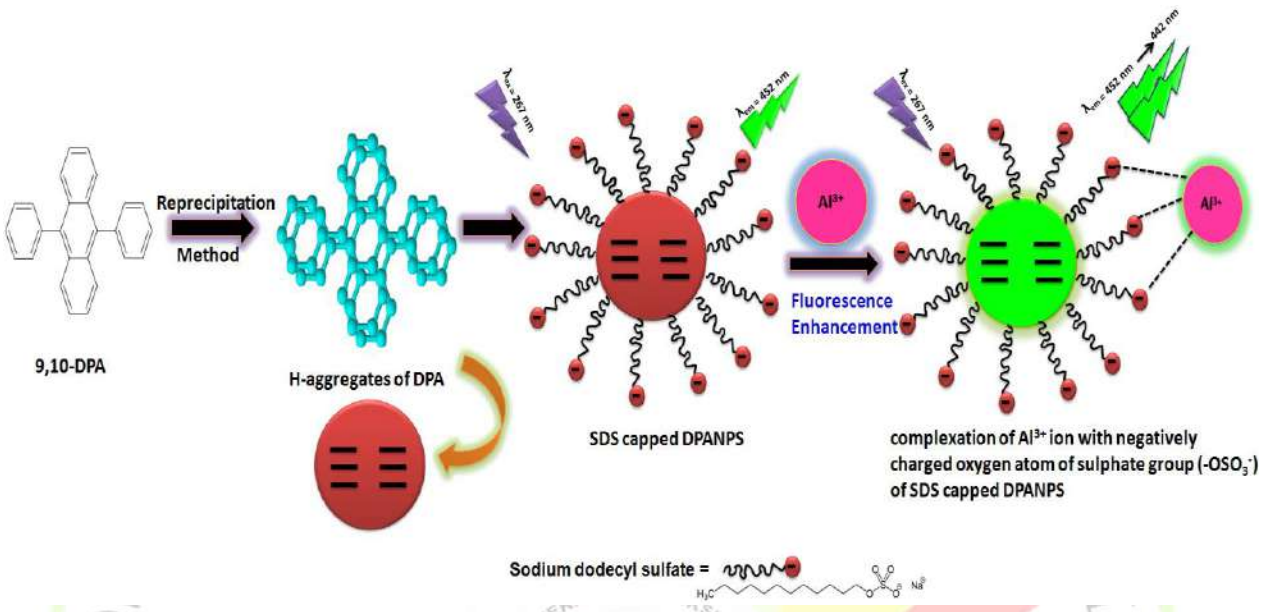
Abstract

The sodium dodecyl sulphate (SDS) capped 9, 10 Diphenylanthracene nanoparticles (DPANPs) was prepared by using reprecipitation method. The average particle size of NPs obtained from DLS examination is 67 nm. The aqueous suspension of NPs exhibits red shifted aggregation induced enhanced emission (AIEE). The zeta potential value -42.9 mV indicates stability of nanoparticles and generation of expected negative surface charge over the NPs to attract and adsorb cations from the solution on the surface. The cation recognition test based on fluorescence shows that the presence of Al^{3+} ion significantly enhances the fluorescence of nanoparticles. Further the proposed system is successfully applied for the detection of Al^{3+} ion from environmental water samples and Digene table available in the market. The advantage of developed analytical method is lower value of LOD and even in presence of interfering ion Mg^{2+} the Al^{3+} is estimated with no need of their separation prior to analysis.



Schematic presentation of fluorescence enhancement of SDS capped DPANPs by Al^{3+} ion through interaction with polar head of surfactant SDS containing oxygen donar atom.

PP-07

Synthesis and Characterization of New Organosoluble and Thermally Stable Aromatic Polyamides Containing Flexible Ether and Aliphatic Spacer Linkages

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Abstract. A new aromatic diacid monomer, viz; N(1),N(10)-Bis (4'-carboxy methylene phenyl) decane diamide **(BCPDD)** was successfully synthesized and characterized by physical constant, FT-IR, NMR (^{1}H and ^{13}C) spectroscopy and mass spectrometry. Synthesis of new series of Polyamides with high thermal stability and improved solubility was performed by Yamazaki's direct phosphorylative polycondensation method from new **BCPDD** with different aromatic diamines. The inherent viscosity of these Polyamides was in the range 0.40 to 0.67 dL/g. All these polyamides are amorphous or partly crystalline and revealed good solubility in polar aprotic solvents and exhibited glass transition temperatures between 201 to 232°C, no weight loss upto 324°C indicating good thermal stability of these polyamides. The present observations suggest that these polyamides can find potential applications as high performance polymers.

Keywords: diacid, polyamides, thermally stable, solubility

PP-08

Effect of Concentration on NO_2 Gas Sensing as Deposited Cadmium Oxide Thin Films Prepared by Reflux Method on Glass Substrate

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Abstract

Cadmium Oxide (CdO) thin films are deposited on glass substrate by the reflux method, taking Cadmium Chloride and ammonia as a precursor materials. X-Ray diffraction (XRD) pattern revealed the good crystallinity of Cadmium Oxide thin films. Its crystallite size 30 nm calculated by Debye Scherrer's formula. Scanning electron micrograph (SEM) micrograph showed spherical shaped grains spread over the surface and image shows the porous morphology. Band gap of CdO thin films measured by UV-visible Spectroscopy. It showed 2.01eV. The wetabillity test of CdO thin flims showed that its contact angle with water is less than 90◦ therefore its nature is hydrophilic. The gas performance of CdO gas sensor showed that as concentration of injected NO_2 gas is increased, the response of CdO sensor also increased and it was become maximum for 100 ppm of NO_2, which is 57%.

Keywords: CdO thin films, XRD, SEM, UV-Vis. Spectroscopy, Contact angle, Gas sensing, etc.

PP-09

Complex Optical Studies on Conducting Polypyrrole Doped With ZnO Nanoparticles

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Abstract

The Conducting polymer polypyrrole and Polypyrrole/ZnO nanocomposites were synthesized by in-situ polymerization method at 0-5°c temperature with Ammonium persulphate as an oxidising agent. Optical band gap of chemically synthesized polypyrrole andPolypyrrole/ZnO (10%,30%,50%) nanocomposites have been studied at room temperature and normal pressure. Optical energy band gap of these materials are determined by absorption spectra in the wavelength range 200 to 800 nm by T90+ UV/VIS Spectrometer this work the experimental results obtained from the optical absorption spectra in the range 385nm are reported for nanocomposites of different weight percentages (10%,30%,50%). The Characteristic peaks around 300nm and 469nm (3.71eV) was observed in all the nanocomposites confirming the formation of polypyrrole . The optical properties of this conducting polymer make them a suitable application in field of optoelectronic devices.

Keywords: Polypyrrole, Optical band gap, Absorption spectra, Nanocomposite , Optoelectronic.

PP-10

Dielectric and Impedance Study of LSM Thin Films as Cathode for SOFC

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Abstract

Lanthanum Strontium Manganite (LSM) thin films with 0.1, 0.2 and 0.3 mol % were synthesized by spray pyrolysis technique. LSM thin films were formed by optimizing various spray parameters. These thin films were sintered at $750^{O}C$ for 2 hours and dielectric properties were studied by varying frequency. Temperature dependence dielectric properties were also studied and impedance study was done at constant temperature. At low frequency dielectric constant is high and as frequency increases dielectric constant suddenly decreases and attend constant value. This means that LSM material behaves semiconducting property. Impedance graph shows as strontium content increases polarization resistance decreases.

Keywords: Spray Pyrolysis, Dielectric constant, Impedance, Cathode, LSM, SOFC.

PP-11

Synthesis of SnO2 Nanoparticle using Mushroom Extract by Soln Gel Method

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Abstract

Tin Oxide (SnO2) nanoparticles powder have been synthesized by using mushroom extract". The samples were characterized by X-ray diffraction, UV-Visible absorption and scanning Electron Microscope. By green sol gel method SnO2 nanoparticles were synthesized at 300 ^{0}C. The structural, morphological and optical properties of a SnO2 sample were investigated The XRD pattern of the prepared sample is indexed to the tetragonal structure of SnO2, and the calculated particle size in the range 8-10nm. Structural and morphological properties of synthesized nanoparticle were characterized using XRD and SEM .We report on synthesis and effect on sno2 on chick embryo & gas sensing properties of mesoporous tin oxide (sno2). For the synthesis Phellinous Mushroom was used as a structure-directing agent, the resulting sno2 powders To study the U.V protectant effect of SnO2: 72 hrs. old chick embryos. Chick embryos were irradiated with UV light for 3min, 5min and 7 min. and compare the controlled and SnO2 nano particles 300^{o}C sample and concluded that 300^{o}C sample has better UV protection.

Keywords: SnO_2 Nanoparticles, UV-Vis. absorption, XRD, SEM, Phellinous Mushroom, chick embryos etc.

PP-12

Photocatalytic Environmental Remediation of Cassiterite-Titania Nanocomposite

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Abstract

Nanocrystalline cassiterite (SnO_2), titania (TiO_2) and cassiterite - titania (SnO_2-TiO_2) have been synthesized by microwave method. X-ray diffraction study was reveals that cassiterite properly supported on the surface of titania. Nano sized cassiterite, titania and cassiterite - titania nanocomposite were confirmed by transmission electron microscopy technique. The particle size of the SnO_2, TiO_2 and their nanocomposite is in the range of 12-18 nm. The enhanced photocatalytic activity is observed in the SnO_2-TiO_2 composite as compared to SnO_2 and TiO_2.

Keywords: Cassiterite, titania, nanocomposite, photocatalytic degradation, crystal violet

PP-13

Antimicrobial Efficacy of Commercially Available Swarna Bhasms and Bio-Synthesized Gold using Cow Urine

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Abstract

The development of a green rapid method for synthesis of nanomaterials is day by day becoming popular among nanotechnologists. In the present study, the synthesis of gold nanoparticles at room temperature using cow urine was carried out. The synthesized nanoparticles have been found to be stable for several months. The nanoparticles were characterized by UV- Visible, XRD, FTIR, FE-SEM equipped with EDS. The UV- Visible spectrophotometric analysis was carried out to ensure the formation of gold nanoparticles. XRD pattern indicated the polycrystalline nature of gold with the cubic crystal structure. agglomerated particles were observed using field emission scanning electron microscopy. Elemental studies showed the presence of Au and O elements. The synthesized nanoparticle is multi-applicative and showing potential efficacy against bacterium like *Pseudomonas aeruginasa* and *Staphylococcus aureus.* Also the antimicrobial and antifungal efficacy of commercially available Swarna Bhasma was studied against same micro-organisms. The result obtained indicates that gold nanoparticles obtained using cow urine shows better activity against the microorganisms under study.

Keywords: Green-synthesis; cow urine; XRD; Antimicrobial Activity.

PP-14

A. C. Electrical Properties of Nanoparticle Sized CuxCo1-xFe2-2yAl2yO4 Ferrite

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Abstract

The polycrystalline aluminium substituted nano-particle size copper cobalt ferrite samples $Cu_xCo_{1-x}Fe_{2-2y}Al_{2y}O_4$ (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. The lattice constants of the phases are evaluated from x-ray diffraction data. The effects of aluminium and copper on structural properties of cobalt ferrite are studied. A universal testing machine as well as Archimedes's method was applied for determining the physical properties of the samples. Phase formation is investigated using X-ray diffraction, Infrared absorption technique and Scanning electron microscope technique. Ionic radii R_A and bond lengths (A-O) on both sites are found decreases with Al^{3+} and copper content. The Lattice constant 'a', physical density as well as X-ray density of samples goes on increasing with Al^{3+} and copper content. The ratio c/a is found increasing when addition of copper content and decreases with aluminium content. It means that Al3+ and copper acquire the tetragonal prolate type distortions on B site and hence (c/a) ratio increases and automatically crystal lattice turned from tetragonal spinel to cubic spinel. The dielectric constant, complex permittivity and dielectric loss tangent (tanδ) measured at room temperature as a function of the frequency. The effect of Al^{3+}ion substitution of copper cobalt ferrite on the AC electrical resistivity and dielectric properties in frequency range 20 Hz to 1MHz. were studied. The data revealed that and tanδ

decreased as the Al3+ion increased, due to the increase in the number of vacancies at the iron site.

Key Words: polycrystalline, AC electrical resistivity, dielectric constants

PP-15

Structural and Microstructural Properties of La3+ doped Mg-Zn Nano-ferrite Synthesized by Co-Precipitation Route

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Abstract

Nanoparticles of Lanthanum doped Magnesium Zinc ferrites with general formula $Mg_{0.6}Zn_{0.4}La_{2y}Fe_{2-2y}O_4$ (where y = 0.0, 0.05, 0.1, 0.15, 0.20 and 0.25) have been prepared by using co-precipitation route. The synthesized sample was characterized by different physical and chemical characterization techniques for their structural and micro-structural properties. The X-ray diffraction (XRD) analysis was carried out to confirm the single-phase cubic spinel structure of La^{3+} substituted magnesium zinc ferrites. As composition y varies from 0.00 to 0.25 then lattice constant decreases from 8.4514 A^o to 8.4488 A^o. The surface morphology of L-MZF shows that the interlocked nanoparticles with average grain size varying from 300 nm to 40 nm. Also, energy dispersive analysis by X-ray (EDAX) shows the presence of all the metals in the exact composition as that of precursors used for preparation of samples.

Key Words: Co-precipatition, EDAX, XRD

PP-16

Simple a Chemical Bath Deposition for Systematically Controlling ZnO Crystal Size and Growth Orientation by Post Annealing

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Abstract

We present a simple, easy and reproducible method to systematically control the dimension and shape evolution of zinc oxide (ZnO) thin film on glass substrate by chemical bath deposition **(**CBD**)**. It is found that, deposition with annealing temperature significantly influence the quality and growth of ZnO thin films. The films were uniform and adherent to glass substrates. During deposition of ZnO thin films at constant bath temperature and pH~12, effect of increase of Zn^{2+} precursor concentration and annealing temperature on crystal size and growth orientation studied. We proceeded to anneal in air for 60 min from 150ºC to 300 ºC. The results correlated by structural, optical and morphological characterization. The structural properties by XRD study reveals films have strong orientation along (0 0 2) plane with wurtzite crystalline structure and also showed enhancement in crystallinity with annealing. ZnO lattice crystals transformed from agglomerated random growth to long-and-slim hexagonal rods observed by scanning electron microscopy (SEM). With increase in annealing temperature the band gap of films decreases from 3.25 to 3.15 Ev .This strategies can provide a novel and simple route to obtain ZnO nanostructures, which may improve the properties of nanostructure based devices such as solar cells, dilute magnetic semiconductor,piezoelectric transducers and actuators etc.

Keywords: Chemical bath, Structural, optical properties, wurtzite, ZnO lattice

PP-17

Studies on Spray pyrolysis Synthesized Lanthanum Molybdenum Oxide Thin Films

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Abstract

The fast oxide ion conductor $La_2Mo_2O_9$ (LAMOX) were synthesized in form of solid thin film by using chemical spry pyrolysis method for solid oxide fuel cell (SOFC). This synthesized solid film of LAMOX were characterize to studies the structural properties by using XRD, morphological studies done by using SEM (Scanning Tunneling Microscopy), the functional group in synthesized thin film of LAMOX studies by using FT-IR (Fourier Transform Infrared) and optical properties of LAMOX thin film were studied by using UV-Visible. The observed lattice parameter from XRD data is a=16.85 A^0, b=11.90 A^0, c = 15.10 A^0 gives the confirmation of monoclinic crystal structure. SEM reveled the dense but sufficiently porous surface morphology which required for electrolyte material. The FTIR study gives the functional group and bond stretching at different wave number gives confirmation of precursor lanthanum and molybdenum in synthesized LAMOX thin film. UV-Visible gives variation of absorption with wavelength and maximum absorption are observed in ultraviolet region.

