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

Shikshanmaharshi Dr. Bapuji Salunkhe Birth Centenary

& Golden Jubilee Year of the College (2018-19)

Third International Conference on Advances in Materials Science (ICAMS- 2018)

27th – 29th December 2018

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	Mr. R. S. Sutar	Dr. V. S. Dhekale
Convenor	Co-Convenor	Secretary	Principal

Shikshanmaharshi Dr. Bapuji Salunkhe Birth Centenary

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 M.A.	Prin. Miss Shubhangi M. Gawade M.Sc.B.Ed.
Promoter-Founder B.A.B.T.D. Lit	President Minister for, Revenue, Relief and Rehabilitation, Public Works	Chairman	Secretary

Ref. No.: Date : 24-12-2018

On the occasion of Birth Centenary of Shikshanmaharshi Dr. Bapuji Salunkhe and Golden Jubilee Year of the College (2018-19), the Post-Graduate Department of Physics, Raje Ramrao Mahavidyalaya, Jath has organized the Third International Conference on Advances in Materials Science (ICAMS-2018) during 27 – 29 December 2018. 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 five scientists from Qatar and three researchers from Nepal, Guinea Conakry, Gambia have agreed to participate and share their ideas in the conference. It is also a historic event that the college like Jath is going to have an International MoU with Henan University, China. The college already have an International MoU with Tokyo University of Science, Japan. It is a matter of pride to the college as well as Shri Swami Vivekanand Shikshan Sanstha, Kolhapur. I am sure that the theme of conference will provide 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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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 : 25-12-2018

I am very happy to know that the Post-Graduate Department of Physics, Raje Ramrao Mahavidyalaya, Jath has organized the Third International Conference on Advances in Materials Science (ICAMS-2018) during 27-29 December 2018. I appreciate the endeavor of the college to shoulder the responsibility of organizing an International Conference on the occasion of Shikshanmaharshi Dr. Bapuji Salunkhe Birth Centenary and Golden Jubilee Year of the College (2018-19). The presence of five scientists from Qatar and three researchers from Nepal, Guinea Conakry, Gambia is an excellent opportunity to the delegates participating in this International Conference. I feel proud that during the conference, college is signing its second International MoU with Henan University, China, after Tokyo University of Science, Japan in 2016. It is really an honor to the college and Shri Swami Vivekanand Shikshan Sanstha, Kolhapur.

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 Vice-Chancellor, Shivaji University, Kolhapur

Prof. (Dr.) Devanand B. Shinde

प्रा. (डॉ.) देवानंद बी. शिंदे
एम.एस्सी., पीएच्.डी.
कुलगुरू

Prof. (Dr.) Devanand B. Shinde
M.Sc.,Ph.D.
Vice-Chancellor

Estd :1962
NAAC 'A' Grade

शिवाजी विद्यापीठ,
विद्यानगर, कोल्हापूर - ४१६ ००४.
SHIVAJI UNIVERSITY,
Vidyanagar, Kolhapur - 416 004.

दूरध्वनी : कार्यालय - (०२३१) २६०९०६०
निवास - (०२३१) २६०९०५३
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MESSAGE

I am very happy to know that Post – Graduate Department of Physics, Raje Ramrao College, Jath, Dist. Sangli is organizing the Third International Conference on Advances in Materials Science (ICAMS-2018) during 27-29 December 2018. I am also happy to know that the research papers on the theme of the conference will be published in the Macromolecular Symposia (Wiley Publication). It is a pride moment that the College is signing its second International MoU with Henan University, China during the Conference.

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

I wish the International Conference a grant success.

24 DEC 2018

(Devanand Shinde)
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

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

Estd : June 1969

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"

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 : 23-12-2018

It is a matter of great pride that the Post-Graduate Department of Physics of our college has organized an Third International Conference on Advance in Materials Science (ICAMS-2018) during 27-29 December 2018. This is consecutive third 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 conference.

Dr. V. S. Dhekale
I/C Principal,
Raje Ramrao Mahavidyalya, Jath

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: 21st December 2018

Dear Convener,
ICAMS – 2018

I am very glad to receive a news of organization of Third International Conference on Advances in Materials Science (ICAMS-2018) by Post-Graduate Department of Physics, Raje Ramrao College, Jath during 27-29 December 2018. I am also happy that Raje Ramrao College is signing an International MoU with our institute Henan University, China in the conference. This will strengthen the research collaboration between two institutes.

For consecutive three 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-2018 will encourage these activities in the best possible manner.

Grand success to ICAMS-2018.

Sincerely yours,

Prof. Shanhu Liu
December 21st 2018

From the Desk of Convenor, ICAMS - 2018

Dr. Sanjay S. Latthe

It is matter of great pleasure to welcome and thank you all for gathering in Third International Conference on Advances in Materials Science (ICAMS-2018) 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 (Qatar, Nepal, The Gambia and Guinea Conakry) are participating in ICAMS-2018. 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.

During my visit to Henan University, China as a visiting professor, Prof. Shanhu Liu agreed to sign an International MoU between Henan University, China and Raje Ramrao College, Jath, India. The MoU will be signed during opening ceremony of ICAMS-2018. 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 only quality works as part of the conference. The conference received 95 abstracts and 41 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. Shrikant R. Kokare, Former Head, Department of Physics and currently Director, Board of Examination and Evaluation, Solapur University, Solapur. Both of them gave me full liberty to carry out the things smoothly.

Once again welcome to ICAMS-2018.

From the Desk of Co – Convenor, ICAMS - 2018

Dr. A. K. Bhosale

Heartily welcome to ICAMS-2018. Post-Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli has organized the Third International Conference on Advances in Materials Science (ICAMS-2018) during 27-29 December 2018. 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 and Second International Conference on Advances in Materials Science (ICAMS-2016 and ICAMS-2017) were successfully organized by the Post-Graduate Department of Physics, Raje Ramrao College, Jath in December 2016 and 2017. In ICAMS-2016, 06 Japanese researchers were participated, whereas in ICAMS-2017, 09 Japanese presented their research work. ICAMS-2018 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-2018 will include keynote and invited talks, contributed oral & poster presentations. ICAMS-2018 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-2018.

From the Desk of Secretary, ICAMS - 2018

Mr. Rajaram S. Sutar

After the grand success of First and Second International Conference on Advances in Materials Science (ICAMS-2016 and ICAMS-2017) we welcome you back for the Third International Conference on Advances in Materials Science (ICAMS – 2018) organized by Post-Graduate Department of Physics, Raje Ramrao College, Jath, Dist: Sangli, Maharashtra, India. It is also a pride moment that after its First International MoU with Tokyo University of Science, Japan in 2016, Raje Ramrao College, Jath is signing its Second International MoU with Henan University, China in this conference.

ICAMS-2018 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 Qatar, Nepal, The Gambia, Guinea Conakry and different parts of India will be gathering in ICAMS – 2018. 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-2018 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-2018

Day and Date	Time	Programme
Thursday, 27th December 2018	03.00 – 05.30	Registration
Friday, 28th December 2018	09.30 – 11.30	Welcome, Registration and Breakfast
	11.30 – 12.00	Inauguration (Main Hall)
	12.00 – 12.45	**Key Note Address** *Resource Person:* ***Prof. Aboubakr M. Abdullah*** Topic: Highly Robust Superhydrophobic Poly(vinylidene fluoride-co-hexafluoropropylene) / Carbon Nanotubes Nanocomposite Coating for Aluminum Center of Advanced Materials, Qatar University, P. O. Box 2713, Doha, **Qatar.**
	12.45 – 01.30	Lunch
		Main Hall
	01.30 – 02.00	Technical Session I *Resource Person:* ***Prof. Babasaheb R. Sankapal*** Topic: Solution Processsed Device Grade Colorful Solar Cells and Flexible Solid-state Supercapacitor Nano Materials & Device Laboratory, Dept. of Physics, Visvesvaraya National Institute of Technology, Nagpur, Maharashtra, India.

	02.00 – 02.30	*Resource Person:* ***Prof. Suresh W. Gosavi*** Topic: Development of continuous hydrogen evolution system by water splitting under sunlight using highly conductive N-doped TiO_2 nanofibers Head, Department of Physics, Savitribai Phule Pune University, Pune 411 007, Maharashtra, India.
	02.30 – 03.30	Oral presentation Session – I (OP – 1 to OP – 6) in Main Hall Oral presentation Session – II (OP – 7 to OP – 12) in Hall 2
	03.30 – 03.45	Tea
		Main Hall
	03.45 – 04.15	Technical Session II *Resource Person:****Dr. Sushilkumar A. Jadhav*** Topic: Thermoresponsive Polymer-coated Hybrid Magnetic Mesoporous Silica Nanoparticles as Smart Pharmaceutical Nanocarriers Department of Chemistry & NIS Centre, University of Torino, 10125 Torino, Italy & School of Nanoscience & Technology, Shivaji University, Kolhapur, Maharashtra, India.
	04.15 – 04.45	*Resource Person:* ***Dr. Sagar D. Delekar*** Topic: Functional Hybrids for Solar Energy Harvesting and Biomedical Applications Department of Chemistry, Shivaji University, Kolhapur - 416 004, Maharashtra, India.
	04.45 – 05.45	Oral presentation Session – III (OP – 13 to OP – 18) in Main Hall Oral presentation Session – IV (OP – 19 to OP – 24) in Hall 2
	06.00 – 07.00	Poster Presentation Session (PA – 01 to PA – 50)
	07.15 – 08.30	Cultural
	08.30 onwards	Dinner

Saturday, 29th December 2018	08.00 – 08.30	Breakfast
	Main Hall	
	08.30 – 09.00	Technical Session III *Resource Person:* ***Dr. Rahul C. Kambale*** Topic: Recent Development to Improve the Piezoelectric Properties of BaTiO3 based Lead-free Electroceramics Department of Physics, Savitribai Phule Pune University, Pune 411 007, Maharashtra, India.
	09.00 – 09.30	*Resource Person:* ***Dr. Gajanan S. Ghodake*** Topic: Temperature Dependent Synthesis of Tryptophan-functionalized Gold Nanoparticles and their Application in Imaging and Sensing Department of Biological & Environmental Science, College of Life Science & Biotechnology, Dongguk University, Seoul, South Korea.
	09.30 – 10.30	Oral presentation Session – V (OP – 25 to OP – 32) in Main Hall Oral presentation Session – V (OP – 33 to OP – 40) Hall 2
	10.30 – 10.45	Tea
	Main Hall	
	10.45 – 11.15	Technical Session IV *Resource Person:* ***Dr. Sandeep A. Waghuley*** Topic: Effect of Nanoparticles Concentration on Thermal Conductivity of Ceramic-water based Nanofluids Department of Physics, Sant Gadge Baba Amravati University, Amravati - 444 602, Maharashtra, India.
	11.15 – 11.45	*Resource Person:* ***Dr. Shriniwas B. Kulkarni*** Topic: Multiferroic Materials: Magnetoelectric (ME) and Magnetodielectric (MD) Materials Physics Department, The Institute of Science, 15, Madam Cama Road, Mumbai - 400 032, Maharashtra, India.
	12.00 – 01.00	Valedictory
	01.00 onwards	Lunch

Technical Session of ICAMS-2018

Invited Talk (IT – 01 to IT – 08)