Keywords: LAMOX, SOFC, FT-IR, XRD.

PP-18

Biofabrication of Silver Nanoparticles using Hibiscus cannabinus Leaves Extract and their Antibacterial Activity

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Abstract:

Hibiscus cannabinus is a fiber, food and oil crop, possessing cytotoxic, anthelmintic, antibacterial, antiulcer, antidiabetic, hypolipidemic, antioxidant, immunological, haematinic and hepatoprotective effects. The total flavonoid content of the *Hibiscus cannabinus* leaves and flowers were promising in the water extract. Flavonoid compounds such as ascorbic acid and gallic acid which present in *Hibiscus cannabinus* leaves extract (HCLE) are responsible for reduction as well as stabilization of metal ions. Herein we present an eco-friendly approach for the biogenic synthesis of silver nanoparticles (AgNPs) from an aqueous $AgNO_3$ solution by using the HCLE as reducing and stabilizing agent. Reduction of Ag^+ ions by HCLE was examined by UV–visible absorption spectra. The surface plasmon resonance band was observed at 420-460 nm. To recognize the functional group responsible for reduction of Ag^+ ions, the HCLE was characterized by FTIR spectroscopy. Spherical shaped AgNPs with average particle size 20 nm was confirmed using transmission electron microscopy. The biosynthesized AgNPs displayed distinctive antibacterial activities against both gram positive and gram negative microorganisms. The AgNPs synthesized using HCLE have the potential application in the field of biomedicine.

Keywords: Biofabrication, Silver Nanoparticles, *Hibiscus cannabinus*, Antibacterial activity

PP-19

Investigating the Influence of Fe Doping on the Structural, Optical and Magnetic Properties of ZnS Nanoparticles

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Abstract

The nanometer scale semiconductor crystals, also referred as nanoparticles or quantum dots, are being extensively studied to explore their extraordinary properties and potential applications. One of the main features that made these materials ideal candidate of the research is the ability of tailoring their electronic, optical and magnetic properties by doping with transition metals and/or through quantum confinement effect. In particular, diluted magnetic semiconductors (DMS) have attracted much attention because of their novel applications in photoluminescent and spintronic devices. In order to make these applications practically viable the study room temperature ferromagnetic DMS materials are required.

Among all the II–VI semiconductors, the ZnS nanoparticles are preferred over others due nontoxicity, stability and ease in synthesis with a wide band gap of 3.68eV. The ZnS nanoparticles also form a good host for most of the transition and gives remarkable optical and magnetic properties.

The current paper focuses on the synthesis of diluted magnetic semiconducting pure ZnS nanoparticles and Fe doped ZnS nanoparticles of varying concentration of dopant by chemical co-precipitation method with PVP as stabiliser. The formation of cubic zinc blend structure and the incorporation of Fe impurity into ZnS lattice are confirmed by the X-ray diffraction (XRD) and EDS. The transmission electron microscopy result shows the uniform particle size distribution with spherical shape. Both the technique gives the approximate particle size in the range of 2-3nm. The UV–VIS spectra show a sharp absorption edge at 321nm for pure and 317nm for the Fe doped ZnS nanoparticles. The band gap is calculated by Tauc plot and come out to be 4eV for pure and 4.2eV which is result of the quantum confinement effect and much higher than the bulk ZnS. The study of magnetic properties is done by PPMS at room

temperature. The room temperature magnetic measurements show the diamagnetic behaviour in undoped ZnS nanoparticles due to the presence of structural defects. The results reveal that all the doped ZnS nanoparticles exhibit the ferromagnetism and the saturation magnetism increases with increasing the concentration of Fe doping but at the cost of photoluminescence quenching.

PP-20

Characterization and Electrochemical Study Of Electrodeposited Nanostructured Sb2Te3 Thin Films

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Abstract

The cauliflower like nanostructured antimony telluride (Sb2Te3) thin fims have been deposited on stainless steel substrate by potentiostatic electrodeposition process. In this paper the effect of deposition time on structural and electrochemical properties have been studied with various characterization techniques such as CV, XRD, FESEM, EDS, FT-Raman, wettability, XPS, TEM and EIS. The The well deposited and adherent thin films were occurred at deposition potential -210mV which was derived from CV analysis; this potential kept constant for further deposition. The deposited material have rhombohedral crystal structure with maximum crystallite size 35 nm and cauliflower like morphology. Maximum ECSA (2.77 cm2) is found at deposition time 400 second.

Keywords: Nanostructured Sb2Te3; Thin films; electrodeposition; potentiostatic; hydrophilic; ECSA; EIS.

PP-21

Studies on Real and Imaginary Part of Permeability for Sm - Dy Substituted Mg Ferrite

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Abstract

The ferrite samples having composition $Mg[(Sm)_{0.5}(Dy)_{0.5}]_xFe_{2-x}O_4$, in which x varies from 0.05 to 0.3 in steps of 0.05 have been prepared by using combustion method. XRD analysis confirmed the formation of cubic spinel structure in addition of ortho-ferrite phase due to substitution of rare earth ions. The initial permeability and complex permeability of torroid samples were calculated by measuring the values of inductance and Q-factor. It is seen that initial permeability and real part of initial permeability increases with increase in Samarium(Sm) – Dysprosium (Dy) rare earth element in Magnetium (Mg) up to x = 0.15 and thereafter it decreases. The composition $Mg[(Sm)_{0.5}(Dy)_{0.5}]_{0.15}Fe_{1.85}O_4$ show low loss factor and initial permeability becomes higher as compared to other prepared rare earth content samples.

Keywords: Combustion, Sm-Dy-Mg ferrite, Real permeability

PP-22

Performance Modeling and Experimental Investigation of Bi2Te3 Material in STEG

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Abstract

Solar energy can be directly utilize for power generation by using thermoelectric generator (STEG) technology.The main purpose of this paper is to design and develop set up for solar thermoelectric generator and obtain electricity and hot water. In this presented design, parabolic dish and thermoelectric module were utilized in order to concentrate solar beam and generate electrical power and hot water. And also the analysis of power generation with water on cold side and without water on cold side.The energy of concentered sunlight on heat absorber of TE module is transferred to cold water reservoir. Heat transfer in TE module leads to temperature difference in its both side and electrical power is generated. The performance of a STEG consisting of series combination of four commercial bi_2Te_3 thermoelectric module coupled to the selective absorber (copper plate coated with soot).For the temperature difference of 19°C it produces 0.95 W electrical power.

Keywords: STEG, Parabolic dish, Bi_2Te_3 semiconductor material, Heat Absorber of TE Module

PP-23

Effect of Process Control Reagents on Structure and Electrochemical Performance of La0.8Sr0.2MnO3

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Abstract

In the present work, well-recognized $La_{0.8}Sr_{0.2}MnO_3$ (LSM) system as cathode for IT-SOFC was prepared by using different process control reagents (PCAs) such as stearic acid and salicylic acid with varying grinding times. According to our knowledge, this is the first attempt to develop LSM by using PCAs in mechanochemical synthesis. By using stearic acid single cubic phase $La_{0.8}Sr_{0.2}MnO_3$ material was obtained at 3 h of grinding (LSM-St). However, in case of salicylic acid the respective phase of $La_{0.8}Sr_{0.2}MnO_3$ was achieved for 5 h of grinding (LSM-Sa) and without PCA the same phase was obtained for 7 h of grinding (LSM-Wt). X-ray diffraction confirms single crystalline cubic phase of as-synthesized LSM by PCAs and without PCA. All the samples were sintered at 700°C to improve the degree of crystallinity. SEM images of as-synthesized samples reveal highly agglomerate fine-scale grains. The temperature dependence of DC conductivity curve exhibits linear dependence of conductivity with temperature, which is found maximum for LSM-St as compared to other two samples. Symmetric cells in the configuration given by -composite cathode/ electrolyte/composite cathode- were fabricated using spin coating technique. The Area specific resistance (ASR) was minimum for LSM-St based symmetric cell and correlated with the maximum conductivity.

Keywords: Mechanochemical synthesis, process control reagent (PCA), X-ray powder diffraction, cathode, symmetric cell and fuel cell.

PP-24

Optical Characterization Of Chalcone Doped PMMA Thin Films For Photonic Applications Using Spectroscopic Technique Of Drop Casting Method

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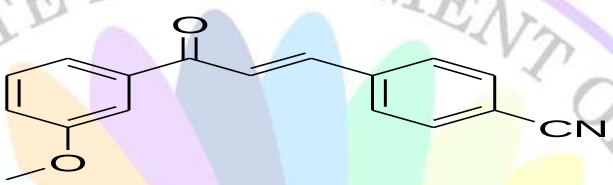
Abstract

The effort has been made to determine the thin films of PMMA (poly methyl methacrylate) and chalcone prepared via drop casting method. The newly synthesized Chalcone derivative namely 1-(3-Methoxy-phenyl)-3-(4-nitro-phenyl)-propenone (C1) were used to dope the films with different concentrations. The prepared films are transparent and so they can be studied for applications in photonics. Optical characterization of the samples is done through different spectroscopy techniques. Absorption spectra for both the samples are obtained using UV-Vis spectrophotometer. Other significant optical parameters like refractive index, extinction coefficient and band gap energies were calculated from the absorption spectra. The effect of doping concentration on these parameters is studied. Emission spectra is obtained using fluorescence spectrophotometer and effect of doping was observed. Also, FTIR spectra of the

doped films is obtained and compared with the pure compound to notice changes in the peak values and intensity of the peaks. The present work is done to study the effect of doping on optical properties and figure out the application of samples in photonics. The molecular structure of the compound (C1) is provided in figure.



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PP-25

Study of Bimolecular Quenching Reactions of Coumarin Dye C1 by the Fluorescence Behavior in Toluene and Butanol Binary Mixtures

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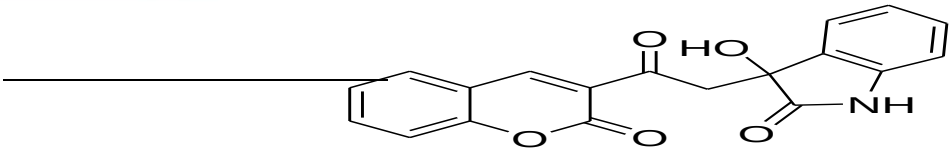
Abstract

Inferable from the significance of solvent mixtures in practical chemistry, Toluene (TL) and Butanol (BL) mixtures are used to study fluorescence behavior of Coumarin dye C1 namely 3-Hydroxy-3-[2-oxo-2-(2-oxo-2H-chromen-3-yl)-ethyl]-1,3-dihydro-indol-2one. Bimolecular quenching reaction studies of C1 with aniline as quencher are made in mixtures of TL –BL to know the effect of viscosity and dielectric constant variation at room temperature. The quenching process is studied in all solvent mixtures by Steady state and Transient state method. Quenching is characterized by S-V plots having upward curvature. Analysis of modified S-V equations which accounts both static and dynamic quenching allows calculating bimolecular quenching rate constant. The bimolecular quenching reactions are found to be significantly larger. Further finite sink approximation model is invoked so as to check whether reactions are diffusion limited. The extents of these rate parameters demonstrate that positive deviations in the Stern-Volmer (S-V) plot are because of the presence of apparent static and dynamic quenching process [1-3]. The molecular structure of C1 as shown in the figure



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PP-26

Prospective of ZnO Based Devices And Its Applications

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Abstract

In the modern era, metal oxides are widely used in various applications. Zinc is an alkaline metal and its oxide i.e. Zinc Oxide (ZnO) is a trending material owing to its exclusive physical and chemical properties. The high refractive index, high thermal conductivity, high binding energy, antibacterial, as well as UV protection properties are among some unique features because of which ZnO has a remarkable perspective in various fields such as rubber industry, pharmaceutical industry, cosmetics, textile, electronic and electro-technology. ZnO stands out to be a promising material for optoelectronic devices as it is economical, crystal clear, and conducting material for electronic circuits, or for spintronics. Owing to such huge applications, many researchers worked to explore various aspects of ZnO. Hence this review article presents recent work and applications of ZnO. This review makes available valuable evidence regarding zinc oxide.

Keywords: Zinc oxide, applications, nanoparticles.

PP-27

Nano Fluid Heat Transfer Characteristics & Its Futuristic Applications

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Abstract

The heat transfer characteristics of modern fluids are immensely improved by suspending nano-sized solid particles with diameter below 100nm and are deliberated as prospective fluids for the numerous applications such as heat pipes, nuclear reactors, electronic cooling systems, and solar collectors automobile radiators etc. Nano fluids basically well-defined as the fluids that contain nanometer-sized particles named as nanoparticles. These nanoparticles solute is dispersed in conventional base solvents like H_2O, $C_2H_6O_2$ or oil, etc. The nanoparticles which are used in the fabrication of nano fluids contains the oxides of metals such as Aluminum oxide, Copper(II) oxide, Metals such as copper, silver, etc, Semiconductor such as titanium dioxide and Silicon Carbide, alloys of nanoparticles, etc. The present paper summarizes the current research in the nanofluid studies on convective heat transfer performance, thermo-physical properties, effect of fluid temperature and use of surfactant for better stability of Nano fluids, particle size, and volume concentration effects and also suggests valuable evidence in the direction for future development.

Keywords: Nanoparticle, Semiconductor, convective heat transfer, thermo-physical properties

PP-28

Non-invasive Diabetic Sensor based on Cellulose Acetate/Graphene Nanocomposite

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Abstract

Metabolic changes or pathological disorders is a promising tool for non-invasive medical diagnosis, occurring in human exhaled breath as a measurement of volatile organic compounds (VOCs), such as the exhaled acetone quantities in expressions of monitoring of diabetes. Basis of acetone recognition and non-invasiveness are the most apparent physiognomies of the arrangement. The patient's breath samples are collected beforehand and then passed through the container prior to the reaction with the sensors and the final result data are put out on the screen at regular intermissions. A conductive composite based on Cellulose Acetate and thermally Reduced Graphene was prepared to fabricate the highly selective Acetone sensor (especially for the diabetics. In the panorama of future developments of devices investigating real breath samples, a complex occurrence was studied with down to 1 ppm of acetone, ethanol and methanol (mixed with water) with a sufficiently good signal to noise ratio and was worth inspecting.

Keywords: Sensor, Diabetics, Non-invasive, Graphene, Nanocomposite, Acetone

PP-29

Importance of Advanced Nano – Bio Fertilizer-Pesticides in Sustainable Agriculture

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Abstract

In Agriculture, Quality of food and natural resources are a part of those challenges like sustainability, human health, and healthy life. The ambition of nano bio fertilizers in agriculture is to maintain the environmental balanced, minimize nutrient losses in fertilization and increased yield through soil nutrient management. The significant interests of using nanotechnology in agriculture includes specific applications like Nano Bio fertilizers and Nano pesticides to trail products and nutrients levels to increase the productivity without decontamination of soils, waters, and protection against several insect pest and microbial disease.

Keywards: Rock phosphates, Nano bio fertilizers and micronutrients, Farmers friendly techniques, Pesticides formation, Waste decomposer, Environmental-Social-Economical balance.

PP-30

Estimation of the Surface Free Energy of the Hydrophobic Monolithic Silica Aerogels

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Abstract

Aerogels are prepared by quantifying the sol-gel process of the organo – metallic precursor. The objective of the present paper is to synthesize ultralow density, low refractive index, and monolithic silica aerogels. The quantification of hydrophobicity of the silica aerogels using water drop contact angle is not only crucial but also the estimation of the surface free energy is an important parameter to understand the interfacial behavior of the aerogel surface and liquid. To provide insight on this behavior, we have carried out the calculation of the surface free energy by using Neumann's equation of state. These synthesized aerogels emerged with ultralow density 24 Kgm^{-3} with low thermal conductivity ~0.091 $Wm^{-1}K^{-1}$.