Sr. No.	Title of Paper	Author(s)	Paper Code	Page number
1	Highly robust superhydrophobic poly(vinylidene fluoride-co-hexafluoropropylene) / carbon nanotubes nanocomposite coating for aluminum	Ahmed Bahgat Radwan, Aboubakr M. Abdullah and Nasser M. Elbasiony	Key Note Talk	23
2	Solution Processsed Device Grade Colorful Solar Cells And Flexible Solid-State Supercapacitor	Babasaheb R. Sankapal	IT – 1	24
3	Development of continuous hydrogen evolution system by water splitting under sunlight using highly conductive N-doped TiO_2 nanofibers	Suresh W. Gosavi, Ashif H. Tamboli, Madhushree Bute-Kant, Norihiro Suzuki, Chiaki Terashima, Akira Fujishima	IT – 2	25
4	Thermoresponsive polymer-coated hybrid magnetic mesoporous silica nanoparticles as smart pharmaceutical nanocarriers	Sushilkumar A. Jadhav, Marcos E. Peralta, Giuliana Magnacca, Dominique Scalarone, Daniel O. Mártire, María E. Parolo, Luciano Carlos	IT – 3	26
5	Functional Hybrids for Solar Energy Harvesting and Biomedical Applications	Sagar D. Delekar	IT – 4	28
6	Recent development to improve the piezoelectric properties of $BaTiO_3$ based lead-free electroceramics	Rahul C. Kambale	IT – 5	30
7	Temperature dependent synthesis of tryptophan-functionalized gold nanoparticles and their application in imaging and sensing	Dae-Young Kim, Surendra Shinde, Jung-Suk Sung, Min Kim, Rijuta Saratale, Gajanan S. Ghodake	IT – 6	32
8	Effect of nanoparticles concentration on thermal conductivity of ceramic-water based nanofluids	S. A. Waghuley	IT – 7	34
9	Multiferroic Materials: Magnetoelectric (ME) and Magnetodielectric (MD) Materials	S. B. Kulkarni	IT – 8	35

Oral Presentation (OP – 01 to OP – 40)

Sr. No.	Title of Paper	Author(s)	Paper Code	Page number
1	Thermal Study of PMMA-$LiNO_3$Electrolyte	More Amit Arvind Sunita and B. Sundaresan	OP – 1	37
2	AC Impedance Study of PMMA-$LiNO_3$ Electrolyte	Anita Bhimrao Patil and B. Sundaresan	OP – 2	38
3	Chemically Synthesized Nanospheres of α-Fe_3O_4 Electrodes for Energy Storage Application	Anuja A. Yadav, Yuvraj M. Hunge, and Shrinivas B. Kulkarni	OP – 3	39
4	Photoelectrochemical Performance of Solution Processed CdS Nanowires	Avinash C. Mendhe, Sutripto Majumder, and Babasaheb R. Sankapal	OP – 4	40
5	Synthesis and Characterization of Soluble Poly(amide-azomethine)s Containing Tetraphenyl Thiophene Moiety, Methylene Spacer	A. S. Patil, and N. N. Maldar	OP – 5	41
6	Activated Carbon Grafted Hydrothermally Synthesized CuO Thin Films for Electrochemical Measurements	A. M. Teli, T. D. Tibile, S. A. Beknalkar, T. S. Bhat, S. D. Korade, S. B. Sadale, P. S. Patil	OP – 6	43
7	Effect of Cu Doping on Structural and Optical properties of ZnO Nanoparticles Using Sol-gel Method	Deepak A. Kumbhar, Sarita Kumbhar, Govind D. Salunke, Rekha Nalawade, and Avinash Nalawade	OP – 7	44
8	Crystal Growth as a Thermodynamic Process: Estimation of the Growth Rate of InSb based Bulk Crystals in VDS	Dilip Maske, Manisha Deshpande, and Dattatray Gadkari	OP – 8	45
9	In-situ Deposited Polyaniline films are Excellent NH_3 sensor Over Drop Casted Polyaniline Sensor Films	D. K. Bandgar, Y. H. Navale, S. M. Ingole, and V. B. Patil	OP – 9	46
10	Low Temperature Synthesis and Characterization of Nanocrystalline TiO_2 Thin Films	Dadaso B. Shinde, Popatrao N. Bhosale, and Raghunath K. Mane	OP – 10	47
11	Study of Aggregation Behaviour of Cationic Gemini Surfactants in the Presence of 1-Alkyl-3-Methylimidazolium Bromide Ionic Liquids in Aqueous Solution	U. U. More and N. I. Malek	OP – 11	48

12	Study of Rayleigh to Compton Scattering Ratio and Effective Atomic Number as a Function of Photon Energy and Scattering Angle	Manjunath A., Mahalesh D., Balaji B., B. R. Kerur, and Pushpanjali G. M.	OP – 12	49
13	Studies on Dielectric Properties of ADP Crystals	Bharati B., Mahalesh Devendrappa, Pushpanjali G. M., and Basavaraja Sannakki	OP – 13	50
14	Supercapacitive Performance of Electrodeposited Cobalt Oxide Electrode	I. A. Dhole, M. M. Tonape, U. T. Pawar, S. S. Gavande, S. G. Pawar, and V. B. Patil	OP – 14	51
15	Zn Doped Hydroxyapatite Bioceramics, Synthesis and its Characterization for in Vitro Biocompatibility	S. R. Kulal	OP – 15	52
16	Deposition and Characterizations of Graphene: Electrophoresis Technique	Jasmin. S. Shaikh, N. L. Tarwal, Sambhaji. S. Pawar, Navajsharif. S. Shaikh, Pongsakorn Kanjanaboos, W. B. Choi, Pramod. S. Patil	OP – 16	53
17	Degradation of Methylene Blue using ZnO Nanoparticles by Hydrothermal Method	K. B. Gaikwad and R. T. Sapkal	OP – 17	54
18	Structural and Optical Properties of Niobium Pentaoxide Films	Kajal S. Nivangune, Niyamat I. Beedri, Habib M. Pathan	OP – 18	55
19	Curtains for EMI Shields	Madhuja Katkar	OP – 19	56
20	Study of Growth and Composition of InSbN Bulk Crystal	M. Deshpande, D. S. Maske, D. B. Gadkari	OP – 20	57
21	Preparation of Bismuth Oxide Thin Films by Spray Pyrolysis Method and its Characterizations	C. H. Jadhav, P. K. Pagare, K. K. Inamdar, and L. D. Kadam	OP – 21	58
22	Ferroelectric and Piezoelectric Properties of $(Ba_{0.97}Ca_{0.03}Ti)O_3$ Lead-Free Electroceramics	Pravin S. Kadhane, Bharat G. Baraskar, Tulshidas C. Darvade and Rahul C. Kambale	OP – 22	59
23	Compositional Facile Synthesis of Manganese Oxide Thin Films by Hydrothermal Route	P. L. Yadav, A. M. Teli, S. D. Korade, S. Bekanalkar, P. M. Kadam, L. D. Kadam, and P. S. Patil	OP – 23	60
24	Electrodeposited Iron Oxide Thin Films For New Generation Supercapacitor Application	Rahul S. Ingole, Snehal L. Kadam, Revan C. Ambare, Shrinivas B. Kulakarni, and Balakrishna J. Lokhande	OP – 24	61
25	Durable Self-cleaning Superhydrophobic Coating of	Rajaram S. Sutar, A. K. Bhosale, M. H. Karenavar	OP – 25	62

	SiO_2/Cyanoacrylate Adhesive via Facile Dip Coat Technique	and Sanjay S. Latthe		
26	Analysis of Pure Collisional Quenching of 2-Isopropylphenyl Boronic Acidusing Linear S-V Plots	Raveendra Melavanki, Kalama Sharma, S. S. Patil, Venktesh T. Muttannavar and N. R. Patil	OP – 26	63
27	Structural, Optical and Magnetic Properties of Fe_3O_4@ZnS Bifunctional Core-shell Nanostructure of Synthesised by Chemical Co-precipitation Method at Room Temperature	I. A. Shaikh and D. V. Shah	OP – 27	64
28	Photo-Luminescence Study of $Sr_3Y_{1-X}(BO_3)_3$:X Bi^{3+}	Sanjay P. Hargunani, Rajkumar P. Sonekar, Pranita patil and Shriniwas K. Omanwar	OP – 28	65
29	Fabrication of Silica/PMMA Composite basedSuperhydrophobic Coating by Drop Casting Method	Sanjay S. Latthe, Rajaram S. Sutar, A. K. Bhosale, Vishnu S. Kodag, Poonam M. Shewale, Smita Mahajan, Swati Patil, Ruimin Xing, and Shanhu Liu	OP – 29	66
30	Structural, Electrical, Magnetic and Electronic Properties of Transition Element Doped $La_{0.7}Sr_{0.3}Mn_{0.95}(TE)_{0.05}O_3$	Shankar Kekade, D. M. Phase, R. J. Choudhari, S. I. Patil	OP – 30	67
31	Arrested Precipitation Assembled Cd ($S_{0.7}$, $Se_{0.3}$) Nanostructures Thin Films for Solar Cell Performance	S. S. Jadhav, P. S. Patil, P. N. Bhosale, G. N. Mulik	OP – 31	68
32	Study of structural, optical and Dielectric properties of Pb^{2+} doped cobalt ferrite synthesized by autocombustion method	Shriyog S. Kokare, S. M. Rathod, A. B. Shinde	OP – 32	69
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Key-Note Talk

Highly Robust Superhydrophobic Poly(vinylidene fluoride-co-hexafluoropropylene) / Carbon Nanotubes Nanocomposite Coating for Aluminum

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Abstract

A highly robust superhydrophobic coating of PVDFHFP-CNTs was fabricated on aluminum surfaces within two steps using electrospinning and spray coating technique. The wettability properties of the prepared coating has been inspected, the water contact angle (WCA), before addition of CNTs is 150°±3 and the sliding angle (SA) is 2°±3, while the measured WCA and WCAH after addition of CNTs is 155°±2 and 3°±2, respectively. The wettability of the prepared coatings has been inspected also after exposure to strong UV irradiant, 1.5 W/m^2, and high temperature degree 70 °C, for 11 cycles. It was found that the measured WCA and WCAH for PVDF-co-HFP / CNTs nanocomposite 152° ± 2 and 6° ± 2 compared to 147° ± 2 and 17° ± 3 of pure PVDF-co- HFP, respectively. The morphology of the superhydrophobic coating was documented, illustrating formation of beaded fiber structure. Spectral elements of the prepared coatings were obtained using the Fourier transform infrared instrument (FTIR). The surface roughness of the fabricated super water-repellent coatings were measured using atomic force microscope (AFM). The electrochemical behavior of superhydrophobic coating was evaluated by electrochemical impedance spectroscopy (EIS) in 3.5 wt. % NaCl before and after exposure to UV radiation. The results showed a high corrosion resistance of PVDF-HFP/CNTs nanocomposite compared to the PVDF-HFP coating.

IT-1

Solution Processsed Device Grade Colorful Solar Cells and Flexible Solid-State Supercapacitor

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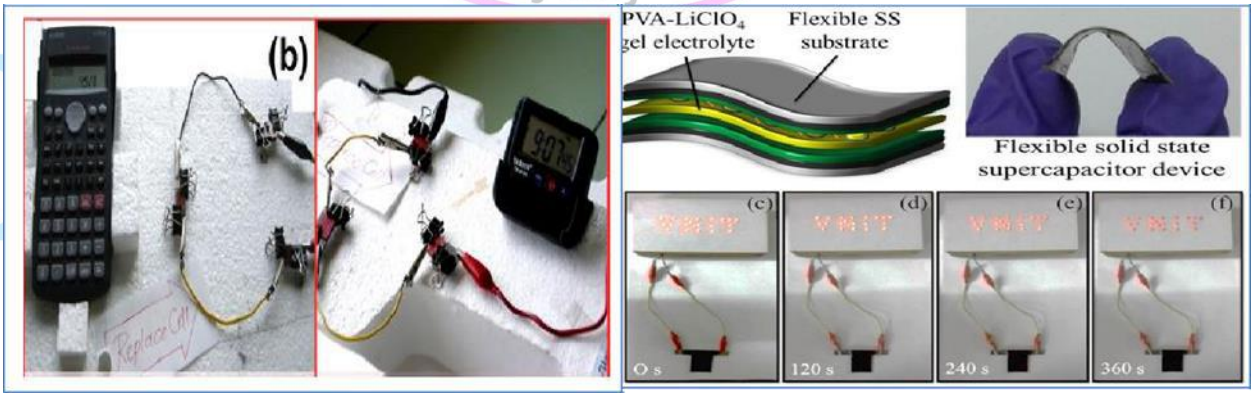
Abstract

Today's research challenge is mainly focused to clean the past environmental damage, correct the present environmental problem and prevent future environmental impacts which help to sustain the planet for future generations. In this regards, nano is playing vital role which can be used for diversed applications. The films with this complex nano structure with and high surface area can be utilized for variety of application such as energy conversion and energy storage. This can be achieved by means of dye sensitized solar cells (DSSC) and quantum dot sensitized solar cells to make colorful device grade solar cell for conversion of light to electricity whereas for energy storage by means of supercapacitor (solid-state and flexible).



IT-2

Development of Continuous Hydrogen Evolution System by Water Splitting Under Sunlight Using Highly Conductive N-Doped TiO_2 Nanofibers

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Abstract

Hydrogen is observed to be a clean energy carrier and one of the main energy sources in this decade. In this regards, their storage, distribution and controlled release are of important concerns for hydrogen based economy. In recent years, water splitting is one the mostly studied topic for hydrogen evolution and although it requires efficient catalysts to accelerate rate of water splitting. The main objective of this study is to synthesize various N-doped TiO_2 nanofibers with novel topological properties using simple and cost effective electrospinning method and their use as catalyst for hydrogen production from continuous water splitting. The prepared materials were characterized by Raman, XRD, FT-IR, TEM, EDX and FESEM techniques. Further, we demonstrate that the water splitting can be driven by TiO_2 percentage in catalyst eg.35 % TiO2 doped catalyst shows high catalytic performance with a maximum hydrogen evolution rate of µmol/h/g. Moreover, this catalyst exhibits no mass or activity loss even after 5 cycles with an obvious advantage of easy separation from the fuel solution. We strongly believe that this development offers us a cost-effective and recyclable catalytic material toward continuous hydrogen evolution through water splitting under sunlight.

IT-3

Thermoresponsive Polymer-Coated Hybrid Magnetic Mesoporous Silica Nanoparticles as Smart Pharmaceutical Nanocarriers

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Abstract

This work deals with synthesis and testing of thermoresponsive polymer coated magnetic mesoporous silica nanoparticles as smart pharmaceutical nanocarriers. The magnetic iron oxide nanoparticles were synthesized and coated with mesoporous silica shell followed by grafting with thermoresponsive copolymer of poly(*N*-isopropylacrylamide) (PNIPAM). The hybrid nanoparticles were fully characterized with various instrumental techniques. A model drug (ibuprofen) was used to test the thermosensitive drug delivery efficiency of the hybrid nanoparticles. The *in vitro* drug delivery tests were carried out at below (25°C) and above (40°C) the lower critical solution temperature (LCST) of the thermoresponsive copolymer. The drug release profiles at 25 and 40 ºC showed large difference in quantities of the drug released. This proved that the drug release can be triggered at temperatures above the LCST of the polymer.

These results clearly indicated that the thermoresponsive polymer grafted on the porous silica act as a gatekeeper through its typical *coil to globule* transition for the thermally triggered release of the drug. Thus, the hybrid thermoresponsive polymer coated magnetic mesoporous silica nanoparticles are promising smart nanocarriers for controlled and targeted delivery of therapeutic substances.

IT-4

Functional Hybrids for Solar Energy Harvesting and Biomedical Applications

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Abstract

Functional hybrids are emerging materials due to their remarkable properties and hence have been used in the various fields such as catalysis, opto-electronic devices, biomedical fields, etc. The present talk consists of two halves; first part is devoted for the use of hybrids in solar energy conversions and second part is reserved for the use of these materials in biomedical applications.

As concerned to solar energy conversions, we have designed the different strategies for modifying the nanocrystalline TiO_2 so as to form the different sensitized solar devices. A supramolecular ruthenium(II) phthalocyanine⋯peryleneimide (RuPc⋯PI) dyad has been assembled and incorporated into TiO_2-thin films so as to form nanocrystalline TiO_2⋯RuPc⋯PI solar cells (SCs) in a bottom-up fashion and upon photo-irradiation at air-mass (AM) 1.5, the dyad-based solar devices convert light to electricity more efficiently (internal efficiency = 29%, external efficiency = 2.1%) than those made of individual dyes. In next strategies, the synthesized CdS quantum dots (QDs) have connected electrostatically to the surfaces of TiO_2 nanoparticles (NPs) and thereafter, this binary hybrid heterojunction is further self-assembled physically with N719 dye to form ternary TiO_2 NPs-CdS QDs-N719 photoelectrodes. These co-sensitization devices reported the overall solar energy conversion efficiency (η) up to 2.35 %. In addition, anatase TiO_2 NPs is anchored on the surface of functionalized multi-walled carbon nanostructures (CNs=MWCNTs or RGO); which is further sensitized with Ru(II) dyes for solar energy conversions with efficiency reported up to 6.21%. Thereafter, the insertion of Cr(III) into TiO_2 host lattice and its further sensitized devices boosting the power conversion efficiency up to 7.69 %.

In antibacterial studies, TiO_2-based hybrids have been used for making the paints. Initially, we have synthesized the various doped or composites of TiO_2 and further these are tested for antibacterial activity against representative bacteria. Then, selective composites have been used

as effective antibacterial agents in paint formulations. In addition, the Serotonin biosensing is also conducted using ZnO nano-rods based composites.

IT-5

Recent Development to Improve the Piezoelectric Properties of Batio$_3$ based Lead-Free Electroceramics

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Abstract

Barium titanate, $BaTiO_3$ (BT) is the first polycrystalline ceramic ever discovered that exhibits the stable piezoelectric and dielectric properties; hence considered as a promising lead-free electroceramic having wide range of applications from dielectric capacitor to non-linear optic devices. However, $BaTiO_3$ (BT) based piezoelectric has the main issue of lower Curie temperature (T_c) ~ < 100 ^oC and lower coercive field which results in more temperature dependent properties and less polarization stability as well as difficulties in poling treatments. The present scenario of BT based electroceramics is to bring the polymorphic phase transition (PPT) i.e. Rhombohedral to orthorhombic (T_{R-O}) and Orthorhombic to Tetragonal (T_{O-T}) close to room temperature to achieve the phase coexistence at 300 K and hence shows the enhanced piezoelectric properties. For Zr^{4+}, Sn^{4+}, and Hf^{4+} substitution at Ti^{4+} site in $BaTiO_3$ increases PPT temperatures from low temperatures (0 ^oC and -90 ^oC) to room temperature. Recently, high performance BT-based ceramics such as $(Ba,Ca)(Ti,Zr)O_3$ (BCZT) and $(Ba,Ca)(Ti,Sn)O_3$ (BCST) prepared by substitution of Ca^{2+} at A-site and Zr^{4+}/Sn^{4+} at B-site showed the properties comparable to that of soft PZT materials. Furthermore, the substitution of Ca^{2+}at Ba^{2+} in $BaTiO_3$-$CaTiO_3$ system (i.e. to form $Ba_{1-x}Ca_xTiO_3$ (BCT) ceramics) results in a slight increase in the Curie temperature (T_C) and on the other hand suppresses the orthorhombic to tetragonal (T_{O-T}) transition temperature. This is one of the important considerations in developing the temperature stability of piezoelectric properties for various practical applications.

In this talk, the strategy to develop the superior quality high dense microstructure $BaTiO_3$ (BT) electroceramic material with *c/a* ~1.0144 and an average grain size ~7.8 μm is discussed. The fully saturated polarization-electric field hysteresis curves with saturation and remnant polarization, Psat.= 24.13 μC/cm^2 and Pr =10.42μC/cm^2 achieved respectively with lower

coercive field of Ec = 2.047 kV/cm. Another important observation is the peaking characteristics of the polarization current density-electric field measurement which evidences the saturation state of polarization for most of the ferroelectric materials. The BT ceramic developed possesses the "sprout" shape nature instead of typical "butterfly loop with remnant strain ~ 0.212%, converse piezoelectric constant d^*_{33} ~376.35 pm/V and electrostrictive coefficient Q_{33}~ 0.03493 m^4/C^2. To improve the piezoelectric properties of BT ceramic substitutions at A and B site of the ABO_3 perovskite structure namely by Ca^{2+} and Sn^{4+}, Zr^{4+} at Ba^{2+} and Ti^{4+} sites respectively were performed. We have designed the lead-free $Ba_{0.7}Ca_{0.3}Ti_{1-x}Sn_xO_3$ (x = 0.00, 0.025, 0.050, 0.075, and 0.1, abbreviated as BCST) system and investigated its ferroelectric, piezoelectric and electrostrictive properties. How the phase coexistence of two noncentrosymmetric lattice symmetries (Tetragonal- Orthorhombic) improves the ferroelectric and piezoelectric properties of BT based ceramics is discussed. The maximum electrostrictive coefficient (Q_{33}) value of 0.0667 m^4/C^2 was observed for x = 0.075 and it is higher than some of the significant lead based electrostrictive materials. From BCST system the compositions x = 0.05 and 0.075 showed the notable electrostrictive properties that may be useful for piezoelectric Ac device applications. Another (1-x) BCST-xBCZT ceramics with x = 0.00, 0.25, 0.50, 0.75, and 1 is designed and investigated the structural, microstructural, dielectric, ferroelectric and piezoelectric properties. In this BCST-BCZT system we observed the phase coexistence of rhombohedral-orthorhombic lattice symmetries also we are successful to push the polymorphic phase transition temperatures (PPT) close to room temperature by Ca^{2+}, Sn^{4+} and Zr^{4+} substitution for BT system. For BCST-BCZT system the composition x = 0.75 exhibits the d_{33}, d^*_{33} and Q_{33} values of 310 pC/N, 385 pm/V and 0.075 m^4/C^2 respectively which is greater than BT ceramics. Thus, the piezoelectric and ferroelectric properties of BT ceramic can significantly tune by Ca^{2+} and Sn^{4+}, Zr^{4+} substitutions useful for electromechanical device application in future.

Keywords: Lead-free piezoelectric; $BaTiO_3$; Ferroelectric; Curie temperature, Electrostrictive coefficient.