PP-31

Theoretical Study of Surface Plasmon Resonance in P3HT:PCBM/Cu Nano Film

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Abstract

It is well known that copper has second best conductivity metals after silver which can be used as potential plasmonic properties. In the present paper, we have theoretically study the surface plasmon resonance properties of P3HT-PCBM: Cu nano film with variation of thickness of Cu nao film. He-Ne Laser wavelength of 632.8 nm used for Kretschmann-Raether experimental setup for theoretical investigation. The reflectance becomes zero at 18 nm thickness of P3HT-PCBM film and 39 nm thickness of nano copper film. The result shows strong dependence of reflectance on thickness of P3HT-PCBM: Cu film. The present theoretical studies show that variation of thickness of the Cu nano film gives better result as compared to gold and solver nano films. Considering the cost of silver and gold, copper would be good candidates to replace silver and gold as plasmonic materials.

Keywords: Surface plasmon resonance, metallic reflection, reflectance, electromagnetic propagation, nanoparticles,

PP-32

Oil-water Separation by ZnO-Coated Superhydrophobic Sponges

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Abstract

Continuous oil/water separation is not only an important topic for scientific research but also for practical applications to clean oil from industrial oily wastewater and oil-spill pollution. In this work, polyurethane sponges were coated by ZnO using dip coating technique. ZnO-coated sponges were modified by stearic acid to achieve superhydrophobicity. At ZnO-coated sponges exhibited water contact angle ~ 165° and oil contact angle ~ 0°. The prepared superhydrophobic

sponge is well sustainable in oil-water separation and in separation of oil-hot water mixture. Also the wetting properties of the sponge was stable in mechanical test like cutting and twisting. Stearic acid modified ZnO-coated sponge holds great promise for oil spills cleanup as well as oil/water separation from harsh environments.

Keywords: Contact angle, Superhydrophobic, ZnO, Wettability, Lotus leaf.

PP-33

Synthesis and Characterization of Fe doped Polypyrrole

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Abstract

As nanocomposite materials are a special class of material which has unique physical properties and wide range of application. In the present study reveals that the method of synthesis is also playing a major role in its structure and property. Nanocomposite material of Iron doped Polypyrrole is synthesized by chemical bath deposition method. To deposite material the ammonium per sulphate is used as an oxidant agent and Iron Oxide(Fe_2O_3) is added in varying percentage from 10% to 50% . The substrate can be used for the thin film coating a glass, copper and stainless steel. The films coated on the glass substrate can be used for electrical and optical characteration while other films may be used for structural and morphological characteration. The paper gives the detailed procedure of material synthesis and its structural characterization with the help of X-Ray diffraction(XRD) study.

Keywords: Polypyrrole

PP-34

Perturbation in Structural Properties of Ni-Cd-Zn ferrites by Mg+2 Substitution

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Abstract

Ferrites find a wide range of applications from household electronics and magnetic appliances to microwave communication devices. This research paper reveals the synthesis of Mg+2 substituted Ni-Cd-Zn ferrites with three different compositions by ceramic method. The phase purity of the samples was confirmed by X-ray diffraction studies, which was cross verified with FTIR absorption investigations. The FTIR studies revealed the presence of four absorption bands. The bond length and force constants were calculated with the special emphasis on tetrahedral and octahedral sites. Electrical resistivity was obtained at various temperatures and activation energy was evaluated. Magnetic hysteresis studies of the samples was undertaken and the parameters like saturation magnetization, Coercivity were calculated.

Keywords: Ceramic method, Microwave, X-ray, FTIR and Magnetic hysteresis

PP-35

Spray Deposited TiO2 Photoelectrode for Degradation Of Phthalic Acid

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Abstract

Titanium dioxide (TiO_2) thin films were prepared by simple chemical spray pyrolysis technique onto glass and fluorine doped tine oxide (FTO) coated glass substrates. The effect of substrate temperature on PEC, structural, optical, morphological and compositional properties of films were studied. All the deposited TiO_2 films are polycrystalline with the tetragonal crystal structure, prominent peak observed along (101) plane shows anatase phase. The maximum photoelectrochemical performance was observed for the film deposited at 350 °C. The Surface morphological study showed the porous nature of film with different sizes of grain were uniformly distributed on its surface. The band gap energy of TiO_2 thin films was calculated to be 3.30 eV. Optimized parameters will be further used for preparation of large area (10×10 cm^2) photoelectrode to study photocatalytic and photoelectrocatalytic properties of TiO_2 photoelectrode. Mineralization of the pollutant (phthalic acid) as a model in laboratory scale will be studied by measuring chemical oxygen demand (COD) values.

Keywords: Titanium dioxide, Spray pyrolysis, photocatalysis etc.

PP-36

Solvent Polarity and Environment Sensitive Behaviour of Coumarin Derivative

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Abstrat: This paper reports an investigation on ground and excited state preferential solvation index (i.e. δs2) and relative quantum yield of 2-acetyl-3H-benzo[f]chromen-3-one [2AHBC] molecule. The title molecule showed the ground state preferential solvation index (i.e. δ_{s2}) have negative values in different binary solvent mixtures, which indicates that molecule is preferentially solvated by DXN.The excited state preferential solvation index (i.e δ_{s2}) values are positive which may be due to strong solute–solvent interaction over solvent–solvent interaction. Existence of synergistic effect is confirmed by the higher values of fluorescence wave maximum for binary mixtures than for pure solvents. And further, it is observed that, non-radiative decay constant is found to be more than radiative decay constant in all the solvents. This may be attributed to intermolecular forces between hydrogen atoms. The quantum yield of the title molecule increases with decrease in the solvent polarity. It may be due to bathochromic effect and intermolecular charge transfer (ICT). The quantum yield and viscosity are directly proportional to each other, which obey Forster's equation. Polarity and viscosity sensitive fluorescence quantum yields of the studied molecule provides vital information, in designing polarity sensors and biological probes.

Keywords: 2AHBC, preferential solvation, binary mixtures, quantum yield, ICT,

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PP-37

Synthesis, Characterisation and Applications of Cinnamaldehyde-Thiosemicarbazone

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Abstract

Determination of metal ion concentration in µg quantity from samples is interdisciplinary areas of material sciences. Cinnamaldehyde-Thiosemicarbazone (Cinnamaldehyde-TSC) is innovative reagent for determination of transition metals in µg quantity from sample. Cinnamaldehyde-TSC is prepared by refluxing equimolar quantities of Cinnamaldehyde with thiosemicarbazide for an hour. It is recrystallized in alcohol. Synthesized reagent has M.P. 173^0C with formula weight 205.30. Its elemental analysis shows 58.22% C, 5.10%H, 10.30% S and 20.20% N. It shows antimicrobial activity against *Klebsiella pneumonia.* Its λmax is 330 nm and it shows IR spectral frequency in between 4000-200 cm^{-1}. With standard Fe (III) solution Cinnamaldehyde-TSC forms coloured (complexes) solution, which can be determined photometrically. Standard plot of Beers law was prepared using standard Fe (III) solution. Water sample of the Panchganga river was used to determine Fe (III) content per cm^3. From standard plot, Fe (III) content in water sample was determined. In calculation method ratio of concentration of known to unknown and ratio of optical density of known and unknown were compared. By both the methods results obtained were almost same. Fe (III) from sample obtained by calculation and graphical method was 0.82 and 0.83 ppm/cm^3 respectively. Similarly Ni(II) content from Cadbury chocolate was determined using Cinnamaldehyde-TSC by same method as used for determination of Fe(III) content from water sample. Ni (II) content of cadbury chocolate by calculation and graphical method was 84.4 and 80µm/gm respectively. By this method concentration of most of the transition metals in µg quantity can be determined accurately by using Cinnamaldehyde-TSC.

Key words: Cinnamaldehyde- Thiosemicarbazone, Fe (III), Ni (II), Beers law

PP-38

Nanostructured CuO Thin Films Prepared by Aqueous Based Novel Reflux Method

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Abstract

Copper oxide (CuO) thin films have been deposited on glass and steel substrates by novel aqueous based Reflux method wherein for deposition of CuO thin film use of copper sulphate as copper ion source from an aqueous alkaline medium. The effects of copper ion concentration, temperature, deposition time were studied for deposition of thin films. The CuO thin films have been characterized by XRD, UV, SEM and Contact angle. The X-Ray Diffraction results revealed that CuO is monoclinic in nature. Optical band gap is observed from UV-visible spectrophotometer which is 1.9 eV. The surface morphological studies obtained from SEM micrograph shows rice shape of exterior. While wettability test showed hydrophobic nature of CuO. This material characterization of CuO thin film clearly indicates that these films can be widely used in various applications such as gas sensor, transducers, solar cells and super capacitor.

Keywords: Copper Oxide; Reflux method; XRD; SEM; UV-Vis Spectroscopy.

PP-39

Synthesis and Characterization of Mn-Co Mixed Metal Oxide Electrode for Supercapacitor Application

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Abstract

Transition metal oxides have recently emerged as a promising electrode material for supercapacitive applications. In this perspective, a worldwide research has been reported to address this and rapid progress has been achieved in the advancement of fundamental as well as the applied aspects of supercapacitors. In the present work, we have synthesized Mn-Co mixed metal oxide by using simple Electrodeposition method on stainless steel substrate. The resulting electrodes were analyzed by using X-ray diffraction spectroscopy (XRD), scanning electron microscopy (SEM) and electrochemical characterization techniques like cyclic voltammetry (CV), galvanostatic charge discharge (GCD) & electrochemical impedance spectroscopy (EIS). The Mn-Co electrode material deposited on stainless steel substrate exhibited a maximum specific capacitance of 548.70 F/g at a scan rate of 5mV/s in 1M NaOH as an electrolyte. Also, Mn-Co electrode posses an excellent cyclic stability upto 1000 cycles at scan rate of 100mV/s. These results show that electrochemically synthesized Mn-Co on the stainless steel substrate is an inordinate electrode material which is most appropriate for supercapacitor application. The obtained results demonstrate that Mn-Co mixed metal oxide electrode material of higher specific capacitance and better cycling stability has enormous application potential for supercapacitors.

Keywords: Supercapacitor, Electrodeposition, X-ray diffraction spectroscopy, Cyclic voltammetry

PP-40

Binding Interaction between Boronic Acid Derivatives with Monosaccharaides: Effect of Structural Change of Monosaccharaides upon binding using Steady State Spectroscopic Methods in S-V plots

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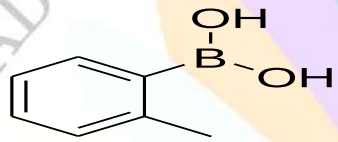
Abstract

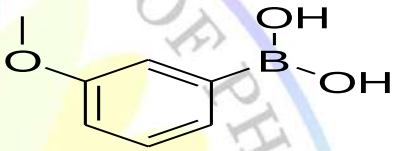
Sugar sensing and continuous monitoring of glucose (CGM) play an important and vital role in controlling diabetes. The present enzyme based sugar sensors have their own drawbacks. Problems associated with them have encouraged alternate approaches to design new sensors. Among many, fluorescent intensity change based sensors are drawing more attention. Fluorescence sensors based on boronic acid derivatives are more popular because of their ability to reversibly bind diol-containing compounds [1-5]. Here we have investigated the binding ability of two boronic acid derivative namely 2-Methylphenyl boronic acid (B1) and 3-Methoxyphenyl boronic acid (B2) with mono saccharides (sugars) in aqueous medium at physiological pH 7.4. The required buffer is obtained using Na_2HPO_4 (0.077 M) and NaH_2PO_4 (0.023 M) in one liter of distilled water, and the pH value adjusted to 7.4 using 0.1M HCl and saturated NaOH. The sugar concentration is kept nearly 1000 times more than that of boronic acid. The interactions of boronic acids with three saccharides (D-Sorbitol, Fructose and galactose) were studied by absorbance and steady-state fluorescence. Fluorescence is quenched

by formation of esters with saccharides. Apparent Binding constants or association constants (K_a) and dissociation constants (K_d) are calculated by using fluorescence spectroscopy method and Stern-Volmer plots. In each case slope of modified S-V plots is nearly one indicating only a single binding site in boronic acids for sugars. Molecular structures of B1 and B2 as shown in figures

B1



B2



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PP-41

Nanostructured CuO Thin Films Prepared by Aqueous Based Novel Reflux Method

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Abstract

Copper oxide (CuO) thin films have been deposited on glass and steel substrates by novel aqueous based Reflux method wherein for deposition of CuO thin film use of copper sulphate as copper ion source from an aqueous alkaline medium. The effects of copper ion concentration, temperature, deposition time were studied for deposition of thin films. The CuO thin films have been characterized by XRD, UV, SEM and Contact angle. The X-Ray Diffraction results revealed that CuO is monoclinic in nature. Optical band gap is observed from UV-visible spectrophotometer which is 1.9 eV. The surface morphological studies obtained from SEM micrograph shows rice shape of exterior. While wettability test showed hydrophobic nature of CuO. This material characterization of CuO thin film clearly indicates that these films can be widely used in various applications such as gas sensor, transducers, solar cells and super capacitor.

Keywords: Copper Oxide; Reflux method; XRD; SEM; UV-Vis Spectroscopy.

PP-42

Determination of Mass Attenuation Coefficient for Some Technetium-99M Compounds

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Abstract

Medical Physics will contribute to maintaining and improving the quality, safety, and cost-effectiveness of healthcare services through patient-oriented activities requiring expert action, involvement or advice regarding the specification, selection, acceptance testing, commissioning, quality assurance including quality control and optimized clinical use of medical devices and regarding risks from associated physical agents; all activities will be based on current best evidence or own scientific research when the available evidence is not sufficient. The scope includes risks to volunteers in biomedical research, careers and comforters; it also includes risk to workers and the public when these have an impact on patient doses.

In this respect we framed our objectives to develop and validate the specific, accurate, precise and reproducible quality control by the non-destructive analytical method. Hence by the X-ray spectrometric technique, mass attenuation coefficients were determined for the radiopharma compound technetium-99m.

Technetium-99m is a metastable nuclear isomer of technetium-99, it is used in tens of millions of medical diagnostic procedures annually, making it the most commonly used medical radioisotope. Technetium-99m is used as a radioactive tracer and can be detected in the body by medical equipment (gamma cameras). The relative short physical half-life of the isotope and its biological half-life of one day (in terms of human activity and metabolism) allows for scanning procedures.

Mass attenuation coefficient is a measure of the average number of interaction between incident photons and the matter that occur in a given mass per unit area thickness of the substance. Hence, the importance of mass attenuation coefficient have been found in different/verities of fields viz., radiation shielding, medical fields, aeronautical engineering, photon transport, space research, military, security checking purposes (most important now-a-days), research and development etc. Hence, in view of the above applications this mass attenuation coefficient have been estimated by WinXCom programme which is the successor of program XCOM for the technetium-99m compounds such as mebrofenin, disofenin, Lidofenin, Bisicate and Exametazime for the energy range from 8keV to 32keV.

PP-43

Understanding Nonlinear Optical Response of Chalcone Derivative on Quantum Chemical Computations

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Abstract

In the present research work, one of the chalcone derivatives named 1-(3-Methoxy-phenyl)-3-napthalen-1-yl-propenone (1MPNP) has been investigated by quantum chemical calculations. Quantitative estimation of NLO properties of the title material has been investigated with the help of different theory functional viz. Hartree–Fock, Möller–Plesset and density functional theory. The parameters which determine the NLO efficacy of the molecule such as molecular dipole moment, polarizability, static first and second order hyperpolarizability and HOMO-LUMO energy gap of the compound have been calculated using a series of basis sets including polarized and diffuse functions at different levels of approximation in order to assess the impact of including electron correlation. The results obtained in this study reveal that compound has an absolute predominant second harmonic generation efficiency as it has large secondorder hyperpolarizability. A trade-off between accuracy of results and computation levels has been found. The hyperpolarizability values show that the compound can respond to an external electric field and possesses efficient second (SHG) and third (THG) harmonic generation.