IT-6

Temperature Dependent Synthesis of Tryptophan-Functionalized Gold Nanoparticles and their Application in Imaging and Sensing

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Abstract

The growth kinetics and temporal evolution of the UV–vis spectrum of gold nanoparticles (AuNPs) by following tryptophan reduction in different temperature conditions were studied systematically. The results revealed the productivity and overall reaction mechanism were mostly determined by the temperature, which was in turn affected by the concentration of tryptophan. Two considerably different reaction pathways were observed. The first pathway occurred at ambient temperature (35 °C) and consisted of three corresponding steps: nucleation, growth, and oriented attachment. The second pathway occurred above the ambient temperature (45, 65, and 95 °C) and was responsible for the well-known nucleation–growth route. The second pathway was used to develop a facile synthetic route for the preparation of functionalized AuNPs with the size of about 20 nm. Thus, the stability and functionalization of the AuNPs were demonstrated using dilution studies, zeta potential, and FTIR measurements. The imaging of

human neuronal (SH-SY5Y) cells showed that the fluorescent signal from the tryptophan-functionalized AuNPs was significantly brighter than that from autofluorescence of the cells. The strong signal, resistance to photobleaching, excellent stability, ease of synthesis, the simplicity of functionalization, and biocompatibility make AuNPs an attractive option for imaging and biomedical applications. The functional nanoparticles with specific molecular probe appear to be a promising approach for developing colorimetric nanosensor. The colorimetric response of the AuNPs toward Mg^{2+} was noticed with naked eyes, and spectral changes were monitored by using UV-Vis spectrophotometer. The detection response was rapid (less than 1 min), with a detection limit (LOD) about 0.2 μmol L^{-1}. The proposed nanoprobe shows characteristic red-shift of the AuNPs at 620 nm and high selectivity for Mg^{2+} due to the binding affinity of the tryptophan with Mg^{2+}. The real-time response of the UV-Vis spectrum was monitored at three different concentrations of Mg^{2+} (0.45, 0.50, and 0.55 μmol L^{-1}). The AuNPs probe was suitable to provide a molecular platform for selective coordination with Mg^{2+} over Ca^{2+} ions, thus it could be facile to establish a practically viable sensing system. Furthermore, experimental results were confirmed to exhibit excellent linear curve for urine and serum samples spiked with Mg^{2+}. Thus, this nanosensor is practically useful for the detection of Mg^{2+}, without using expensive instruments, enzymes and/or DNA molecules.

Keywords: Gold nanoparticles, Green chemistry, Human neuronal cells, Imaging, Colorimetric detection, Magnesium ions.

IT-7

Effect of Nanoparticles Concentration on Thermal Conductivity of Ceramic-Water based Nanofluids

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Abstract

In most of the recent attempts regarding the enhancement of thermal conductivity is accompanied by concentration of nanoparticles shape of nanoparticles and particle size. The ceramic nanofluid mainly dominated by Al_2O_3 based nanofluid. For optimum application of nanofluid in thermal engineering, lower viscosity and high thermal conductivity are the desirable thermo-physical parameters. A mathematical model for thermal conductivity enhancement due to dispersion of nanoparticles in base fluids was firstly attempted by Maxwell for statically homogenous and spherical particles of uniform size. There are relatively few experimental reports present on ceramic nanofluids in literature of materials science.

In our research, surfactant free stable $SrAl_2O_4$-water based nanofluids were prepared by two step method. The $SrAl_2O_4$ nanoparticles were synthesized by solid state diffusion method. The influence of $SrAl_2O_4$ nanoparticles concentration (0.01-0.05 M) on thermal conductivity of nanofluid was studied in the temperature range 30-80 °C. While the viscosity and average hydrodynamic radius of suspension increases with nanoparticle concentration. The enhancement in thermal conductivity of $SrAl_2O_4$-water based ceramic nanofluids increased smoothly with nanoparticle concentration. The nearly 68% enhancement is observed in 0.05 M $SrAl_2O_4$-water based ceramic nanofluid at 80 °C.

Keywords: Thermal conductivity; $SrAl_2O_4$; Ceramic nanofluids

IT-8

Multiferroic Materials: Magnetoelectric (ME) and Magnetodielectric (MD) Materials

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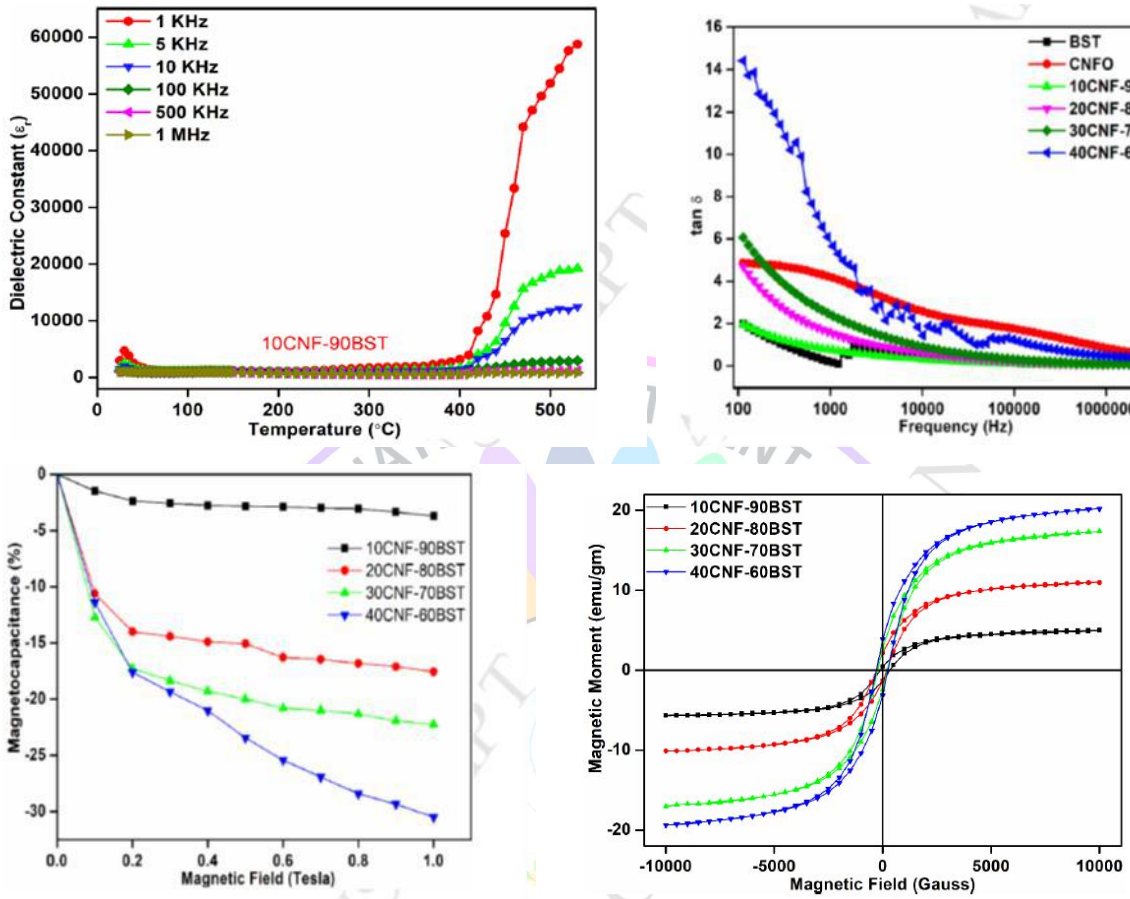
Abstract

Materials science is recognized as one of main factors driving development and economic growth. Nowadays, the magnetic and ferroelectric materials are found very important for device fabrication. Ferromagnetic materials show spontaneous magnetization when placed in the external magnetic field, are widely used in data storage industries while ferroelectric materials show spontaneous polarization under the application of the external electric field, are widely used in fabrication of sensors, and in actuation industry. Multiferroic materials are a special class of solid-state compounds, in which at least two order states such as magnetic, electric, or piezo-elastic phases coexist. The surge of interest in multiferroic materials over the past 15 years has been driven by their fascinating physical properties and huge potential for technological applications. These multiferroic material shows the magneto-electric effect which facilitates the conversion between energies stored in magnetic and electric fields.

These multiferroic materials gained much interest due to their potential applications in multifunctional devices such as magnetic field sensors, spintronics, electronic memory devices, switches, actuators, transducers, filters.

Intensive research has been carried out in composites of ferroelectric and magnetic phases since 1972. Recently, researchers have noticed the magnetodielectric effect in ferroelectric/ferromagnetic composite ceramics. This magnetic field dependence of the dielectric constant or the variation in the dielectric permittivity of a material under an applied magnetic field is known as magnetodielectric (MD)/ magnetocapacitance effect. Quantitatively MD effect is defined as MD=$\frac{|\varepsilon(H)-\varepsilon(0)|}{\varepsilon(0)}$. Multiferroic materials are considered as probable candidates for the study of MD effect.



As an example frequency dependent dielectric constant and loss tangent, variation of magnetocapacitance with applied magnetic field and magnetic moment with applied magnetic field for (1-x)($Ba_{0.8}Sr_{0.2}TiO_3$)-x($Co_{0.9}Ni_{0.1}Fe_2O_4$ multiferroic composite

In the view of above discussion, in present talk the phenomenon of multiferroic composites and heterostructures synthesized in our laboratory will be discussed and the results will be presented.

OP-1

Thermal Study of PMMA-$LiNO_3$ Electrolyte

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Abstract

Poly(methyl methacrylate),PMMA, is complexed with lithium nitrate ($LiNO_3$) and prepared as thick films by solution casting method. TG-DTA technique has been employed to study the thermal behavior of the complex and it is found to be different for PMMA and its complex with $LiNO_3$.

OP-2

AC Impedance Study of PMMA-$LiNO_3$ Electrolyte

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Abstract

Solid polymer electrolyte (SPE) films based on poly(methyl methacrylate) complexed with lithium nitrate ($LiNO_3$) has been developed by solution casting method. AC impedance Spectroscopy technique has been employed to study the ionic conductivity of the complex. Also, the effect of addition of nano Al_2O_3 particles on the ionic conductivity of the complex is studied.

OP-3

Chemically Synthesized Nanospheres of α-Fe_3O_4 Electrodes for Energy Storage Application

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Abstract

In present investigation, α-Fe_3O_4 thin films are chemically deposited on SS substrate. These films are characterized using different chacterization techniques such as, X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscope (SEM) and transmission electron microscopy (TEM). The electrochemical properties of Fe_3O_4 are measured in 1M KOH. The specific capacitance of α-Fe_3O_4 increased with increasing scan rate of deposition. The maximum specific capacitance of 756 F g^{-1} is obtained from cyclic voltammetry at a scan rate of 5 mV s^{-1}.

Keywords*:* α-Fe_3O_4; Thin film; Nanospheres -like morphology.

OP-4

Photoelectrochemical Performance of Solution Processed CdS Nanowires

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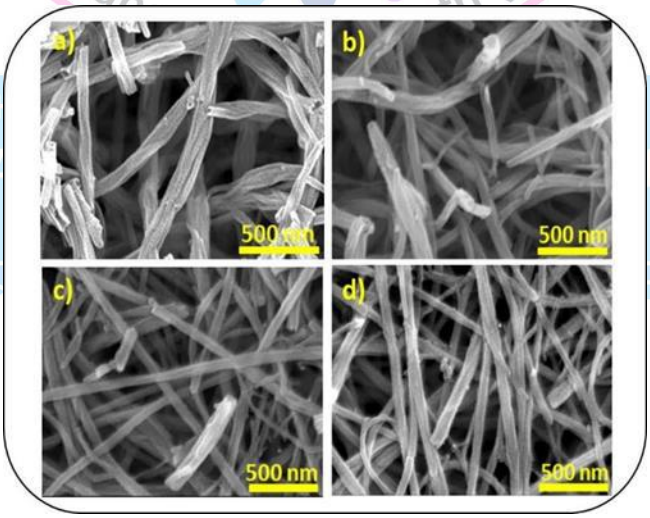
Abstract

Cadmium sulfide (CdS) nanowires were synthesized over a flat CdS thin film by using ion exchange route at room temperature (300K) based on negative free energy of formation. The effect of post annealing treatment on as-deposited CdS NW films has been investigated in the temperature range 423–523 K through the observation of nanowires alignments. The annealing effect on the fundamental properties have been studied with respect to the crystallite's sizes, micro strain, dislocation density and optical band gap of the deposited films. Additionally, the behaviour of inter and intramolecular hydroxide ion (OH) has been examined from FTIR analysis. Moreover, the effects of post annealing on photovoltaic device performance has been studied and the found results were associated with structural and optical properties.The annealed sample gives 3.6 times heightening in efficiency with respect to as deposited CdS NW due to straightening of CdS NW's.



OP-5

Synthesis and Characterization of Soluble Poly(amide-azomethine)s Containing Tetraphenyl Thiophene Moiety, Methylene Spacer

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Abstract

Aromatic poly(amide-azomethyne)s are an important class of high performance polymers having excellent thermal stability and a favorable balance of physical, chemical and mechanical properties. A novel aromatic diamine, 2,5-bis-[4”-aminobenzyl)-4’-benzamide]-3,4-diphenyl thiophene (BATP) containing bulky tetraphenyl thiophene group, methylene spacer and preformed amide linkage was synthesized and characterized by FT-IR, NMR (^{1}H, ^{13}C, DEPT ^{13}C) and Mass spectrometry. A series of novel aromatic poly(amide-azomethine)s and co-poly(amide-azomethine)s was successfully prepared by solution polycondensation of BATP with aromatic dialdehydes, namely isophthalaldehyde (IPA) and / or terephthaldehyde (TPA) in different mole % proportions. All the poly(amide-azomethine)s were obtained in very good yields and were characterized by FT-IR Spectroscopy, viscosity measurements, solubility tests, differential scanning calorimetry (DSC), thermogravimetric analysis (TGA) and X-ray diffraction (XRD). The inherent viscosities (η_{inh}) of these poly(amide-azomethine)s were in the range 0.20 - 0.35 dL/g in DMAc at 30 ± 0.1 °C; indicating moderate molecular weight buildup. The poly(amide-azomethine)s were readily soluble in aprotic polar solvents such as N-methyl-2-pyrrolidone (NMP), N,N-dimethylacetamide (DMAc), dimethyl sulphoxide (DMSO), N,N-dimethylformamide (DMF), pyridine, m-Cresol etc. which is supported by the XRD results showing that the poly(amide- azomethine)s were amorphous. The glass transition temperature (T_g) of poly(amide- azomethine)s were around 200 °C. The thermogravimetric analysis (TGA) of these polymers showed no weight loss below 335°C whereas the char yields at 900 °C were in

the range 46 to 51 % indicating high thermal stabilities of these polymers. Thus these polymers meet high temperature resistant requirements and are processable (soluble in polar aprotic solvents, Tg: 200-201 °C) so could find applications as special materials in aerospace, military and microelectronics industries. The structure–property correlation among these poly(amide-azomethine)s will be discussed.

Keywords: 2,5-Bis-[4”-aminobenzyl)-4’-benzamide]-3,4-diphenyl thiophene; soluble poly(amide- azomethine)s; thermal stability; WXRD.

OP-6

Activated Carbon Grafted Hydrothermally Synthesized CuO Thin Films for Electrochemical Measurements

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Abstract

Due to increasing energy demands, their is need of efforts for developing light weight and durable energy storage devices.In this report, we synthesized copper oxide (CuO) nanostructured thin film electrodes by a simple and rapid hydrothermal method for supercapacitor application. Nanostructures and conductivity of material plays an important role in an ion transport, short ion and electron diffusion pathways and provide more active sites for electrochemical reactions. The conductivity of the CuO sample increased by using activated carbon (AC). The CuOAC1 electrode demonstrates excellent electrochemical performance with a specific capacitance of 333.3 F/g at 20mV/s from CV curve (277 F/g at 1mA/cm^2 from GCD curve) retains over 66 % of this capacitance when operated at an high scan rate of 100 mV/s. Also, the sample demonstrates remarkable performance with an energy densityof 9.63 Wh/kg and power density of 509.8 W/kg at 1mA/cm^2 current density in 1M aq. Na_2SO_4 electrolyte. This work presents a new platform to increase coductivity of pseudocapacitive electrode material, which gives high-performance supercapacitor for future portable electronic devices.

Key words: Activated carbon; CuO thin film, Hydrothermal, Electrochemical measurements.

OP-7

Effect of Cu Doping on Structural and Optical properties of ZnO Nanoparticles Using Sol-gel Method

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Abstract

ZnO has large exciton binding energy (60 meV) and wide directband gap (3.37 eV). It is promising base materials for optoelectronicsapplications. To optimize its optical properties Cu doped ZnO is synthesized by low cost sol-gel method and analysed by X-ray diffraction (XRD), Scanning electron microscopy (SEM), UV-Visible spectroscopy. The XRDanalysis reveals that the samples are polycrystalline with hexagonal wurtzitestructure. It also indicate that there is no impurity peaks present in preparedsamples and shows the samples are in stoichiometric. SEM images of Cudoping exhibit a slight variation in grain size. In addition the absorptionspectrum of pure and Cu doped ZnO nanoparticles (NPs) are studied and Taucplots shows band gap narrowing effect on Cu doping concentration to use it as advance material in different devices.

Keywords: Cu doped ZnONPs; XRD; SEM and UV-visible.

OP-8

Crystal Growth as a Thermodynamic Process: Estimation of the Growth Rate of InSb based Bulk Crystals in VDS

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Abstract

Indium antimonide (InSb) is a narrow-gap semiconductor material obtained from the elements indium (In) and antimony (Sb). Among all the III–V binary semiconductors InSb is the most studied semiconductor because of its narrow energy band gap (0.17 eV). Considering importance of bulk semiconductors seven InSb based crystals were grown by Vertical Directional Solidification (VDS) technique. In the growth process, temperature of the constituents was raised to a temperature well above their melting point to obtain melt of InSb and the melt was solidified by cooling. Thus it becomes a thermodynamic process where the cooling rate shows effect on the material quality. One of the parameter on which the cooling rate depends is the temperature gradient at the solid-melt interface. In VDS system the temperature gradient can be controlled between 14 $Kcm^{-1}$to 24 Kcm^{-1}. Estimation of heat exchange during the growth process, using the concept of enthalpy indicate that, for the crystal growth of InSb using VDS, the growth rate must be less than 9 mm/hour when the temperature gradient is 20 Kcm^{-1}. Growth rates of the seven crystals were between 2 mm/hour to 6mm/hour. Study of microstructures and defects in the crystal indicate that, the defect density is reduced at lower growth rate.

Keywords: growth rate; defect density; enthalpy; temperature gradient; directional solidification.

OP-9

In-situ Deposited Polyaniline films are Excellent NH_3 sensor Over Drop Casted Polyaniline Sensor Films

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Abstracts

Polyaniline(PAni) films were deposited by in-situ and drop casting methods respectively. In-situ deposition of PAni was carried out at the time of chemical oxidative polymerization of PAni. Drop casted films were prepared using casting solution of PAni in m-cresol solvent. The film thickness of in-situ deposited PAnifilms was very thin in the order of 50nm as compared to the drop casted films 200µm. The prepared films were characterized by XRD, FTIR and FESEM techniques. The gas sensing properties of the films were tested at room temperature for different oxidizing and reducing gases, each having 100 ppm concentrations. Both the in-situ deposited and drop casted Polyaniline sensor film showed better response to NH_3 gas as compared to NO_2, H_2S, LPG, ethanol and methanol gases. The response curve of in-situ deposited sensor film showed26% response and faster response and recovery times of 19sec and 36sec with excellent repeatability. Response curve of drop casted PAnisensor films showed 30% response and slightly longer response and recovery times of 70sec and 371sec respectively.

Keywords: Polyanilinefilms; XRD; FTIR; FESEM; Gas sensing.

OP-10

Low Temperature Synthesis and Characterization of Nanocrystalline TiO_2 Thin Films

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Abstracts

In the present investigation, we report low temperature facile synthesis of TiO_2 nanocomposite thin films. The TiO_2 nanorods were hydrothermally deposited on transparent conducting oxide substrate at relatively low temperature. The structural, optical, morphological properties are investigated by detailed XRD, UV-Vis-NIR spectrophotometer SEM and EDX studies. Optical spectra showed strong light absorption in UV region. The XRD and EDX spectrademonstrated that the deposited thin films consist pure rutile phase tetragonal TiO_2 nanorods. The SEM images confirm uniform, compact and well aligned nanorods were grown on the overall substrate surface.

Keywords: Single crystalline, rutile phase, nanorods.

OP-11

Study of Aggregation Behaviour of Cationic Gemini Surfactants in the Presence of 1-Alkyl-3-Methylimidazolium Bromide Ionic Liquids in Aqueous Solution

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Abstract

Modifying the physicochemical properties of aqueous cationic gemini surfactant solutions comprised of normal or reverse micelles by means of external additives is of utmost importance due to the enormous potential application of surfactant-based systems. Environmentally benign ionic liquids (IL) make them suitable unusual and interesting properties for this purpose. To understand the role of IL in modifying the physicochemical properties of cationic gemini surfactant. We have investigated the effect of 1-alkyl-3-methylimidazolium bromide, [Cnmim][Br] (n = 3,4,and 6 ionic liquids on the aggregation behavior of twin tailed cationic gemini surfactants [Propyl-α,ω-bis (dodecyldimethylammonium bromide) and Propels- α,ω-bis (tetradecyldimethylammonium bromide)] (12-3-12) and (14-3-14) respectively. through conductance, surface tension, dye absorbance through UV-vis spectroscopy, fluorescence spectroscopy and dynamic light scattering (DLS) at 298.15 K. Various surface parameters were investigated through surface tension measurement. This study we compared with conventional surfactant (DTAB and TTAB) for the study of effect of conventional surfactant and chain length of gemini surfactant. *Cmc* of aqueous Gemini surfactant decreases with increase in alkyl chain length of Gemini surfactant. ILs behave as electrolyte and cosurfactants based on *c*(IL).

Keywords: Cationic gemini surfactants; Micellar properties; Ionic liquids; Fluorescence quenching; Dynamic light scattering; Aggregation number.

OP-12

Study of Rayleigh to Compton Scattering Ratio and Effective Atomic Number as a Function of Photon Energy and Scattering Angle

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Abstract

For photon energies below 1 Mev the predominant phenomenon involved are photoelectric absorption, coherent scattering (Rayleigh) and incoherent scattering (Compton). Biological samples with small thickness attenuate the transmitted beam very little and the application of transmission technique is not possible, when atomic number variations are more significant. Indeed, the Rayleigh to Compton scattering ratio enables material to be characterized only by its atomic number, independent of the material density or of the attenuation inside the tested object. Hence evaluation of the parameter "effective atomic number" is still necessary to characterize the measurement sensibility and to establish a correlation with the estimated Rayleigh to Compton scattering ratio.

Keywords: Atomic Form Factor, Compton scattering function, intensity ratio

OP-13

Studies on Dielectric Properties of ADP Crystals

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Abstract

Ammonium dihydrogen phosphate (NH_4HPO_4) is an excellent inorganic nonlinear optical material with different device applications. The present work is based on the pure ADP Crystals were successfully grown from aqueous solution by slow evaporation technique at room temperature. The grown crystals have been subjected to various characterizations like XRD, and dielectric studies. The Crystalline nature and tetragonal structure of the grown crystals having lattice parameters were observed by powder X-ray diffraction analysis .The dielectric properties such as dielectric constant and dielectric loss for the crystals at different area are studied as a function of frequency in the range 50kHz–5MHz at room temperature. It is found that the dielectric permittivity decreased exponentially at lower frequency region up to 1 kHz and then the dielectric permittivity remains constant at higher frequency region as the frequency increased. It is observed that as area of ADP crystal increases the dielectric constant increases and for area of 42 mm^2 the dielectric constant value is high among all the different areas of ADP crystals.