Keywords: Dipole moment, Polarizability, Hyperpolarizability, MP2, Density functional theory

PP-44

Cobalt Doped Nickel Aluminate Nano-Materials Synthesis, Characterization, and Catalytic Properties

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Abstract

The spinel $Ni_{1-x}Co_xAl_2O_4$ (x = 0.0, 0.25, 0.50, 0.75, 1.0) nano-aluminates have been efficiently synthesized by using sol-gel combustion heating method with the use of glycine fuel. The nanostructured nickel aluminate, cobalt aluminate nono-materials and their variable component spinel systems calcined by the meticulous temperature. The influence of Co^{++} ions over $NiAl_2O_4$ forces system, leads to the great position in the substitution and development on thermal, spectroscopic, structural, morphological, elemental then catalytic behaviors of cobalt doped nickel aluminates have been studied. It was observed that the synthesized aluminate material acts as efficient nano-catalyst for the conversion of organic compounds with higher yields. Therefore, these practices were verified to be useful for investigation of the premeditated systems which produced the number of outcomes.

Keywords: Aluminate Spinel, Sol-gel combustion, Structural and Morphological Properties, Catalytic Activities

PP-45

A Study on Thermo-Acoustic and Sound Parameters of Aqueous Urea at Different Concentration and Temperature.

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Abstract

Present study outlines the estimation of different physical and thermodynamic parameters of aqueous urea solution over the entire range of concentrations viz. 0.02-0.2 mol-kg^{-1} at couple of temperature (298.15K and 303.15K) at 2 MHz frequency. The variation of the aligned parameters has been interpreted in terms of different kind of molecular interactions, physic-chemical behavior and their strength. The all parameters shows nonlinear increase or decrease with various concentration and temperature provide important information regarding molecular properties of solute and solvent interaction.

In viewpoint of above facts, the ultrasonic velocity and density measurements studies on aqueous urea. Hence the study investigates the structural sense of the liquid mixture.

Keywords*:* fertilizer, urea, non-linearity parameter, bulk modulus, available volume.

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PP-46

Structure and Morphology of Polymer and Polymer Blend Electrolytes

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Abstract

PMMA/PVC polymer and polymer blend electrolytes are prepared in the form of thick films through solvent casting technique using THF as solvent and $LiClO_4$ as salt. XRD patterns of PMMA, PVC and PMMA-PVC blends are compared with the polymer – salt and polymer blend – salt samples and the occurrence of complexation is confirmed. The amorphous nature is observed for all the samples and is predominant for the polymer blend electrolyte for particular compositions. Different types of morphologies are identified for the samples using SEM micrographs. The solvent evaporation has led to the formation of micro pores in the smooth surface of both polymer and polymer electrolyte samples.

PP-47

Physical and Spectroscopic Studies between Cu2+ and Mn3+ ions doped ZnO-Al2O3-Li2O-B2O3 Glasses

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Abstract

Zinc Alumino Lithium borate (ZnAlLiB) glasses of different compositions doped with Cu^{2+} and Mn^{3+} ions have been prepared using conventional melt quenching technique. Fourier transform infrared and UV-Visible spectroscopic studies have been carried out for ZnAlLiB glasses. The physical properties have been measured. Optical absorption spectra of Cu^{2+} doped ZnAlLiB glasses reveals a strong and wide UV absorption band centered at 740-800nm, indicate the presence of copper ions mostly in octahedral distorted tetragonally positions. The spectra of the glasses doped with Mn^{3+} have exhibited the intense absorption band at around 472 nm. The FT-IR studies indicate that insertion of Cu^{2+} ions produces [BO_3] and [BO_4] basic structural units by breaking the boroxol (B_3O_6) ring, but manganese ions are found to gradual depolymerization of MnO_2–B_2O_3 glass matrix.

Keywords*:* Borate Glasses, Physical Properties, FT-IR and UV–Visible spectroscopy.

PP-48

Statistical Modeling in Material Science

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Abstract

Material Science is engaged with the application of informatic principles to materials science in order to assist in the discovery and development of new materials. Central to the field is the application of data mining techniques and in particular machine learning approaches, often referred to as Quantitative Structure Activity Relationship (QSAR) modeling, to derive predictive models for a variety of materials-related "activities". Such models can accelerate the development of new materials with favorable properties and provide insight into the factors governing these properties. Here we provide a comparison between medicinal chemistry/drug design and materials-related QSAR modeling and highlight the importance of developing new, materials-specific descriptors. We survey some of the most recent QSAR models developed in materials science with focus on energetic materials and on solar cells. Finally we present new examples of material-informatic analyses of solar cells libraries produced from metal oxides using combinatorial material synthesis. Different analyses lead to interesting physical insights as well as to the design of new cells with potentially improved photovoltaic parameters.

Keywords: Material informatics, material science, chemo informatics, solar cells.

PP-49

Preparation of Self-cleaning Superhydrophobic Coating by Spraying Alumina/Polymethylhydrosiloxane Composition on Glass Substrate

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Abstract

The alumina nanoparticles were synthesized by hydrothermal method using aluminium nitrate nonahydrate as precursor. The hydrated alumina and carbon particles collected by washing and filtration of obtained residues, and then calcinated at 100º C for 3 hr. The composition of synthesized particles and polymethylhydrosiloxane in chloroform, sprayed on clean glass substrate for coating. The hierarchical rough surface structure controlled by varying amount of alumina particles in polymethylhydrosiloxane composition. At optimization result showed the water contact angle nearly 162º and rolling angle 4º. After examining wettability and water jet test it confirmed that prepared coating is highly water repellent. The bright plastron layer was observed on coating due to reflection of light, when immersed in water. This plastron layer indicating that coating reveals highly non-wetting property. The self-cleaning ability investigated by using artificial dust, coating exhibits good self-cleaning property. The highly water repellent and self-cleaning coating has great industrial application.

Keywords: Superhydrophobic; self-cleaning and alumina particles.

PP-50

Self-cleaning Photocatalytic TiO2 Film 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 [1]. Herein, photocatalytic, superhydrophilic and 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 sheets 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 2h of UV irradiation confirming excellent photocatalytic activity. The mechanical stability of the applied TiO_2 films are currently under study.

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PP-51

In Situ Deposition of Aniline Coated Thin Film for Supercapacitor Application

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Abstract

This literature review summarizes the recent progress in polyaniline based composite for energy storage like applications in supercapacitor, rechargeable batteries and fuel cells. Polyaniline as a one kind of conducting polymers have been playing a great role in the energy storage devices. To composite the material the Ammoniumpersulphate (APS) is used as an oxidant agent and aniline in varying percentage from 10% to 30%. The substrate used for the thin film coating is glass, copper, and stainless steel.Chemically synthesized polyaniline film will be characterized using X-Ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and Scanning electron microscopy (SEM). The supercapacitive performance of the synthesized polyaniline films may be tested using cyclic voltammetry (CV).

Keywords: Supercapacitor, Polyaniline, Thin film.

PP-52

Electrodeposited Polyaniline Nanofibers as a Supercapacitor Electrode

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Abstract

The present paper reports synthesis and characterization of conducting polyaniline thin film by electrodeposition method for supercapacitor application. The crystal structure and surface morphological behaviour of deposited polyaniline thin film have been characterized by using X-ray diffraction (XRD) and scanning electron microscopy (SEM) techniques. The surface wettability of polyaniline thin film shows hydrophilic in nature. Testing of polyaniline thin film as a supercapacitor was studied by using different characterization techniques such as Cyclic Voltammetry (CV), Charging-Discharging (CD) And Electrochemical Impedance Spectroscopy (EIS) study. The polyaniline thin film shows maximum specific capacitance of 340 $F.g^{-1}$ at scan rate 50 $mV.s^{-1}$ in 0.5 M Na_2SO_4 electrolyte solution. Hence, Electrodeposited polyaniline thin film is best for energy storage application.

Keywords: Polyaniline (PANI), Electrodeposition, Supercapacitor, Charging-discharging, Electrochemical impedance spectroscopy (EIS).

PP-53

Synthesis and Characterization of Dy2O3 Doped Potassium Alumino-Borate Glasses for White LED

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Abstract

The rare earth ions have drawn much interest among the researchers due to their luminescence, lasing and sensing properties. Due to the electronic transitions of 4f–4f and 4f–5d in rare earth ions doped glasses, it can be used in various optical and optoelectronic devices. In present work, potassium alumino-borate glasses co-doped with Dy_2O_3 (KABD glasses) have been synthesized and characterized for white LED application. The conventional melt quench technique was used to prepare the glass samples. X-ray analysis confirmed the amorphous nature of prepared glasses and FTIR spectrum supported the presence of various functional groups in the glasses. UV-Vis-NIR spectrometer was used to record the optical absorption spectra and allowed direct and indirect band gaps were determined by using Tauc's plot. At room temperature excitation and emission spectra were derived which shows that, corresponding to an excitation wavelength of 347nm, the glass samples show two intense emission bands nearly at 482nm (blue) and 574nm (yellow) and one feeble band at 663nm (red). These emissions correspond to the transitions $^4F_{9/2} \rightarrow {}^6H_{15/2}$ (blue), $^4F_{9/2} \rightarrow {}^6H_{13/2}$ (yellow) and $^4F_{9/2} \rightarrow {}^6H_{11/2}$ (red). The CIE chromaticity diagram obtained for all the glass samples and deduced that the sample KABD-4 (doped with 0.5 mol% of Dy_2O_3) with chromaticity co-ordinates X=0.37 and Y=0.39 having highest luminescence intensity. The results obtained are prevalent with other studies and thus it will be useful for white LED applications.

PP-54

Study of Stacked Binary (Cobalt: Ruthenium) Oxide Thin Film

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Abstract

Thin film of Stacked binary (Cobalt : Ruthenium) Oxide are deposited by Sol-Gel technique. The as deposited films were uniform, greyish black in colour and well adherent to the substrate. The XRD pattern shows the dominating peaks at [101], [211], of ruthenium oxide. Crystalline nature and tetragonal structure of ruthenium oxide was confirmed by sharp intense peaks. The calculated values of the lattice parameters for tetragonal structure are (a=b≠c) a =4.514 Å, b = 4.683 Å, c = 3.068 Å. In XRD pattern the peaks corresponding to cubic phase of cobalt oxide are also observed the planes [400], [440], [444] and [620] the lattice parameter a= 8.118 A0 The surface morphological study of the stacked Co_3O_4:RuO_2 thin film has been carried out from SEM image. The scanning electron microscopic (SEM) at different magnifications showed that the substrate is well covered with Co_3O_4:RuO_2 material. The infrared spectrum depicts strong absorption band at 876.70cm^{-1} indicating the stretching mode of Ru-O and O-Ru-O. Highest specific capacitance of 890 F/g at the scan rate of 10 mV/sec was observed.

Keywords: (Co: Ru)oxide, XRD, SEM, FTIR, CV

PP-55

Structural, Electrical and Magnetic Properties of Nanocrystaline Lanthanum Substituted Magnesium Zinc Ferrites

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Abstract

Nanoparticles of Lanthanum substituted Magnesium Zinc ferrites with general formula Mg0.6 Zn0.4 La2yFe2-2yO4 (where y = 0.0, 0.05, 0.1, 0.15, 0.20 and 0.25) have been synthesized using co-precipitation method. The effects of lanthanum on structural, magnetic and electrical properties are studied. Phase formation was investigated using X-ray diffraction and Infrared absorption technique. . Two prominent infrared absorption bands for all ferrite samples are observed; one at 600 cm^{-1} due to tetrahedral (A) interstitial voids and other at 400 cm^{-1} due to octahedral (B) interstitial voids is observed. The SEM micrograph reveals that an average grain size decreases with lanthanum content. Electrical properties of synthesized nanoparticles are studied by AC conductivity measurement. The dielectric constant ε' and complex permittivity ε" were measured at room temperature as a function of the frequency from 20Hz to 50MHz. The magnetic properties of the produced samples are investigated using vibrating sample magnetometer.

PP-56

PDMS/Candle Soot Composite for Self-cleaning Superhydrophobic Coating

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Abstract

The preparation of superhydrophobic coating using cheaply synthesized candle soot nanoparticles from candle flame has very novel research topic. A less than 30 nm sized candle soot particles were collected by passing through stainless steel mesh of pore size ~ 30 nm. The suspension of candle soot (CS) and polydimethylsiloxane (PDMS) in chloroform sprayed on clean glass substrate and dried at 100º C for 1 h. The coating surface with water contact angle ~ 173º and rolling angle ~ 4 º was achieved by spraying suspension of 100 mg CS and 0.3 ml

PDMS in chloroform. The stability of superhydrophobic coating was studied by finger-wiping, water jet hitting, water dripping, adhesive tape and sandpaper abrasion test. Result showed that the optimum 100 mg CS particles in suspension was stable in water jet hitting and water dripping test. The superhydrophobicity destroyed in four cycle of adhesive tape peeling and seven cycle of sandpaper abrasion tests. The coated substrate showed good self-cleaning performance. The high water repellent and self-cleaning property of coating can be adopted for industrial applications.

Keywords: Candle soot, PDMS, superhydrophobic and self-cleaning.

PP-57

Superhydrophobic PVC/SiO_2 coating via Layer-by-Layer deposition for Self-cleaning Application

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Abstract

The superhydrophobic coating were prepared by using alternative dip and spray coating technique. The multiple layer of polyvinyl chloride (PVC) by dipping followed by spraying a hydrophobic SiO_2 particles on substrate temperature ~ 50 ºC. The water contact angle 169 ± 2º and sliding 6º achieved by applying three layers of PVC and SiO_2 particles on glass slide. The dual scale roughness were observed in the SEM micrographs. The stability of coating characterized by impacting water jet and water drops, adhesive tape and sandpaper abrasion test.

The self-cleaning property of superhydrophobic coating investigated by spreading artificial dust particles on coating. The highly water repellent coating can be applicable in both academic and industries for self-cleaning application.

Keywords: hydrophobic SiO_2 particles, PVC, superhydrophobic and self-cleaning coating.

PP-58

Superhydrophobic TiO2/PMHS Composite Surface for Self-Cleaning Application

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Abstract

In this work, we report facile spray technique for fabrication of superhydrophobic (SHP) surface on glass slide using synthesized TiO_2 and polymethylhydrosyloxane (PMHS) composite. The scanning electron microscope images reveals micro- and naoscale rough and porous structure developed by TiO_2/PMHS composite. The superhydrophobicity with water contact angle 163 ± 2º and rolling angle 6 º is achieved. The prepared SHP surface showed excellent self-cleaning performance. For durability the prepared SHP surface characterized by water jet, water drop impact, adhesive tape peeling and sandpaper abrasion tests. This approach can be applied to any size and shape of substrate and hence has huge application in industries.

PP-59

Synthesis, Characterization and Impedance Spectroscopic Studies of (1-x) PMMA: x PC: 10PVP: 5LiClO4 Plasticized Blend Polymer Solid Electrolyte Systems

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Abstract

Plasticized blend polymer solid electrolytes in (1-x) PMMA: x PC : 10 wt% PVP: 5 wt% $LiClO_4$ (where x = 10, 20, 30, 40 wt%) stoichiometric ratios are synthesized. dc ionic conductivity on four different polymer matrices is reported. The maximum enhanced ionic conductivity is observed at a threshold combination of 70 wt% PMMA : 20 wt% PC : 10 wt% PVP : 5 wt% $LiClO_4$ polymer matrix. This could be attributed to the increased number of free volumes present around the polymer chains and increase in Li^+ ion mobility in polymer matrix. Further, complex impedance, dielectric and electric modulus studies are carried out and explained. The XRD patterns of all these polymer matrices confirm that there is an increase in the amorphous nature with increase in plasticizer PC wt%. The plasticizer plays an important role in decreasing the viscosity of the system which in turn favors the mobility of segmental motion of polymer network and fast ion motion in polymer.