Keywords: DP Crystal; Dielectric properties & XRD.

OP-14

Supercapacitive Performance of Electrodeposited Cobalt Oxide Electrode

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Abstract

Metal oxide based supercapacitors have emerged as one of the most smart storage systems with exclusive characteristics with high power density and long term cycling stability. Cobalt oxide (Co_3O_4) has particularly obtained rising interest due to their natural abundance, environment friendly; cheapness and high specific capacitance. Co_3O_4 thin film electrodes were successfully deposited via a simple and easy galvanostatic electrodeposition technique on to cheap stainless steel substrate. As-deposited thin film was heated at 500ºC for its conversion to Co_3O_4. These films were characterized for XRD, SEM and CA to understand the structural, morphological and wettability properties of Co_3O_4 electrode. By using cyclic voltammetry, charge-discharge study and supercapacitive behaviour of Co_3O_4 electrode were examined. The Co_3O_4 electrode showed maximum specific capacitance of 554 F/g at 5mV/S in 1M NaOH electrolyte. The specific energy, specific power and coulombic efficiency showed 16.32 Wh/kg, 11.72 kW/kg and 94.2% respectively. The results clearly evidenced those devices based on Co_3O_4 electrodes are promising energy storage devices for microelectronic applications as well as high energy supercapacitors.

Keywords: Cobalt oxide; XRD; SEM; CV; Supercapacitor.

OP-15

Zn Doped Hydroxyapatite Bioceramics, Synthesis and its Characterization for in Vitro Biocompatibility

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Abstract

Significance of nanosized zinc doped hydroxyapatite (HAP) ceramics has been reported via sol-gel auto combustion technique. The synthesized sample was characterized by physico-chemical method. Thermal stability investigated using thermo-gravimetric and differential thermal analysis (TG-DTA). In vitro biodegradation was evaluated in simulated body fluid (SBF). These findings indicate that the Zn doped HAP ceramics possesses biodegradation behaviour and that are promising as a biomaterial.

Keywords: Biomaterials; cell viability; biocompatibility; X-ray diffraction.

OP-16

Deposition and Characterizations of Graphene: Electrophoresis Technique

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Abstract

Graphene has attracted great attention due to its unique properties, such as high electronic conductivity, good mechanical properties, high optical transparency, and high thermal conductivity. At present, several methods have been introduced for depositions of graphene, such as micromechanical cleavage, epitaxial growth on silicon carbide wafers, chemical vapor deposition (CVD) on metal layers, and electrophoretic deposition (EPD). EPD technique is widely used in industry and it is an automated and high throughput process. It provides a homogeneous and robust film on the surface of substrate. EPD has advantages such as a high deposition rate, good uniformity, controlled thickness, no need of binders, and simplicity of scaling up. In this report, we synthesized graphene films on FTO substrate by using EPD. The layer by layer deposition technique was used to deposit graphene films on anodic side FTO. Scanning electron microscopy study revealed that formation of uniform graphene flakes which covered overall surfaces of substrates. FT-Raman study confirms the formation of graphene.

Key words: Graphene; Electrophoresis; FT-Raman.

OP-17

Degradation of Methylene Blue using ZnO Nanoparticles by Hydrothermal Method

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Abstract

In order to synthesize the ZnO Nanoparticles, stock solutions of Zn (CH3COO)2 .2H2O (0.1 M) was prepared in 50ml methanol under stirring. To this stock solution 25ml of NaOH (varying from 0.2 M to 0.5 M) solution prepared in methanol was added under continuous stirring in order to get the pH value of reactants between 8 and 11. These solutions was transferred into Teflon lined sealed stainless steel autoclaves and maintained at various temperature in the range of 100 - 200oC for 6 and 12 h under autogenous pressure. It was then allowed to cool naturally to room temperature. After the reaction was complete, the resulting white solid products were washed with methanol, filtered and then dried in air in a laboratory oven at 60oC. The synthesized samples were characterized for their structure by x-ray diffraction. The XRD analysis demonstrates that the ZnO Nanoparticles have the Hexagonal wurtzite structure. From XRD analysis it is observed that the average crystallite size of the optimized sample is 34.80 nm. Optimized ZnO nanoparticles were used to degrade Methylene Blue. It was observed that MB degraded 86.98% within 1hour with rate constant 0.0007135/min.

Keywords: ZnO Thin film; Hydrothermal; MB degradation.

OP-18

Structural and Optical Properties of Niobium Pentaoxide Films

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Abstract

The present work deals with the study of structural and optical properties of niobium pentaoxide (Nb_2O_5) films. Nb_2O_5 films was prepared by using doctor blade method. The X-ray diffraction (XRD) pattern of Nb_2O_5 films confirms nanocrystalline Nb_2O_5 and crystalline size was calculated using Scherrer formula. The energy dispersive X-ray spectroscopy (EDS) confirms the presence of Nb and O, which supports the XRD result. The band gap value for Nb_2O_5 film was calculated as 3.2 eV, using diffused reflectance spectroscopy (DRS). The scanning electron microscopy (SEM) images of Nb_2O_5 films show the porous structure useful for solar cell application.

Keywords: Niobium pentaoxide; X-ray diffraction; Scanning electron microscopy; Diffused reflectance spectroscopy.

OP-19

Curtains for EMI Shields

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Abstract

Sometimes we need a solution that is more portable, less hassle, or simply has the look and feel of "normal". So upholstery products like beddings, curtains, carpets, canopies etc. can be used as electromagnetic shields.Today, everyone is exposed to an intricate mix of weak electric and magnetic fields, both at home and at work. Increase in the use of mobile phones and wireless local area networks (Wi-Fi) in recent times has increased the risk associated. Over the last few years, there has been intensifying concern about the adverse health effects from acquaintance to radiofrequency electromagnetic fields. Amandate for secure the human beings against consequences of electromagnetic signals and troublesome burdens, has been increasing.Textile based soft barriers will help mitigate the problems faced by human beings on exposure to the harmful electromagnetic radiations to a certain extent. This paper reviews various ways to develop and characterize electromagnetic shields in the form of textile fabric, specific towards curtains.

Keywords: Curtain; Electromagnetic; Shield, Textile.

OP-20

Study of Growth and Composition of InSbN Bulk Crystal

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Abstract

Three bulk ingots of InSbN with 12mm diameter were grown using vertical directional solidification process with nitrogen composition 0.1%, 0.2 % and 0.5%. The composition was studied using various methods. The EDS and secondary ion mass spectroscopy results indicated that the nitrogen was uniformly distributed throughout the crystal. The optical and electrical properties were studied. The optical and electrical properties varied with change in composition of nitrogen in Indium antimony. The bonding between nitrogen, Indium and Antimony are studied using Secondary ion mass spectroscopy and XPS.

OP-21

Preparation of Bismuth Oxide Thin Films by Spray Pyrolysis Method and its Characterizations

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Abstract

The Bi_2O_3 thin films were prepared onto glass substrates by spray pyrolysis method. The crystal structure, crystallite size and surface morphology of Bi_2O_3 thin films were investigated by X-ray diffraction (XRD) and scanning electron microscopy (SEM) techniques respectively. The X-ray diffraction pattern of Bi_2O_3 thin films show polycrystalline in nature. The SEM images show porous morphology of Bi_2O_3 thin films. The optical absorption spectra of films were examined in order to study their band gap energy. The optical study shows a direct band gap of 2.90 eV for annealed Bi_2O_3 films.

Keywords: Bi_2O_3; Spray pyrolysis; Optical properties; X-ray diffraction; Raman spectra.

OP-22

Ferroelectric and Piezoelectric Properties of $(Ba_{0.97}Ca_{0.03}Ti)O_3$ Lead-Free Electroceramics

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Abstract

Lead-free $(Ba_{0.97}Ca_{0.03}Ti)O_3$ electroceramic is synthesized by conventional solid state reaction method and investigated their dielectric, ferroelectric and piezoelectric properties. X-ray diffraction study revealthe tetragonal lattice symmetry with*P4mm*space group suggesting formation of perovskite $BaTiO_3$ – $CaTiO_3$ solid solution without any other secondary phase formation. The microstructural observation reveals the dense microstructure with an average grain size ~ 9 µm having the relative density ~ 98%. Temperature dependant dielectric measurement shows ferroelectric ($T_{(R-O)}$, $T_{(O-T)}$) to paraelectric ($T_{(T-C)}$) phase transition. The observed dielectric anomaly for Curie temperature is at T_C= 142 ^{0} C having relative permittivity ε' ~ 7822.Ferroelectric hysteresis loop confirms the ferroelectric nature of $(Ba_{0.97}Ca_{0.03}Ti)O_3$electroceramics having the values P_r ~ 4.05 µC/cm^2 and E_c ~ 2.2 kV/cm^2. The direct piezoelectric charge coefficient (d_{33}) was found to be 190 pC/N at the applied force 250 mN. Thus, with this observed modified Curie temperature, dielectric constant and piezoelectric charge coefficient values the $(Ba_{0.97}Ca_{0.03}Ti)$ O_3composition may be useful for lead-free piezoelectric device applications.

Keywords: Curie tempe Lead-free; $BaTiO_3$; rapture; piezoelectric constant.

OP-23

Compositional Facile Synthesis of Manganese Oxide Thin Films by Hydrothermal Route

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Abstract

It has been demonstrated that the morphologies of the manganese oxide thin films are effectively tuned by hydrothermal method with the composition of the metallic precursor. Highly spongy porous surface states with hydrophilic surface potentially enhance the intercalation of the carriers from the electrode to the electrolyte to enhance the electrochemical performance. However, synergistic effect of the in plane bond stretching motion of the pairs of Mn – O bond observed in Raman spectrum with the composition reduces the structural stability and hence the electrochemical performance at the higher composition. Comprehensive electrochemical study reveals low internal resistance at the intermediate composition enhances ionic diffusion and the intercalation through the spongy porous electrode lead to the superior electrochemical performance. Although, different metal oxide systems have been employed for the electrode material, in this study simple way to effectively tune the morphologies and its significant impact on the psedocapacitive properties should be demonstrated.

Keywords: Electrochemical Performance; Hydrothermal; Manganese Oxide; Pseudocapacitor.

OP-24

Electrodeposited Iron Oxide Thin Films for New Generation 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 and FE-SEM micrographs shows compact granular and porous surface morphology. Prepared electrodes shows mixed capacitive behavior, the highest specific capacitance of Iron oxide (annealed at 300 ^{o}c for 1 hr) is 408.45 F/gm at 2 mV/sec scan rate in 1 M Na_2SO_4 respectively. Charge discharge behavior exhibits specific energy 8.09 Wh/kg, specific power 7.465 kW/kg and columbic efficiency 91.00 % of the Iron oxide electrode. Impedance spectroscopy carried in 1mHz to 1MHz frequency range reveals capacitive behavior of the electrode and gives internal resistance is 2.35 ohm. From above discussion it is seen that electrochemically deposited iron oxide thin film electrode is superlative and suitable electrode for decent physical and electrochemical properties for the supercapacitor applications.

Keywords: Electrochemical Deposition,Iron Oxide; Thin Films; Supercapacitor; Porous; Electrochemical Impedance Spectroscopy; etc

OP-25

Durable Self-cleaning Superhydrophobic Coating of SiO_2/Cyanoacrylate Adhesive via Facile Dip Coat Technique

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Abstract

The hydrophobic silica nanoparticles have been widely used in fabrication of superhydrophobic surfaces. In this study, we prepared self-cleaning superhydrophobic coating using hydrophobic SiO_2 nanoparticles by facile dip coat technique. After that a layer of cyanoacrylate adhesive was applied to improve stability and durability of superhydrophobic coating. Finally the coating was annealed at 200ºC for 10 min. A water drop on prepared superhydrophobic coatingshowed contact angle ~173º and sliding angle ~1º.The prepared superhydrophobic coating revealed self-cleaning behavior for more than two years.This approch can be useful for fabrication of superhydrophobic coating for practical industrial application including solar panel, windows glass, vehicle glass and fabric and so on.

Keywords: Superhydrophobic; self-cleaning; durable; SiO_2 nanoparticles; adhesive.

OP-26

Analysis of Pure Collisional Quenching of 2-Isopropylphenyl Boronic Acidusing Linear S-V Plots

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Abstract

The Steady state studies of fluorescence quenching of excitation energy of heterocyclic compound namely 2-Isopropylphenyl boronic acid (2IPBA) by aniline was carried out in 1, 4 dioxane (DX), toluene (TL), methanol (ML), heptane (HP), nonane (NN), butanol (BL) and propanol (PL) solvents with a view to understanding the role of diffusion in the quenching mechanism. The molecule is excited directly by UV radiation of 300 nm and probabilities of quenching per encounter p were determined in all the solvents. Further the activation energy E_a of quenching were determined using the literature values of activation energy of diffusion E_d and the experimentally determined values of p. Magnitudes of p as well as the values of E_a suggests that the quenching reaction is predominantly controlled by material diffusion.

OP-27

Structural, Optical and Magnetic Properties of Fe_3O_4@ZnS Bifunctional Core-shell Nanostructure of Synthesised by Chemical Co-precipitation Method at Room Temperature

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Abstract

Bifunctional magnetic-optical Fe_3O_4@ZnS nanocomposites with core-shell structure have been synthesised by a simple co precipitation method using an aqueous route at room temperature. The Fe_3O_4 is used as core whereas ZnS as the shell material. The synthesised nanoparticles are characterised using X-ray diffraction, field effect scanning electron microscopy (FESEM) for elemental, structural and morphological analysis. The UV-VIS absorbance and photoluminescence spectroscopy is employed to study the optical properties. A vibrating sample magnetometer (VSM) confirms the superparamagnetic behaviour of the synthesised nanocomposite. The synthesised core shell structures have been shown to be strongly photoluminescent due to the ZnS shell while retaining the room temperature superparamagnetic behaviour of the ferric oxide core.

OP-28

Photo-Luminescence Study of $Sr_3Y_{1-X}(BO_3)_3$:X Bi^{3+}

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Abstract

The polycrystalline powder sample of Bi^{3+} activated strontium yttrium borate phosphor $Sr_3Y_{1-0.03}(BO_3)_3$:$0.03Bi^{3+}$ (x = 0.03) was prepared by solution combustion technique. Formation of phosphor in desired crystalline phase was confirmed by powder XRD characterization & FTIR. SEM images of the synthesized phosphor shows the irregular grains with average particle size 5-10 µm. Luminescence properties of the synthesized phosphor were investigated at room temperature. The excitation spectrum consists of a single broadband absorption band from 200 to 350 nm with the strongest absorption peak at 336 nm [$^1S_0$ to $^3P_1$ of Bi^{3+} ions]. Strongest emission peak of 492nm wavelength which is of blue light is observed at 336nm UV light excitation. $Sr_3Y_{1-0.03}(BO_3)_3$:$0.03Bi^{3+}$ phosphor emits blue light. As Bi^{3+} are sensitive to surrounding crystal field environment it shows weak absorption peak at 254nm which gives emission at 413nm. Hence $Sr_3Y_{1-0.03}(BO_3)_3$:$0.03Bi^{3+}$ is new UV excited blue emitting phosphor useful for UV-chip based WLEDs.

Keywords: Borate phosphor; Photoluminescence; Red emission; White light LED.

OP-29

Fabrication of Silica/PMMA Composite basedSuperhydrophobic Coating by Drop Casting Method

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Abstract

The dirt particles get detached and carried away by freely rollingwater drops from superhydrophobic surfaces performing self-cleaning ability.Hence, the self-cleaning superhydrophobic surfaces are gaining huge attentionof industries due to their useful day-to-day applications. Herein, we synthesizedthe hydrophobic silica nanoparticles by sol-gel processing of Methyltrimethoxysilane (MTMS). The nanocomposite solution consistingsuspension of silica nanoparticles in poly(methylmethacrylate) (PMMA) wasapplied on glass substrate by simple drop casting method. The microscaleroughness of the coating facilitated air trapping in the rough protrusionsresulting water contact angle higher than 168°. The self-cleaning ability andmechanical durability of the superhydrophobic coating were also evaluated.

Keywords: Superhydrophobic; Self-cleaning; Hydrophobic silica; Lotus effect; Wetting.

OP-30

Structural, Electrical, Magnetic and Electronic Properties of Transition Element Doped $La_{0.7}Sr_{0.3}Mn_{0.95}(TE)_{0.05}O_3$

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Abstract

The effect of 5% transition element (TE = Cr, Mn, Fe, Co, Ni, Cu and Zn) doping on Mn site of $La_{0.7}Sr_{0.3}Mn_{0.95}(TE)_{0.05}O_3$ was discussed in the present work. We studied the structural, electrical, magnetic and electronic properties of $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) system. Polycrystalline LSMO samples prepared using standard solid state reaction route method. The systematic study of all samples was carried out using different physical properties like resistivity, SQUID, X-ray photoelectron spectroscopy, Valance band spectroscopy. TE doped at Mn site in LSMO does not affect the structural change, but affect the electrical and magnetic properties. Chemical states and surface composition of elements were confirmed using X- ray Photoelectron spectroscopy measurements. Valence band photoemission spectra reveals that VB was composed by Mn 3*d* and O2*p* states below the Fermi level. In VB spectra, we observed that with changing the doping element the density of state near Fermi level changes.

OP-31

Arrested Precipitation Assembled Cd ($S_{0.7}$, $Se_{0.3}$) Nanostructures Thin Films for Solar Cell Performance

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Abstract

In the present investigation, we have developed hexagonal nanostructured Cd ($S_{0.7}$, $Se_{0.3}$) (h-CdSSe) thin films. Chemical growth control over at the nanoscale by manipulating the surface chemistry of thin films. Deposited films were annealed 1h at 150 ^{0} C in a vacuum furnace and used for further characterization. Optical study engineers the direct band gap energies from 1.93 to 1.75 eV. The influence of reaction times in the nanoflakes unit cells, crystallite size, and electron lifetime were studied systematically. The scanning electron microscopy (SEM) demonstrates the morphology was altered from nanoporous to marigold-like texture. X-ray photoelectron spectroscopy reveals the stochastic in elemental chemical valance states. J–V measurements reveal that the mesoporous marigold-like texture has a significant impact on the greatly increase the photoelectrochemical (PEC) performance (0.53%).

Key words: chalcogenide; chemical synthesis; X-ray diffraction; electrochemical properties, thin films.

OP-32

Study of structural, optical and Dielectric properties of Pb^{2+} doped cobalt ferrite synthesized by autocombustion method

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Abstract

Lead doped (Pb^{2+}) cobalt (Co) Nano ferrite $Co_{1-x}Pb_xFe_2O_4$ (x=0.1, 0.2, 0.3, 0.4, 0.5) were synthesized by a simple cost effective sol-gel auto combustion method. The synthesized gel were sintered at 600°C temperatures. The grain size of synthesized Nano ferrite about 34.5nm–54.5nm, which was analyzed by X-ray diffraction (XRD). It was observed that grain size initially increases upto x=0.3 and then decreases with Pb2+ substitution. The absence of extra peak in diffraction pattern ensures that the phase purity for all samples. All the peaks are well matched with standard JCPDS data for $CoFe_2O_4$(22-1086). It was also found that lattice parameter is in the range from 8.3877Å to 8.4108Å. From UV–Vis absorbance spectra it was found that an absorption edge of all samples appears in the range of 690nm to703nm. The band gap decreases with concentration of Pb^{2+} (upto x=0.3), then increases (upto x=0.5). From AC Conductivity analysis, AC conductivity increases linearly with the frequency, due to electron hopping between $Pb^{2+}$and Fe^{3+} ions on the octahedralsites. It is also evident that the frequency dependent ac electrical conductivity of Co1-xPbxFe_2O_4 is remarkably depends on the Pb content in the ceramics. The conductivity was decrease with increasing Pb concentration.

Keywords: Sol-gel; Pb-Co Nano ferrite; XRD; UV; AC Conductivity etc

OP-33

Synthesis and Characterization of Reduced Graphene Oxide as Electrode Material for Supercapacitor Application

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Abstract

In the present work wrinkled sheet like reduced graphene oxide (RGO)deposited on flexible carbon cloth by simple and cost effective hydrothermal method. The structural, morphological, optical and supercapacitive properties of the electrode material was investigated by XRD, TEM, SEM and electrochemical characterization techniques like CV, CP and EIS. SEM images shows that the hydrothermally synthesized reduced graphene oxide on carbon cloth has sheet like structure. Cyclic Voltammetry studies give maximum specific capacitance which is 356 Fg^{-1} at scan rate 5$mVsec^{-1}$. Moreover, stability studies shows 90% capacitance retention over 1000 CV cycles. Galavonostatic Charge-discharge study shows maximum specific capacitance which is 170 Fg^{-1} at current density 1mAg^{-1}. Supercapacitive performance of RGO is attributed from the synergistic contribution of electric double layer capacitance (EDLC) and pseudo-capacitance leads the better electrochemical performance of RGO electrode. These results show that hydrothermally synthesized RGO on carbon cloth is the promising electrode material and would be most appropriate for supercapacitor application.

OP-34

Facile Synthesized of Nanosheets like CuO Electrodes Using Ionic Liquid for High Supercapacitor

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Abstract

In this study, we report about the effect of ionic liquid on the supercapacitive properties of hierarchicalCuOelectrodes. Briefly, theeffects of different ionic liquid like 3-(3-Hydroxypropyl)-1, 2-dimethyl imidazolium chloride (HPDMIM (C1):CuO),1-(2',3'-Dihydroxypropyl)-3-methyl imidazolium chloride (DHPMIM (C1):CuO), N-(-3-methyl-2-oxopropyl) pyridine chloride (MOCPP (C1):CuO) on CuO thin films have been synthesized by chemical bath deposition and characterized by different techniques. Our resultsexhibited the growth of the hierarchicalCuOmaterials with significant morphological deviation through ionic liquid. Additionally, positive effects of the ionic liquid on the electrochemical properties of hierarchical CuO electrodes have been observed. Advanced results suggest that HPDMIM (C1) doping in CuOelectrodes with nanosheets-like nanostructures was responsible in exhibiting the highest specific capacitance. The maximum specific capacitance attained for a HPDMIM (C1):CuOhybrid electrode is 464 Fg^{-1} at 5 mVs^{-1} in a 1 M Na_2SO_4 electrolyte.Moreover, the stability of HPDMIM (C1):CuOmakes it a potential candidate material for energy storage applications.