PP-60

Study of y(Ni0.8Co0.2Fe2O4)+(1-y)BaTiO3 Magnetoelectric Composites

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Abstract

$y(Ni_{0.8}Co_{0.2}Fe_2O_4)+(1-y)BaTiO_3$ ME composites (with y=0.00, 0.15, 0.30, 0.45 and 1.00) were prepared by standard double sintering ceramic method. In the present work structural, electric, dielectric, magnetic and magnetoelectric properties of ME composites were studied by varying composition of ferrite phase. XRD analyses were carried out for confirmation of the existence of constituent phases in the synthesized composites. SEM micrographs are used to investigate microstructure and for calculation of average grain size of the composites. The variation of D.C resistivity with temperature were studied for confirmation of semiconducting nature of the composites. The variations of dielectric properties with frequency and temperature were also studied. Magnetic properties of composites were studied by Alternate Gradient Magnetometer (AGM) at room temperature. Magnetoelectric coupling coefficients for composites were measured as a function of D.C magnetic field. The highest magnetoelectric coefficient of 0.707 mV/cm.Oe was observed for $0.15(Ni_{0.8}Co_{0.2}Fe_2O_4)+ 0.85(BaTiO_3)$.

Keywords: Multiferroics; Synthesis; $NiCoFe_2O_4$-$BaTiO_3$; Magnetoelectric Properties.

PP-61

Structural and Ferroelectric Properties of BaTiO3 (BT) and Bi0.5Na0.5TiO3 (BNT) Lead-Free Piezoelectric Ceramics

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Abstract

Lead-free $BaTiO_3$ (BT) and $Bi_{0.5}Na_{0.5}TiO_3$ (BNT) electroceramics were prepared by solid-state reaction method and investigated their structural and ferroelectric properties. X-ray diffraction pattern of BT and BNT reveals the formation of pure phase with tetragonal (*P4mm*) and rhombohedral *(R3c)* structures. The scanning electron microscopy (SEM) images show the formation of the dense microstructure with an average grain size of approximately 15.20 µm and 2.2 µm for BT and BNT respectively. The ferroelectric nature of synthesized ceramics was confirmed using the electric field induced polarization-electric field (P-E) hysteresis loop with higher remanent polarization (P_r ~ 4.30 µC/cm^2) and lower coercive field (E_c ~ 1.6 kV/cm) for BT and BNT shows high coercive field (E_c ~ 10 kV/cm) so it's difficult to pole the BNT sample. Hence the observed result shows the BT and BNT ceramics may be useful as an alternative to lead-based ceramics for environment-friendly energy harvesting applications.

Keywords: $BaTiO_3$; X-ray diffraction; Polarization; Ferroelectric.

PP-62

Effects of Sintering Temperature on Structural, Morphological and Magnetic Properties of Nickel Ferrite Prepared via a Polyol Method

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Abstract

Nano sized nickel ferrite sample was synthesized by Polyol route. Phase formation study was carried out by using x-ray diffraction technique and it's reveals that single phase crystalline nature of the sample was confirmed by sintered temperature 773K. FT-IR spectra for sample sintered at 773K shows two sharp bands on octahedral and tetrahedral sites. Scanning electron micrographs shows spherical and uniform grains was observed on sintering temperature 773K. Also, the particle size of the nickel ferrite was estimated to be ranging from 10 to 15 nm for above sintered temperature. Magnetic data for all samples indicates that ferromagnetism was increases with increasing sintering temperature. In this manuscript detailed study of structural, magnetic properties of nickel ferrite sample was investigated.

Keywords: ferrite, sintering temperature, XRD, SEM, magnetic materials

PP-63

Povidone-phosphotungstic acid (PVA-PWA) hybrid: An Efficient and Environmentally Benign Catalyst for the Synthesis of Quinazolinone Derivatives

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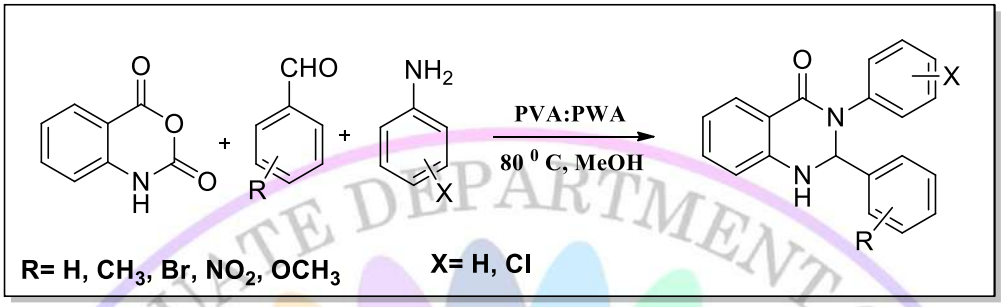
Abstract

In this research, a novel strategy for synthesis of quinazolinones has been formulated via one pot condensation of aromatic aldehydes, isatoic anhydride and aniline by employing prepared povidone-phosphotungstic acid (PVA-PWA) hybrid as a novel solid acid heterogenous catalyst in methanol at 80 ^{0}C. The synthesized povidone-phosphotungstic acid (PVA-PWA) was confirmed by FTIR, XRD and studied ***for*** TGA, BET plots. The reaction was optimized for different solvents and loading of catalyst. The yields of all quinazolinone derivatives were observed in the range of 78-86 %. All the synthesized quinazolinones were investigated by spectral data. The use of ecologically benign catalyst, good atom economy, environmental affordability and easy work up makes this protocol sustainable.



Keywords: povidone-phosphotungstic acid, aromatic aldehydes, isatoic anhydride, quinazolinone

PP-64

Influence of Thickness on microstructural and Optical Properties of In2O3 Thin Films Prepared by Spray Pyrolysis

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Abstract

Highly textured indium oxide (In_2O_3) thin films are produced by chemical spray pyrolysis method onto glass substrates. The impact of fil thickness on the structural, morphological and optoelectronic properties of In_2O_3 thin films have been investigated. The average film thickness lies within 245–352 nm range. The film thickness effect on microstructural properties like grain size, lattice constants, dislocation density and strain of the films were reported. X-ray diffraction study reveals the thin films have a cubic structure with favored (222) plane. The morphological study shows the spherical and uninterrupted distribution of grains. The typical transmittance of the In_2O_3 thin films, measured in the 300 to 1100 nm wavelength. The optical properties show that direct band gap value improved from 3.35 to 3.52 eV with film thickness. The best results are shown with 352nm film thickness, which has direct band gap of 3.49 eV, minimum sheet resistance of 80 Ω/□, lowest resistivity of 4 × 10-3 Ω. Cm, maximum carrier concentration 6.1 × 1020 cm-3, mobility 29.55 cm2/V.s and highest figure of merit is achieved (12.110-2 □/Ω). The results show that 352nm is the optimum thickness level for good quality In_2O_3 films suitable for transparent electronic devices.

Keywords: thin film, spray pyrolysis, XRD, SEM, physical properties

PP-65

Synthesis and Structural Study of Co0.8-x Nix Zn0.2 Fe2O4 Ferrites by Solid State Reaction Method

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Abstract

Ni-doped Co-Zn ferrite with x=0.00, 0.08,0.16, 0.24, 0.32,0.40,0.48,0.56 were synthesized by low cost solid state reaction method. The oxidation of inorganic compounds, decomposition of salts & their degradation is also discussed by TGA-DTA. The structure was characterized by X-ray diffraction, confirmed the formation of single phase spinel structure with no extra peak with lattice constants & particle size of all samples were observed to be in the range of 8.3123-8.3780A^O and 24.50-36.91nm. From X-ray diffraction ,parameters such as lattice constant(a), particle size(D), micro strain (**ε**) ,dislocation density(ρ_D), hopping lengths(L_A and L_B) ,bond lengths (A - O and B-O), ionic radii (r_A and r_B), and texture coefficients (T_{hkl}). The micro structural study is carried out using SEM technology and average grain size 6-28□m.The FT-IR specta of synthesized ferrites showed 2 absorption bands in the range of 598-396 cm^{-1} belonging to tetrahedral [A] & octahedral [B] interstitial sites in the spinel lattice.

Keywords: Ni-doped Co-Zn ferrite, solid state reaction method, TGA-DTA.XRD, lattice constant (a), particle size (D), SEM, FTIR

PP-66

Phenylboronic acid Functionalized Carbon Dot Fluorescent Probes: Preparation, Characterization and Fluorescent Nano Sensor for Glucose Sensing

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Abstract

The present paper is focused on the development of new analytical method using fluorescent nanomaterials, in particular fluorescent carbon dots. Carbon dots have demonstrated great potential as luminescent nanoparticles in bioapplications. Although such nanoparticles appear to exhibit low toxicity compared to other metal luminescent nanomaterials, today we know that the toxicity of carbon dots (C-dots) strongly depends on the protocol of fabrication. A great impact and major benefits that Nanotechnology has produced in our society is potentiality of solving practical problems. We have reported a novel strategy to fabricate fluorescent boronic acid functionalized carbon dots (C-dots) for nonenzymatic blood glucose sensing applications. The functionalized C-dots are obtained by one step hydrothermal carbonization, using phenylboronic acid as the sole precursor. Compared with conventional two-step fabrication of nanoparticle-based sensors, the present "synthesis- modification integration" strategy is simpler and more efficient. The added glucose selectively leads to the assembly and fluorescence quenching of the C-dots. Due to "inert" surface, the C-dots can well resist the interferences from various biomolecules and exhibit excellent selectivity. The proposed sensing system has been successfully used for the assay of glucose in human serum. Due to simplicity and effectivity, it exhibits great promise as a practical platform for blood glucose sensing.

Key words: Boronic acid, fluorescence, carbon dots, nano sensor, glucose sensing

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PP-67

Superhyrophobic PU Sponge modified by Hydrophobic Silica Nanoparticle – Polystyrene Nanocomposite for Oil-water Separation

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Abstract

In this study, we have synthesized the hydrophobic silica nanoparticles by simple sol-gel processing of polymethylhydrosiloxane (PMHS). The nanocomposite solution was prepared by adding hydrophobic silica nanoparticles in polystyrene (PS) solution and applied on the skeleton of polyurethane sponge by simple immersion – drying process. The as prepared sponges exhibited superhydrophobic property with water contact angle 161° and oil contact angle nearly 0° and could separate oil from oil-water and oil-muddy water mixture. The superhydrophobic sponge has sustainable anti-wetting property under cross sectional cutting, pressing and twisting, and different pH environment. Such superhydrophobic sponge is suitable for practical application on large scale.

Keywords: Superhydrophobic, nanocomposite, modified sponge and oil-water separation

PP-68

Mesoporous Silicas for the Removal of Toxic Metal Ions from Water

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Abstract

Porous silicas are investigated with great interest for their use as nanoadsorbents for the removal of pollutants from water. Mesoporous silica nano and microparticles have shown very high adsorption efficiencies for the removal of toxic heavy metal ions from water. Recently, significant new developments are noticed that report new synthesis methods and development of new technologies based on porous silica for the removal of toxic metals from water. This work deals with the study and presentation of interesting literature survey findings through a compilation thesis about the use of porous silica for the removal of metal ions from water. In the work, latest research papers and patents were studied and critically analyzed. The literature study has revealed interesting information and trends. The overall outcome of the study gives an idea about importance of the porous silica for the removal of metal ions and metal ions targeted by the researchers. The outcome is also helpful to decide the future directions of research on mesoporous silica for the removal of toxic metal ions from water.

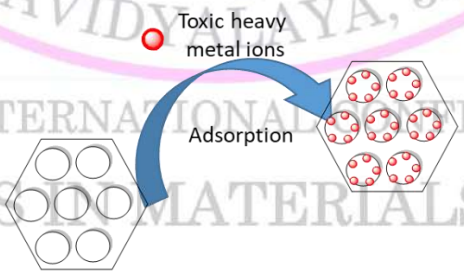

Figure: Adsorption of metal ions on mesoporous silica.

PP-69

Microstructure and Magnetic Properties of Ni-Mg-Zn-Co Ferrites

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Abstract

Preparation of Ni-Mg-Zn-Co ferrites having general formula $Ni_{0.5-x}$ $Mg_{x-0.01}$ $Zn_{0.5-y}$ $Co_{y+0.01}$ Fe_2O_4 (where x=0.1,0.2,0.3,0.4 and y=0.1,0.2,0.3,0.4) have been carried out by conventional ceramic method . The x-ray diffraction studies of compositions reveal the formation of single-phase cubic spinel. The lattice parameter 'a', bond lengths RA, RB and site radii rA, rB are found to increase linearly with increase in Zn content. The average grain diameter determined from SEM studies was found to increase with Ni content. The magnetic moment (n_B) increases on addition of Zn. However it decreases beyond Zn = 0.4. The lower values of hc and Mr/ Ms show the existence of MD particles in the samples. The value of magnetic moment (μB) lie in the range of 0.85 to 1.09 and saturation magnetization (4πMs) varies between 834 emu/ gm and 1115 emu / gm. It is observed that μB and Ms increase with Zn content upto Zn = 0.3 and then decrease. The cation distribution is proposed on the basis of site preference energies of the ions. Initial permeability increases slowly to the peak value at a certain temperature and drops abruptly to zero at the Curie temperature. The Curie temperature found to decrease with increase in Zn content.

Keywords- Ni--Zn ferrites, x-ray, IR, SEM, Magnetization, Permeability.

PP-70

Various Types of Smart Materials and Their Application: An Overview

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Abstract

Now a day's smart materials are used everywhere. This name smart material which is a common name for a wide group of different substances. The present age is considered to be the smart materials era. Earlier, smart material was defined as the material, which responds to its environments in a timely manner. However, the definition of smart materials has been expanded to the materials that receive, transmit, or process a stimulus and respond by producing a useful effect that may include a signal that the materials are acting upon it. This study gives an idea about the introduction of smart materials and their classification/types and applications.

Keywords: Smart materials, transmit, stimuli, etc.

PP-71

Optical and Structural Characterization of Graphene Quantum Dots Synthesized by Modified Electrochemical Exfoliation Method.

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Abstract

In this report, the method of preparation of graphene quantum dots is represented.The method used is the modified electrochemical exfoliation method of graphite. The XRD confirms the structural purity as well as the particle in the quantum size range. The crystalline size is found to be 3.32 nm. The formation of graphene quantum dots is confirmed. The excitation spectra generated from the PL spectroscopy were found to be in the range of 428 nm wavelength which confirms the blue light emission. The UV Visible Spectroscopy shows the $\pi \rightarrow \pi^*$ transition. The graphene quantum dots can be used for the application as the photovoltaic, supercapacitors and gas sensing application.

Keywords: GQDs, XRD, PL, UV Visible spectroscopy.

PP-72

Variation of Particle Size with Copper Content in Copper Cobalt Ferrite

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Abstract

Nano-particle size polycrystalline aluminum substituted copper cobalt ferrite samples $Cu_xCo_{1-x}Fe_{2-2y}Al_{2y}O_4$ (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. The effects of aluminium and copper on structural properties of cobalt ferrite are studied. A universal testing machine as well as Archimedes's method was applied for determining the physical properties of the samples. Phase formation is investigated using X-ray diffraction, Infrared absorption technique and Scanning electron microscope technique. Ionic radii $R_A$and bond lengths (A-O) on both sites are found decreases with Al^{3+} and copper content. The Lattice constant 'a', physical density as well as X-ray density of samples goes on increasing with Al^{3+} and copper content. The ratio c/a is found increasing when addition of copper content and decreases with aluminium content. It means that Al^{3+} and copper acquire the tetragonal prolate type distortions on B site and hence (c/a) ratio increases and automatically crystal lattice turned from tetragonal spinel to cubic spinel.

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

PP-73

Fabrication of Natural Dye Sensitized Polyaniline/Ti02 Solar Cell for Harvesting Solar Energy

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Abstract

PANI/TiO2 nanocomposites have been the most intensively studied among various nanocomposites, because they combine the merits of PANI and nanocrystalline titanium dioxide (TiO2) particles within a single material and could be applied in photoelectrochemical devices, electronic devices and gas sensors.

In this research article, we have prepared dye-sensitized hybrid solar cell (DSHSC) with TiO2 nanoparticles and conjugated polymer (PANI). We have reported the Photoelectrochemical (PEC) performance of different natural dyes extracted from Lac, Aboli, and Ghevada. Three dyes obtained from nature, including flowers, leaves of plants, resin secreted by the female lac bug were used as sensitizers in DSHSC.The dyes extracted from these materials contained cyanine, carotene, chlorophyll, 4-(4- Dimethylaminophenylazo) beta-lactosideetc. The DSHSC sensitized by lac dye extract offered the highest conversion efficiency of 2.063 % among the three natural dyes.

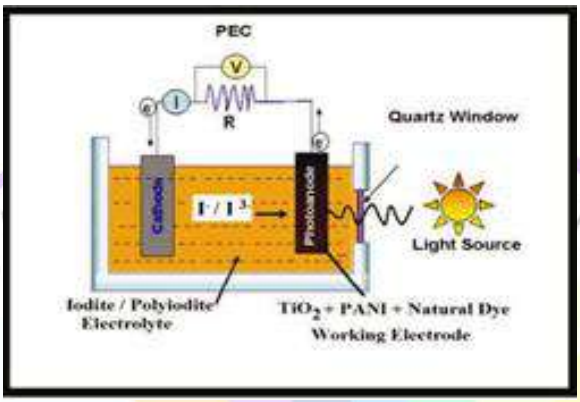

Fig. Dye Sensitized Hybrid Solar Cell

Keywords: Natural dye, Nanocomposites, PEC, Hybrid Solar Cell.

PP-74

Synthesis, Antibacterial and Antifungal Activities of New 4-(3-(chloromethyl)quinolin-2-yl)morpholine Derivatives

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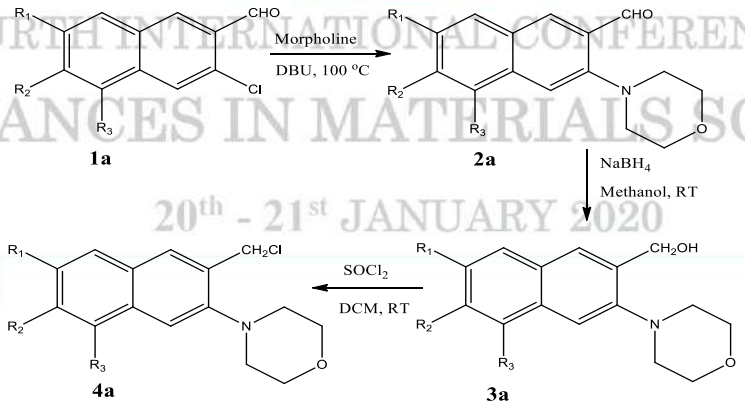
Abstract

A simple and high yielding method was developed for the synthesis ofNewderivatives of 4-(3-(chloromethyl)quinolin-2-yl)morpholinewas obtained from 2-chloroquinolin-3-carbaldehydes, all the synthesized compounds were characterized by IR, ^{1}HNMR, Mass spectroscopy and synthesized compounds were evaluated for their antibacterial as well as antifungal activities.Antibacterial activity of compounds 4a, 4b, 4c, 4d and 4e were found to be good against *E. coli*, *P. aeruginosa*, *S. aureus* and *S. pyogenes* as compared to standard Ampicillin, Erythroycin, chloroamphinicol, Norfloxacin and Ciprofloxacin. Antifungal activity of compounds 4a, 4b, 4c, 4d and 4e were found to be good against *C.Albicans*, *A. Niger*, and *A. Clavatus* as compared to standard Nystatin and Greseofulvin



Conclusion

In this study, a series of New derivatives of 4-(3-(chloromethyl)quinolin-2-yl)morpholineswere prepared from 2-chloroquinolin-3-carbaldehydes and preliminary biological evaluation of antimicrobial activity of the synthesized compounds the compound with methyl substitution at the eighth position of the quinoline ring 4b showed excellent antibacterial activity than standard drug Ampicillin with Gram +ve bacterial strains and Gram –ve strain (*P. aeruginosa*). The antifungal activity of the titled compounds (4a–f) was evaluted against *A. niger*, *A. clavatus* and *C. albicans* using Griseofulvin as the standard drug with the broth dilution method (Table 3). The synthesized compounds 4b and 4d were found to be excellent activity than the standard drug Griseofulvin against *A. niger*, *A. clavatus* and *C. albicans* strains.

All the reactions were performed under mild reaction conditions, shorter reaction time and in quantitative yields. The methodology developed will be of much use to combinatorial chemist.

PP-75

Design and Synthesis of Diketopyrrolopyrrole (DPP) based Conjugated Organogels

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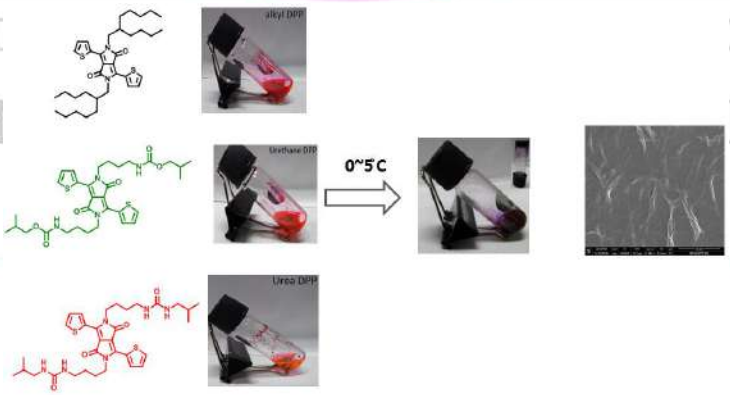
Abstract

The supramolecular self-assembly of π-conjugated materials and organic dyes is a very attractive approach towards synthesis of novel organogelators. In fact, through a rational chemical design and careful selection of the building block, it is possible to control the molecular self-organization process and packing arrangement, which define important properties such as charge transport, absorbance/fluorescence, stretchability, etc. Herein, we synthesized hydrogen bonded urethane side chain substituted Diketopyrrolopyrrole ($DPP_{urethane}$) organogelators. Further we investigated, compatibility of DPP toward formation of organogels by substituting different side chains i.e. DPP_{urea} and DPP_{alkyl} . Further, we manipulate the structure of DPP such conjugated back-bone and position of hydrogen bonding to study the supramolecular organization and consequently their gelation properties. The gelation properties are studied using NMR, UV-Vis absorbance spectra and SEM microscopy.



PP-76

Cyclic Voltammetric Study of NiO Thin Film Electrodes Prepared by Sol-Gel Spin Coating

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Abstract

With an aim of electrochemical supercapacitor studies with X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray (EDAX) technique. Nickel oxide (NiO) thin films have been synthesized on stainless steel substrate using sol gel spin coating method. The XRD data confirms cubic crystal structure of the NiO. The FESEM images reveal homogenous surface. The electrochemical properties of the Nickel oxide electrodes are studied by cyclic voltammetery (CV). The NiO thin film electrode showed excellent super capacitive behavior with increase in specific capacitance with decrease in scan rate. The maximum specific capacitance 125 Fg^{-1} was obtained at scan rate of 10mVs^{-1} in aqueous electrolyte 0.1M KOH.

Keywords: XRD, FESEM, EDAX, CV, FT-IR, Angle of Contact.

PP-77

Structural and Morphological Properties of Nickel Oxide Thin Films

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Abstract

The aim to study the structural and morphological properties of Nickel oxide thin films. The nickel oxide thin films were prepared from nickel chloride ($NiCl_2 \cdot 6H_2O$) as a precursor, relatively low cost, natural abundance in nature. NiO thin films have been synthesized on stainless steel substrate using sol gel spin coating method. Thin film properties of deposited thin films were studied by Structural (XRD), Morphological (FESEM), Compositional (EDAX), ANGLE OF CONTACT, FTIR, The XRD data confirms Rhombohedral structure of the NiO. The FESEM images reveal homogenous surface, porous with micro granules. Existence of Ni and O in EDAX spectrum of thin film sample confirms the formation of NiO. The wetability study was tested by contact angle measurement, which shows hydrophilic nature of NiO electrode with contact angle of 38°.

Keywords: XRD, FESEM, EDAX, ANGLE OF CONTACT, FTIR

PP-78

Photo-Luminescence and Energy Transfer Study of Mn2+; Ce3+ doped Sr3Y(BO3)3 Phosphor for WLED Application

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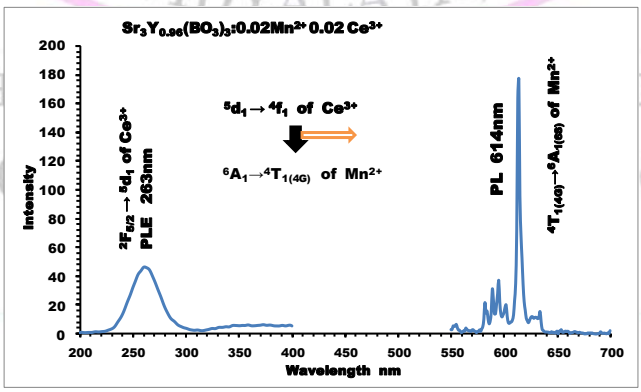
Abstract

$Sr_3Y(BO_3)_3$; $Sr_3Y_{0.98}(BO_3)_3$:0.02Ce^{3+} ;$Sr_3Y_{0.98}(BO_3)_3$:0.02Mn^{2+} ,$Sr_3Y_{0.96}(BO_3)_3$:0.02Ce^{3+} 0.02Mn^{2+} phosphors were synthesised by solution combustion method at 650^0c in muffle furnace. Synthesised phosphors were annealed at 950°c for 3 hours under weak reducing atmosphere provided by activated charcoal / carbon to achieve desire oxidation state of dopants. Photoluminescence study shows that $Sr_3Y_{0.98}(BO_3)_3$:0.02Mn^{2+} phosphors converts Blue light radiation into red. $Sr_3Y_{0.98}(BO_3)_3$:0.02Ce^{3+} converts UV radiation into Blue light. In $Sr_3Y_{0.96}(BO_3)_3$:0.02Ce^{3+} 0.02Mn^{2+} phosphors resonant energy transfer occurs from Ce^{3+} to Mn^{2+} in host matrix, resulting into intense red emission (614nm) from UV light(263nm). So we report it as uv-activated red emitting phosphor for uv-pc-WLED.



Keywords:- $Sr_3Y(BO_3)_3$ phosphor; Cerium ion; Mangnese ion; uv-pc-WLED

PP-79

Synthesis of ZnO Nanoparticles and Characterization of Structural Microstructural and Optical Properties

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Abstract

Nanocrystalline Zinc oxide (Nano-ZnO) particles have been prepared by sol–gel method. The synthesized compound was sintered and characterized out by means of UV, FTIR, TG–DTA, and XRD. The compositional, structural, microstructural, and optical properties of undoped zinc oxide films prepared by the sol–gel process using a drop casting technique were investigated. In sol–gel synthesis, thermal decomposition of the precursor at and above 450 °C for 1 hour in an oven led to pure ZnO nanoparticles. The structure and the morphology of such material have been investigated by high resolution electron microscopy and small area electron diffraction. The average nanoparticles size is in 50–80 nm.

Keywords: Zinc Acetate; Methanol; Nanoparticles; Sol-Gel; X- ray diffraction, FTIR

PP-80

γ – Irradiation Effects on Dielectric properties of NiO doped PANI Nanocomposites

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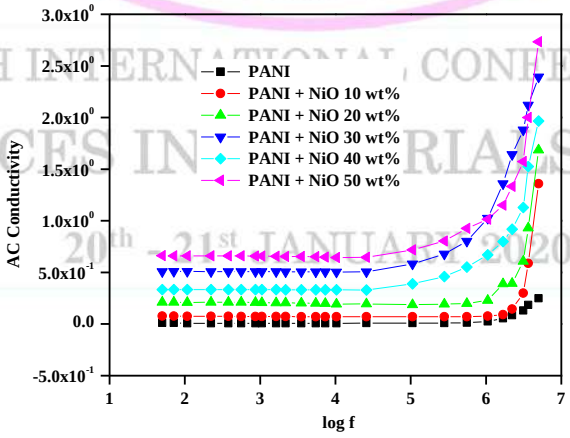
Abstract

In the present study NiO doped PANI nanocomposites were irradiated by Gamma radiation. The gamma ray irradiation process was carried out in the air in a conventional γ- chamber and the nanocomposites were exposed to a dose of 8.5kGy. The dielectric permittivity, dielectric loss and AC Conductivity were investigated as a function of frequency in the range 50 Hz to 5MHz. In the present study, it is observed that as frequency increased the dielectric constant decreased and it remains constant at higher frequencies. It is observed that at a particular value of frequency, the dielectric constant and dielectric loss both are decreased as a weight percentage of NiO increased in PANI nanocomposites. After γ- irradiation AC conductivity it is found that as the frequency increased the AC conductivity remains constant up to 108.592 KHz and afterwards the A C conductivity increased. This might be due to hopping of the charge carriers in the PANI/NiO nanocomposites at higher frequencies. It is also observed that at higher frequency. After γ- irradiation AC conductivity is high as compared to unirraditaed AC conductivity of PANI/NiO nanocomposites.



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PP-81

Synthesis and Structural Studies of Aurivillius-Type Structure Ceramic Ca(1-x)Sr(x)Bi2Nb2O9 Composition

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Abstract

Chemical co-precipitation method is used to synthesize of Aurivillius-Type Structure Ceramic $Ca_{(1-X)}Sr_{(X)}Bi_2Nb_2O_9$ (where x = 0, 0.2, 0.4, 0.6, 0.8 and 1.00) and the precipitate obtained is converted into thick film on alumina substrate by using screen printing method. These thick films were characterized by XRD and SEM micrograph. The well defined diffraction patterns confirm that the chemical reaction is completed. They show the formation of orthorhombic structure without any impurity phase. The SEM micrograph shows uniform nature of the particles. Microwave absorbance is about 95% so formed material is highly useful in commercial shielding application.

Keywords: $Ca_{(1-X)}Sr_{(X)}Bi_2Nb_2O_9$ ceramics, co-precipitation method, XRD, SEM.

PP-82

Investigation of Supercapacitive Performance of Electrodeposited Cobalt Oxide Electrode by Potentiostatic Mode

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Abstract

The present research work is a humble effort to synthesize Cobalt oxide supercapacitive electrode by electrodeposition method via Potentiostatic mode of thin film deposition. The Cobalt hydroxide material is deposited on stainless steel substrate at room temperature and annealed at 500^0C to form cobalt oxide thin film electrode. The structural, morphological and wettability investigation of the as-deposited cobalt oxide thin film electrode is done by XRD-analysis, SEM characterization and Contact Angle measurement. The supercapacitive properties are investigated in aqueous 1M Na_2SO_4 electrolyte by cyclic voltametry and galvanostatic charge-discharge analysis. The results of the investigations are, maximum specific capacitance of 284.4 F g^{-1} at a scan rate of 5mVs^{-1}, specific energy 4.325 Wh/kg, specific power 3 kW/kg and coulomb efficiency 53.75%. The results so obtained promote Cobalt oxide to be a challenging material for energy storage devices and supercapacitor applications.

Keywords: Cobalt oxide, electrodeposition, potentiostatic mode, cyclic voltametry

PP-83

A Study on Dielectric Behavior, AC and DC Conductivities of PANI-Al2O3 Composites

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Abstract

This research work presents the synthesis and characterization of PANI-Al2O3 composites by in situ polymerization technique.Al2O3 content in the composites was varied from 2 to 10 wt% in the steps of 2 wt%. Microstructure and structural characterization of the developed composites was conducted using scanning electron microscope and X-ray diffraction. The dielectric behavior and AC conductivity was studied as a function of frequency while DC conductivity was studied in the 60 - 200°C temperature range. The dielectric constant and loss were found to decrease with the increasing frequency values.AC conductivity of all composites was found to increase for all frequency values which are attributed to polarization of charge carriers between the localized sites.

PP-84

Fabrication of Superhydrophobic PMMA/SiO2 Particles Coating for Self-cleaning Application

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Abstract

By inspiring high water repellency and self-cleaning ability of Lotus leaf, many reports have been published on preparation technology of artificial superhydrophobic surfaces. Silica nanoparticle is one of the promising material in preparation of superhydrophobic coating/surface. Low surface energy polymers plays crucial role in forming continuous layer on substrate. Here in, we prepared hydrophobic silica particles by using methyltrimethoxysilane as a source of silica particles. The synthesized silica particles embedded in polymethyltrymethoxysilane using dip coating method for obtaining superhydrophobicity. The wettability checked by measuring water contact angle using Contact angle meter. We achieved the water contact angle 143±2º by varying silica particles in polymethyltrymethoxysilane at dipping 5 minutes in coating solution. The dip and withdrawing speed controlled by Dip coater instrument. In feature specific amount of silica particles, dipping speed and time, and drying temperature may be affects on wettability. The transparent and durable superhydrophobic coating may be applicable to large scale industrial applications.

Keywords: Superhydrophobic, self-cleaning and silica particles.

PP-85

In Situ Deposition of Pyrrol Coated Thin Film for Supercapacitor Application

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Abstract

Supercapacitors are energy storage device sutable for energy harvesting system.Polypyrrole thin film was synthesized by chemical oxidative polymerization method,analysis was employed to study the frequency response characterstics of supercapacitors based on polypyrrole conducting polymer nanocomposite.Film thickness and surface morphology will be obtained using scanning electron microscopy.The knee frequency of polypyrrole supercapacitor is indicative of high power application and long life cycle.To deposite the material the Ammonium per Sulphate is used as an oxidant agent and Pyrrol is added in varying percentage from 2% to 20%. The substrate used for the thin film coating is glass and stainlessteel. The capacitance properties will be investigated using Cyclic Voltammtery(CV).Chemically synthesized using X-Ray Diffraction analysis and FTIR.

Keywords: Supercapaitor; Polypyrrole; Thin film

PP-86

Synthesis and Characterization of Grahene Oxide Sheets by using Improved Hummers Method

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Abstract

In this investigation, graphite flakes was processed to Graphene Oxide sheets (GOs) using simple and cost effective Improved Hummer's method with addition of toxic chemical by $NaNO_3$. The complete oxidation of graphite flakes to graphene oxide sheets was obtained by exact addition of $KMnO_4$. The graphene oxide sheets analyzed by XRD, wettability analysis, Raman Shift, SEM analysis. In X-ray diffraction displayed diffraction peak related to Bragg's reflections to (001) plane correspond to pure GOs phase and crystallite size is found to be 11.8nm. In wettability analysis water contact angle measurement photograph of GOs thin film shows the contact angle of 71.6°. A Raman spectrum of GOs thin film characteristics peaks is at 1347cm^{-1} and 1599 cm^{-1}, corresponding to D and G bands, respectively. Further, the D/G ration was calculated as 0.842 for GOs. A Scanning electron microscopy (SEM) studies the microstructure and morphology of products. Herein we have clearly noticed a layer-by-layer staking of GOs. The pore sizes of the network are in the scale of 5µm to 10µm pore walls possess only a few thin layers of stacked graphene oxide sheets.

PP-87

Electrochemical Synthesis of CuS Thin Film for Supercapacitor Application

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Abstract

In the present work, Walnut like copper sulfide is prepared via a facile single-step potentiostatic electrodeposition method on conducting stainless steel substrate. The Walnut like morphology of copper sulfide thin film lies of microplates and further microplates converted to nanogranuals, by means of a change in deposition time and thickness. Copper sulfide thin film electrode reveals a specific capacitance of 132 F g^{-1} at 50 mA cm^{-2}. The film thickness is changes with deposition time. The films acquire maximum thickness 610 nm for 25 minute of deposition. XRD analysis revels that the CuS thin films is polycrystalline nature and the crystallite size is 29 nm. The peak at 612 cm^{-1} in the FTIR spectra confirms the formation of CuS. The wettability study shows the hydrophilic nature. The contact angle of water with CuS electrode is 66^{O}. The charge transfer resistance of CuS electrode is 5.66 Ω.

Keywords: CuS thin films, Electrodeposition, XRD, SEM, EDAX, Supercapacitor.

PP-88

Influence of Ta2O5 doping on Electrical and Dielectric Properties of Nanocrystalline NiCuZn Spinel Ferrite

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Abstract

The nanocrystalline $Ni_{0.4}Cu_{0.3}Zn_{0.3}Fe_2O_4$ferrite were prepared by sol gel method by doping Ta_2O_5 (0 to 10 wt %). This paper presents effect of Ta_2O_5doping on electrical and dielectric properties of nanocrystalline NiCuZn ferrite. Direct Current (DC) electrical resistivity was measured by two probe method. The ferrite samples displayed semiconducting nature/properties as resistivity decreased with the increase in temperature. The variation of dielectric constant and dielectric loss tangent for all samples were presented as a function of the frequency. Results also shows as frequency is increased there is an increase in AC conductivity at room temperature.

Keywords: Sol- gel method, Ferrites, DC electrical resistivity, Dielectric properties.

PP-89

Electrochemically Prepared Cobalt Oxide Thin Film Catalyst for Oxygen Evolution Reaction

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Abstract

Cobalt oxide (Co_3O_4) thin film is prepared onto a commercially pure stainless steel (SS) substrate by one step electrodeposition and treated with 350 ^{0}C heat treatment. X-ray diffraction study shows that the achieved Co_3O_4 thin films are in pure phase. The obtained Co_3O_4 thin film supports electrocatalyst for water oxidation in an alkaline 1 M KOH electrolyte by linear sweep voltammetry (LSV). The Co_3O_4 thin films exhibited an overpotential of 295 mV at a current density of 10 mA cm^{-2}, and a Tafel slope of 87 mV dec^{-1}. The Co_3O_4 thin films were highly stable and were capable of maintaining catalytic activity for at least 10 hr.

Keywords: Thin film, OER, Oxide, Alkaline

PP-90

Impact of Linear Absorptionon on Self-Focusing of Guassian Laser Beam in Collisional Plasma

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Abstract

The intention to undertake simple investigation has some relevance related to ionospheric collisions among electrons and ions. In present theoretical investigation, authors have investigated an impact of linear absorption on self-focusing of Gaussian electromagnetic beam in collisional plasma. In case of collisional plasma, the nonlinearity in the dielectric constant is mainly due to the elastic collisions between electron and ion. The theoretical investigation is carried out under parabolic equation approach. The numerical computation to solve coupled differential equations for beam-width parameters is employed through Runge-Kutta fourth order method. Finally the behaviour of transverse Beam-Width Parameters (f_1& f_2) with the dimensionless distance of propagation (η) is presented graphically. It is found that Gaussian beam is sensitive to absorption. The penetration length in collisional plasma also depends on the critical power of the beam.

Keywords: Gaussian beam; Collisional Plasma; Parabolic equation

PP-91

Diversity of Fleshy Mushroom in Dry Decidous Forest in Sangali District, Maharashtra (India)

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Abstract

During the floristic study of the mushroom of this region author come across a number of mushroom species . In this study five species of mushroom are being discussed. 1. *Lacterius vellereus* (Fr.) Kuntze (1891), 2. *Mycena pura* (Pers.) P. Kumm., 3. *Asterophora lycoperdoida* , 4. *Hygrophorus melizeus* (Fr.) and 5., *Spinolosa sps.* are being discussed with different five genus and species. All the different genus and species are being reported for the first time from this region .

Keywords: Mushroom

PP-92

Supercapacitive Performance of Layered Hematite-Polyaniline Thin Films

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Abstract

Herein, we demonstrate a binder free, facile and economical layer by layer synthesis of Hematite–polyaniline thin films by potentiostatic electrodeposition. The structural and morphological properties of as prepared thin films have been investigated using various techniques such as powder X-ray diffraction, FE-SEM, FT- IR analysis and contact angle measurement. Very interestingly, Polyaniline (PANI) decoration over Fe_2O_3 nanoflakes results a concomitant change in the morphology having substantial improvement in the electrochemical performance in aq. 1 M H_2SO_4 electrolyte. The electrochemical supercapacitive performance of layered Fe_2O_3-PANI thin films has been carried out using cyclic voltammetry, galvanostatic charge-discharge, and electrochemical impedance analysis. The specific capacitance (SC) of PANI decorated Fe_2O_3 is found to be 650 Fg^{-1} at a scan rate of 5 mV/s with 85% capacitance after 500 CV cycles. The samples show typical galvanostatic charge discharge behavior comprising double layer capacitance as well as pseudocapacitive nature contributing to enhanced capacitance. The electrochemical impedance spectroscopy (EIS) analysis reveals charge storage mechanism. The remarkable supercapacitive performance of layered Fe_2O_3-PANI thin films is mainly attributed to the synergism evolved between Fe_2O_3 nanoflakes and PANI nanofibers.

Keywords: Supercapacitor; composite; electrodeposition; maghemite; polyaniline.

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

PP-93

Effect of Surfactants on Silver Nanoparticles: Fluorescence Spectroscopic Approach

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Abstract

Citrate stabilized silver nanoparticles were prepared by reduction of silver nitrate. The synthesized silver nanoparticles (AgNps) were studied and characterized by UV-visible absorption and steady state fluorescence spectroscopy. Generally each fluorophore has a unique characteristic excitation and emission wavelength but in case of AgNps it is observed that the emission wavelength changes with change in excitation. Also the effects of cationic and anionic surfactants on emission of AgNps were examined in the present study.

Keywords: silver nanoparticles, surfactants, micelle, fluorescence, excitation dependent emission

PP-94

Studies on Structural, Optical and Morphological Alterations Induced by Means of Indium Doping in Chemisynthesized CdSe Thin Films

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Abstract

Chemisynthesis is a simplistic way to synthesize thin films of several doped semiconductors. Current study discusses chemisynthesis of undoped cadmium selenide (CdSe) and indium doped cadmium selenide (In:CdSe) thin films on stainless steel (SS) and fluorine doped tin oxide coated glass substrates. Reliable photoelectrochemical (PEC) method is used for optimization of various preparative parameters. Both, Undoped CdSe and indium doped CdSe thin films are characterized using X-ray diffraction, raman spectroscopy, field emission scanning electron microscopy (FE-SEM) and UV-Visible spectrophotometry techniques. Thus modification in structural, optical and morphological properties induced by indium doping are studied. Structural study depicts indium doping enhances crystallinity. Optical study reveals indium doping decreases the band gap energy. Indium doping found to induce significant modulation in morphology. The photoelectrochemical (PEC) study was carried out under illumination intensity 50mW with CdSe (SS) /1M Polysulfide/C cell.

Keywords: CdSe, Chemisynthesis, indium doping, FE-SEM, Optical studies.

PP-95

Porous TiN/Red Phosphorus Nanocomposite for Photocatalytic Hydrogen Evolution

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Abstract

The visible light induced photocatalytic H_2 evolution from water with the help of photogenerated electrons in the TiN/Red Phosphorous (RP) nanocomposite is studied. The porous TiN nanotubes are obtained by nitridation (heat treatment under NH_3 flow) process on hydrothermal synthesized TiO_2 fibers. The RP is incorporated into the porous TiN nanotubes by heat treatment in the sealed ampules. The porous TiN nanotubes provide effective conducting channels for the photogenerated electrons, which is reflected in the enhanced photocatalytic H_2 evolution compared to the pristine RP.

Keywords: Photocatalyst, Hydrogen evolution, Red phosphorous, Nanocomposite.

PP-96

Synthesis and Characterization of MnO_2 by Hydrothermal Method for Supercapacitor

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Abstract

The MnO_2 have been synthesized by a hydrothermal method using the potassium manganate, hydrochloric acid and distilled water. The crystal MnO_2 electrode possesses a high specific capacitance with a good power capability. The excellent pseudo capacitive properties a microstructure large tunnel cavity in the Mno2 crystal structure. The as obtained samples were characterized, in the preparation of good quality thin film where optimization of preparative parameters is of vital importance. The different characterization techniques such as thickness measurement, X-ray Diffraction (XRD),Scanning Electron Microscope (SEM), Cyclic Voltammetry (CV), Charging –Discharging (CD), Cyclic Color Voltammetry (CCV) etc, were used for optimization of preparative parameters.

Keywords: Manganese Oxide (MnO_2) and thin film.

PP-97

Electrospun Deposited Manganese Oxide Nanofibers Thin Film Electrode for Supercapacitor Application: Effect of Mn Concentration

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Abstract

The present study investigates in details the synthesis of manganese oxide nanofibers thin films for supercapacitor application. These manganese oxide nanofibers thin films were deposited on stainless steel substrate by single nozzle electrospinning method. These thin films were characterized by X-ray diffraction,

FT-IR, scanning electron microscope and electrochemical measurements to study their structural, morphological and supercapacitive properties respectively. The influence of concentration of Mn precursor on electrochemical measurements were investigated. The resulting nanofibers and porous structure leads to enhanced capacitive behaviour of manganese oxide. The specific capacitance of manganese oxide nanofibers is about 671 F/g at 0.5 mA/cm^2 current density within 0 - +1.0 V vs SCE potential window in 1M aq. Na_2SO_4 electrolyte. This study suggests that, the manganese oxide nanofibers structures electrode is a promising candidate for high performance supercapacitor electrodes.

Keywords: electrospinning technique; manganese oxide; nanofibers; supercapacitor;

PP-98

On the Use of BBSZ glass - NiCoZn Ferrite Composite for LTCC Applications

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Abstract

The NiCoZn ferrite [$Ni_{0.2}Co_{0.3}Zn_{0.5}Fe_2O_4$] material has been prepared with an aim of using with Low Temperature Cofired Ceramic (LTCC) substrate material for embedded magnetic devices. Such integration, however, requires matching sintering temperatures of both materials. Owing to high sintering temperatures of ferrite materials compared to that of LTCC (≤900ºC), this necessitates development glass-ferrite composites having requisite magnetic properties. The NiCoZn ferrite was synthesized by combustion synthesis with neutral precursor solution. Structural and magnetic properties of the calcined ferrite were studied using x-ray diffraction (XRD) and vibrating sample magnetometer (VSM), respectively. 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 augur well for magnetic device applications. An attempt to optimize glass percentage and sintering temperature has been carried out so as to achieve highly dense NiCoZn ferrite suitable for use in LTCC process. The ferrite material sintered with BBSZ glass shows relatively good sintered density and electrical properties, thus emphasizes use in LTCC based magnetic devices for high performance applications viz. fabrication of embedded inductors operating at RF frequencies

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

PP-99

Biogenic Synthesis of Zero Valent Iron Nanoparticles Using Banana Peel Extract and Evaluation of the Smart Nanomaterial for its Antimicrobial Potency

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Abstract

Nanotechnology and its development has enforced most of the research studies over there. Recently, the research development is shifting towards more and more eco-friendly approaches. The green synthesis method of nanoparticles involves use of certain biological extracts for the nanomaterial synthesis, which will ensure minimal cost and chemical hazards. The present research work deals with a novel method for synthesis of zero valent iron nanoparticles using the banana peel extract and evaluation of antibacterial ability of the synthesized nanoparticles. Most stable nanoparticles were synthesised with equal volume of the aqueous extract in the precursor solution ($FeSO_4$) of concentration, 3 mM. The synthesis of nanoparticles was confirmed by observing change in colour of reaction mixture from brown to black. UV-visible spectrophotometer shows absorbance peak in the range of 435-456nm. The particles showed efficient inhibition of about 68.18% and 52% for *Bacillus cereus* and *Staphylococcus aureus*, while 80.95% and 60.86% inhibition for *Escherichia coli* and *Klebsiella pneumoniae* respectively. The synthesized nanoparticles were further being characterised by using XRD, FTIR, EDX and SEM techniques. The current study could provide a very cost effective and eco-friendly scheme which can be employed as an effective alternative for large scale production of zero valent iron nanoparticles with antimicrobial potential.

Keywords: Zero valent iron nanoparticles, Banana peel, Green synthesis, antibacterial activity

PP-100

Facile Synthesis and Characterization of CdO-ZnO Nanocomposite for Gas Sensor

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Abstract

The CdO-ZnO composite films have been deposited by simple chemical bath deposition (CBD) method. In synthesis of composite thin films, 0.1 M $CdCl_2$ and 0.1 M $ZnCl_2$ were used as sources of cadmium and zinc ions respectively. Liquor Triethanol amine was added as complexing agent in precursor solution and supersaturated by sodium Chloride solution. Initially synthesized well deposited films were characterized by spectroscopic techniques. The XRD patterns of composite samples revealed distinct peaks of ZnO and CdO, which clearly indicates formation of CdO–ZnO nanocomposites in thin film. SEM micrographs of ZnO film shows nanoflaks like morphology while that of CdO shows porous structure like morphology. CdO-ZnO sample shows porous web network like morphology which grown over complete glass substrate Elemental compositions of the all deposited films have been confirmed by EDAX. The gas sensing behaviour of the pure and composite sensor was systematically investigated for Ethanol gas under optimum operating temperature of 275˚C at 24 ppm ethanol gas concentration. The CdO–ZnO sensor showed maximum response of 29.11% among other pure test gases. The CdO–

ZnO composite sensor showed better response than pure ZnO and CdO sensor, which is attributed n–n heterojunction at intergrain boundaries.

PP-101

Synthesis and Characterization of Dip Coated TiO2 Thin Films for Ultraviolet Photodetector Application

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Abstract

A simple, cost effective, environment friendly dip coating method was employed to prepare TiO_2 thin films. For the deposition, titanium tetraisopropoxide, propanol, ethanol were used. Substrates were allowed to dip and dry for 5 minutes. The deposited films were annealed at 450˚C to improve its crystallinity. The prepared films were characterized for various characterization techniques to study structural, morphological and optical properties by the techniques such as XRD, SEM etc. The polycrystalline nature and anatase crystal structure of the samples is confirmed by X-ray diffraction analysis. The synthesized films show good absorption in ultraviolet region of the electromagnetic spectrum. The deposited films are further used to study UV photodetector properties.

Keywords: Titanium dioxide, dip coating, XRD, UV photodetector etc

PP-102

Photoelectrochemical (PEC) Investigation of Ga Doped MoBi2Se5 Thin Films Deposited by Arrested Precipitation Technique

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Abstract

Nanocrystalline Ga doped molybdenum bismuth selenide thin films have been deposited onto amorphous and fluorine-doped tin oxide (FTO) coated glass substrate using Arrested Precipitation Technique (APT) which is based on self-organized growth process. As deposited thin films of $Mo_xBi_{(2-x)}Ga_xSe_5$ were characterized by X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Transmission Electron Microscopy (TEM) and X-ray Photoelectron Spectroscopy (XPS). XRD analysis shows mixed phase type crystal structure of $MoBi_{(2-x)}Ga_xSe_5$ thin films. SEM analysis shows closely packed grains provide a pinhole free morphology.The average surface roughness of as deposited $MoBi_{(2-x)}Ga_xSe_5$ (x=0.0, 0.04 and 0.10) thin films obtained from AFM images is 5.04 nm/μm^2. In TEM analysis lattice plane (015), (103) and (103) are observed in SAED pattern confirms mixed phase type crystal structure of $MoBi_{(2-x)}Ga_xSe_5$ thin films. The binding energy, elemental composition and surface nature of $MoBi_{(2-x)}Ga_xSe_5$ thin film is confirmed by using XPS. The photoelectrochemical (PEC) investigations were carried out using cell configuration p-$Mo_xBi_{(2-x)}Ga_xSe_5$(FTO)/ 0.5 M (Na_2S_x- NaOH-S)/ Counter electrode. After Ga doping $MoBi_2Se_5$ thin film electrodes exhibit photo-activity in sulphide/polysulphide electrolyte towards positive polarity (p-type behaviour). The Ga doped $MoBi_2Se_5$ thin film material shows low power conversion

efficiency (η) 0.086%. On addition of gallium power conversion efficiency of $Mo_xBi_{(2-x)}Ga_xSe_5$ thin films improved upto 0.171%.

Keywords: Photoelectrochemical, Ga doped $MoBi_2Se_5$, Thin film, Arrested precipitation technique, Solar cell.

PP-103

A Facile Method for Preparation of Superhydrophobic Silica particles/PMMA Nanocomposite Coating

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Abstract

The surface of Lotus leaf, which have amazing characteristic such as high water repellent and very low sliding angle. The presence of hierarchical structure and low surface energy material reduce contact area between solid surface and water drop. In this work, similar surface structure formed by silica particles/Polymethylmethacrylate (PMMA) nanocomposite coating on glass slide. The surface structure controlled by varying concentration of PMMA in nanocomposite. At optimum concentration coating exhibit the water contact angle 155 ± 3° with rolling angle 7°. The surface structure and chemical composition studied using Scanning electron microscope and Fourier transform infrared spectroscopy. The coating showed good stability for water jet impact test. This antiwetting coating has a tremendous application industrial scale.

Keywords: Superhydrophobic, silica particles, nanocomposite and antiwetting.

PP-104

Overview of Applications of Superhydrophobic Surfaces

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Abstract

Superhydrophobic surfaces have unique properties against water droplets. These unique properties have different applications in various fields including oil-water separation, corrosion resistance, self-cleaning, anti-icing, antibacterial, etc. Removing oil contaminants from water was always challenging and expensive, but this problem is overcome by using superhydrophobic material coated sponges, mesh, filter paper, fabric etc. Steel, aluminium and magnesium are important engineering materials. Their applications are limited due to inadequate corrosion resistance. Superhydrophobic surfaces have received increasing attention as a promising solution to corrosion of metallic materials. Every year ice storms harm the equipment such as electrical transmission equipment, communication systems, aerospace facilities, highways, etc. The preventing of surface from ice development by superhydrophobicity phenomena could be practical in most cases without requiring special requirements and devices. Antibacterial properties are essential in biosensors, implants, food packaging, and industrial and marine equipment. If cotton fabricated with silver nanoparticles and then modified by the hexadecyltrimethoxysilane to get superhydrophobicity. The silver modified cotton surfaces kill all the bacteria under and around them.

Keywords: Superhydrophobic coating, Sponges, Separation of oil-water.

PP-105

Synthesis of Zno Nanoparticles using Plant Extract for their Antimicrobial Activity Applications

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Abstract

Oxide Nanomaterials plays a very important role in many areas of alchemy, physics, and material science. There are a variety of metal oxide nanostructures, ranging from nanoparticles, nanowires, nanotubes etc. which demonstrated great applications in many areas**.** In this paper we focused on ZnO Nanomaterials because it has wide-band gap. Plants have been used in the synthesis of metallic nanoparticles because they are more eco-friendly. These plant extracts also allow a controlled synthesis. Organic chemical solvents are toxic and require extreme conditions during nanoparticle synthesis. Plant extracts function as stabilizing, capping or hydrolytic agents. The ZnO nanoparticles are of significant interest as they provide many practical applications worldwide. Zinc oxide nanoparticles are a semiconductor material due to its application on solar cells, ceramics, catalysts, cosmetic, gas sensors. The most important application of ZnO nanoparticles would be as antibacterial agents. The increases surface area and smaller size of these particles make them an ideal antibacterial agent. In this review, the overview of green synthesis of ZnO nanoparticles along with their antimicrobial activity is studied. The green synthesis of ZnO nanoparticles from *Azadirachta indica* Juss., *Aloe vera* (L.) Burm., *Murraya koenigii* (L.) Jack and *Anisochilus carnosus* (L.f.) Wall. Were also highlighted.

Key words: - ZnO nanoparticles, semiconductor, antibacterial agent, hydrolytic agents.

PP-106

Investigation of Structural and Optical Properties of Transition Metals doped ZnO Thin Films Prepared by Chemical Spray Pyrolysis Method

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Abstract

In this work, transition metal (Ni and Mn) doped zinc oxide (ZnO) thin films are prepared onto glass substrates by using the chemical spry pyrolysis method. The effect of transition metal substitution on the structural and optical properties of prepared ZnO films investigated. X-ray diffraction patterns show that all the films have polycrystalline in nature with (002) preferred orientation. The lattice constants for pure ZnO was calculated from the most prominent peaks and found to be a=3.2448 and c =5.2045. As compared to pure ZnO film the lattice constant were increases with doping of transition metals in ZnO. The average crystalline size values of the films were calculated in the range of 19 to 35 nm. The optical properties of the pure and transition metal doped ZnO films were studied using UV-Visible absorption spectroscopy. Absorption edge of the films show a small shift depending on the dopant elements. Optical transmittance of the films is recorded in the wavelength range of 300 – 900 nm, and the optical band gap of the films is determined. Decrease in optical band gap is observed with the doping of transition metal.

Keywords: ZnO Thin films, Chemical spray pyrolysis, Transition metals doping.

PP-107

Effect of Copper Doping on Structural, Optical and Electrical Properties of ZnO Thin Films

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Abstract

Undoped and Cu-Doped ZnO thin film have been deposited onto the glass substrate at constant temperature 400℃ by spray pyrolysis technique. Structural properties of deposited film were investigated by using X-ray diffraction techniques. X-ray diffraction patterns confirm that film have hexagonal wurtzite structure for Cu doped ZnO nanoparticles. Lattice parameter 'a' and 'c' were calculated by using X-ray diffraction data and it is observed that the lattice parameter decreases with increasing Cu-doping into ZnO. In addition we also calculated, volume, distortion parameter and bond length of deposited film. The volume of unit cell decreases with increasing Cu doping, it confirms the Cu incorporation in ZnO lattice host matrix. Optical study of deposited film was carried out by using UV-visible spectrophotometer. The values of band gap were determined by tau plot. It is observed that as doping percentage of Cu increases, value of band gap decreases from 3.2013 to 3.1668 eV. Electrical properties of thin film were studied by using two probe method.

Keywards: ZnO, spray pyrolysis, structural properties, optical analysis, resistivity.

PP-108

Ultrasonic Investigation of Drug Officinale Zingiber with Metal Ions as a Function of Concentration

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Abstract

In the present study, the molecular association between (metal ions) $ZnCl_2$ and extracted form of drug *Officinale Zingiber* have been investigated by ultrasonic investigation. The density (ρ), ultrasonic velocity (U), and viscosity (η) of an ethanolic extract of drug with metal ions of different concentration (number of moles of drug = 0.7009, 1.4018, 2.1027, 2.8036, and 3.5045) at 2 MHz have been measured through ultrasonic interferometer. From experimental parameters various acoustic parameters such as adiabatic compressibility (β), intermolecular free length (L_f), specific acoustic impedance (Z) has been calculated. This study proves the molecular association is present in liquid mixture system and such study is helpful for pharmacological applications of drugs, transport of drugs across biological membranes.

Keywords: Ultrasonic investigation; adiabatic compressibility; molecular association; complex formation.

PP-109

Doping Effect of Co on the Structural, Optical, Electrical and Dielectric Properties of Zno Thin Films Prepared by Spray Pyrolysis Deposition

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Abstract

ZnO and cobalt (Co) doped ZnO thin films were synthesized from the precursors $Zn(CH_3COO)_2.2H_2O$ and $Co(CH_3COO)2.H_2O$ by using a spray pyrolysis deposition technique at 400^{oC} substrate temperature containing 0, 2, 6 and 10 % Co concentrations. The structural and optical properties of the as-deposited ZnO films have been investigated as a function of Co doping level. The XRD results showed that all films hexagonal structure with perfect orientation along (100), (002), (101), and (110) crystal planes. The crystallite size was calculated using Scherrer's formula and it is found that the undoped ZnO sample has maximum crystallite size**.** The absorbance and transmittance spectra have been recorded in the wavelength range of 200-800 nm in order to study the optical properties. The optical transmission spectra have shown that both pure and doped ZnO films were also transparent in UV-Vis. The energy band gap of 0% Co is about 3.20 eV and decrease to 2.88 eV after 10% doping. The dielectric constants and loss tangents increases with increasing Co content. The dielectric constants value has decreases with increasing frequency for all prepared thin films. The electrical resistivity of thin films increased from$1.063X10^{-2}$ Ω.m to $7.286X10^{-2}$ Ω.m with Co doping is increased. Co doped ZnO thin films may be used in opto-electronics devices of the electrical conductivity decreased while dielectric constant increased with Co concentration.

Keywords: ZnO thin films, Co doping, optical properties, strain, dielectric constant; conductivity.

PP-110

Spray Deposited Bi2WO6 Thin Films for Photocatalytic Application

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Abstract

The Bi_2WO_6 thin films are synthesized by simple and cost-effective chemical spray pyrolysis technique. The effect of substrate temperature on Bi_2WO_6 thin films have been studied. The crystalline study confirmed that Bi_2WO_6 films exhibits orthorhombic crystal structure with $P_{21}ab$ space group. The optical study suggested that the bang gap energy is affected by deposition temperature. The PEC, morphological and photocatalytic properties will be studied for photodegradation of various organic pollutants under solar irradiation.

Keywords: Bi_2WO_6 thin film photocatalyst; Structural and optical properties

PP-111

Superhydrophobic Nanocomposite Coatings of Hydrophobic Silica Nanoparticles and Poly (Methyl Methacrylate) with Notable Self-Cleaning Property

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Abstract

The present paper describes a facile and inexpensive dip coating method for preparation of hierarchical micro and nanostructured superhydrophobic surface. The hydrophobic silica nanoparticles were synthesized via sol-gel technique. The superhydrophobicity were controlled by adjusting concentration of silica nanoparticles in nanocomposite that contained silica nanoparticles and poly (methyl methacrylate) (PMMA). The optimum result exhibit water contact angle 158 ± 3° and sliding 4°. The scanning electron microscopy (SEM) images of coatings revealed hierarchical rough structure formed on glass slide which enable to entrap air pockets. The prepared superhydrophobic coating showed high-impact water jetting and water drop impacting stability with notable self-cleaning performance. The mechanical stability of coating were studied using finger-wiping, sandpaper abrasion and adhesive tape peeling test. Highly anti-wetting and self-cleaning coating possible to be applied in various practical application.

Keywords: hydrophobic silica nanoparticles, superhydrophobic, nanocomposite and self-cleaning.