Keywords: Chemical synthesis: nanoshets like-nanostructures; supercapacitor; ionic liquid.

OP-35

Development of Molybdenum Based (MoS_2 and $MoSe_2$) Hybrid Nanostructures with MWCNTs for High Performance Supercapacitor

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Abstract

The development of hybrid nanostructures towards the fabrication of flexible solid-state energy storage devices with aid of simple, inexpensive and industrial scalable approach provides an efficient way to sustain the growing field of energy storage. Present work emphasis the development of hybrid nanoarchitecture by using simple two step chemical routes namely; 'dip and dry' coating for multiwalled carbon nanotubes (MWCNTs) followed by chemical bath deposition (CBD) for MoS_2 and $MoSe_2$ thin films. This mixed nanostructure has been explored to exhibit strong synergy and materials mutualism leading to enhanced electrochemical properties. Compared to the bare MWCNTs, MoS_2 and $MoSe_2$ the unique decorative ultrathin nanoflakes of MoS_2 over MWCNTs and cryptomelane like growth of $MoSe_2$ over MWCNTs offers excellent charge storage behaviors towards enhanced specific capacitances and cyclic stabilities. Designed flexible symmetric solid-state supercapacitor devices have been fabricated through gel electrolyte demonstrating the upgraded potential window resulting in superior energy density. Furthermore, mechanical flexibility, cyclic stability and practical application to glowing up light emitting diode (LED) have raised the value of devices towards the advanced energy storage meadow.

OP-36

Facile Synthesis of Hierarchical Magnetite for High Performance Electrochemical Supercapacitor Electrode

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Abstract

Hierarchical nanostructured magnetite (Fe_3O_4) has been synthesized via a facile electro-deposition method from additive free nitrate bath at 60°C. The as prepared thin films were characterized for its structural, morphological and electrochemical properties. X-ray diffraction revealed the formation of polycrystalline, orthorhombic magnetite phase. Morphological characterization showed the hierarchical growth of interconnected nanosheets to form tremella like structure. The electrochemical properties of the electrodes were studied in aqueous 0.5M NaOH electrolyte. Remarkably, the as-synthesized Fe_3O_4nanosheets exhibited a higher specific capacitance of 549 F/g at the scan rate of 5mV/s. The capacitance retention of tremella like magnititewas around 81 % after 500 cycles at a scan rate of 100 mV/s. EIS study supports the cyclic voltammetry results. The findings suggested that the low-cost magnetite nanostructures can be recognized as a high performance electrochemical capacitor electrode material.

Keywords: Supercapacitor; metal oxides; magnetite tremella; electrodeposition.

OP-37

Preparation of Sodium Silicate Based Aerogels Using Two Step Sol-Gel Process and Ambient Pressure Drying

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Abstract

The experimental results on the preparation of sodium silicate based aerogels using two step sol-gel process and ambient pressure drying is presented here. The silica aerogels were prepared by following the procedure viz. gel preparation, soaking of the gel in water, solvent exchange/silylation /washing of the gel and finally the drying of silylated gel at ambient pressure. The influence of various sol-gel and preparation parameters such as wt. % of silica (2 to 6 wt. %), NH_4F:HCl molar ratios (0 to 0.5) and aging period (0 to 24 h) on the physical and textural properties of the aerogels were studied. The physical properties such bulk density, thermal conductivity, optical transmission, % porosity as well as the textural properties using BET analysis were studied. It was observed that the silica aerogels with low density ~ 0.11 g/cc, low thermal conductivity ~ 0.12 W/mK and high surface area ~ 690 m^2/g were obtained for 3 wt. % of silica, NH_4F:HCl molar ratio of 0.333 and 3 h aging period. The as synthesized aerogels can be applied for thermal insulation purpose.

Keywords: Sodium silicate; Two step sol-gel process; Ambient pressure drying; Silica aerogels; Thermal insulation.

OP-38

Dielectric Properties of γ- irradiated, Stretched and Poled PVDF Thin Films

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Abstract

We report the effects of γ- irradiation on the dielectric properties of stretched and poled Polyvinylidene fluoride (PVDF) thin films synthesized by solvent cast method. The films were subjected to γ- radiation with different doses (25, 50 and 75 kGy). XRD pattern was obtained to identify the presence of α / β phases. Dielectric constant and loss values of the stretched and poled films have been measured, before and after irradiation, and their nature of variation has been studied. β phase was retained even after the irradiation thereby confirming that the radiation damage was not significant. The dielectric loss was minimum in the frequency range 10^2 - 10^4 Hz, giving the preferable frequency range of operation for devices.

Keywords: PVDF thin films; γ-irradiation; Dielectric spectroscopy.

OP-39

Investigations of Ferroelectric Hysteresis on BaLa2Ti3O10 – Ba0.7Sr0.3TiO3 Composites

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Abstract

Ferroelectricity is a characteristic of few materials that have aspontaneous electric polarization and it can be reversed by the application ofan external electric field. When most materials are polarized, the polarizationinduced, P, is almost exactly proportional to the applied external electric fieldE; so the polarization is a linear function. This is called dielectric polarization.Some materials, known as Paraelectric materials, show a more enhancednonlinear polarization. The electric permittivity, corresponding to the slope ofthe polarization curve, is not constant as in dielectrics but is a function of theexternal electric field. In addition, ferroelectric materials give a spontaneousnonzero polarization even after the applied field E is made to be zero. Thedistinguishing feature of ferroelectrics is that the spontaneous polarization canbe reversed by a suitably strong applied electric field in the opposite direction;the polarization is therefore dependent not only on the current electric field butalso on its history, yielding a hysteresis loop.In this paper we have synthesized ferroelectric materials Ba0.7Sr0.3TiO3(BST)and BaLa2Ti3O10 (BLT) by hydroxide co precipitation method. Both thematerial confirms their single phase formation by XRD data and compositesare made in proportion from zero to hundred percent. The scanning electronmicroscopy gives the average grain size in the range of 1μm. The ferroelectrichysteresis loop gives the values of saturation polarization, remnantpolarization and coercive field. These values are suggestive to have thecomposite material for good candidate of ferroelectric memory device.

Keywords: Barium Strontium Titanate; Barium Lanthanum Titanate; Composites; Ferroelectric hysteresis.

OP-40

Spray Deposited Ni:ZnO Films : Low Temperature LPG Sensor

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Abstract

Ni-doped ZnOnanocrystalline thin films are prepared via the spray pyrolysistechnique and LPG sensing performance is tested at moderately low operating temperature.The doped ZnO thin films are characterized by X-ray diffraction (XRD) scanning electronmicroscopy (SEM), atomic force microscopy (AFM) techniques and as a gas sensor. Theamount of Ni2+ ions that enter the lattice of ZnO increases with increasing the[Ni]/[Zn] molar ratio. The effect of Ni doping on the gas-sensing properties is investigated.The results reveal that the amount of Ni has a great influence on the response ((Ra-Rg)/Ra). The sensor based on 1.5 at % Ni doped ZnO exhibits a high gas response (31 %)at 250 ºC to LPG with 20 s recovery time for 0.9 volume % LPG concentration. LPGresponse at lower and higher temperatures than 250 ºC is low. The Ni doped ZnO thinfilms exhibited good sensitivity rapid response but relatively low recovery characteristicsto LPG. Also, it is observed that the gas sensitivity of the Ni doped ZnO gas sensordepends upon crystallinity of the films.

PA-1

Synthesis and Characterization of Pb doped MnS Thin Films

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Abstract

Pure and Pb doped M nS thin films were prepared by Chemical Bath Deposition (CBD) method onto glass substrates at 60 ^{0}C temperature. The films were characterized by X-ray Diffraction (XRD), Scanning Electronic Microscopy (SEM), Energy Dispersive X-ray Analysis (EDAX), and optical absorption spectroscopy. The particle size of the crystalline was determined from the XRD patterns using Scherrer formula and found to be 47 nm for MnS thin films. The particle size shows a change in the case of the Pb doped film. The optical band gap of MnS thin film is found to be 3.1 eV, which decreases on doping with Pb. EDAX analysis shows the MnS thin films are rich in Mn. SEM graphs of doping of Pb in MnS confirmed the formation of spherical superstructure and indicate that the Pb^{2+} is successfully substituted into the MnS host structure of the Mn^{2+} site.

Keywords: Synthesis; CBD, Thin Film; Structural; Optical; Pb Doped MnS.

PA-2

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 where in 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 1.9eV. The surface morphological studies obtained from SEM micrograph shows rice shape of exterior. While wettability test showed hydrophobic nature of CuO.These 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.

PA-3

Structural and Optical Properties of Liquid Phase Synthesized TiO_2/Cds Coupled Layer Film

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Abstract

Compact, well adherent, uniform and pinhole free thin film of TiO_2 has been successfully deposited onto a glass substrate at room temperature (R.T.) from an aqueous bath containing $TiCl_3$ solution by simple, inexpensive, reproducible and environmental friendly chemical bath method (CBM). Aqueous solution containing $TiCl_3$ and thiourea were mixed in beaker and stirred for 15 min. The pH of the solution was adjusted between 2 to 6. The substrates were immersed vertically after being attached to the holder for several days. CBM method was again employed to deposit Cds thin film on pro-deposited R.T. TiO_2. Both as-deposited R.T. TiO_2 and coupled layer of TiO_2/Cds were characterized by structural and optical absorption study. The optical and structural studies shows the existence of coupled layer was found with amorphous TiO_2.

Keywords: Room temperature; Thin film; TiO_2/CdSlayer; liquid phase; Optical; Amorphous.

PA-4

Dielectric Properties of x $[Co_{0.9}Ni_{0.1}Fe_2O_4]$-(1-x) $[Ba_{0.7}Ca_{0.3}TiO_3]$ Prepared by Hydroxide Co-Precipitation Method

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Abstract

In the present work, x $[Co_{0.9}Ni_{0.1}Fe_2O_4]$-(1-x) $[Ba_{0.7}Ca_{0.3}TiO_3]$ composite is synthesized by hydroxide co-precipitation method. The obtained precipitate is conventionally sintered at 1200°C and characterized using different characterization techniques such as, X-ray diffraction (XRD) for structural analysis, scanning electron microscope (SEM) for morphological and elemental studies. Frequency dependent and temperature dependent dielectric properties were studied using dielectric spectroscopy. X-ray diffraction analysis confirms the perovskite phase and spinal phase.

Keywords: BCT; CNFO; Spinel phas; Dielectric properties.

Acknowledgment: This work was supported by UGC-DAE CSR through project. (Project no.**CRS-M-283/18-DEC-2017**).

PA-5

Green Synthesis of Silver Nanoparticles using zanthoxylum rhesta Fruit Extract and its Antibacterial Activity

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Abstract

Development of green nanotechnology is important for ecofriendly and green synthesis of nanoparticles.Thenumber of reports in the literature about green synthesis of various nanoparticles have increased tremendously which underline the importance of green nanotechnology. In this study, the synthesis of silver nanoparticles (AgNPs) was carried outby a green approach using *Zanthoxylum rhesta* fruit extract.*Zanthoxylum rhesta*is a plant found in Western Ghats region of Maharashtra, India. The nanoparticles using the plant's fruit extract were obtained within 30 min of reaction time at 50^{o} C. The active phytochemicals present in the fruit extractare responsible for the quick reduction of silver ion (Ag^{+}) to AgNPs (Ag^{0}). The synthesized nanoparticles were characterized byUV–vis spectroscopy, X-ray diffraction (XRD), Attenuated total reflactance Fourier transform infrared spectroscopy (ATR-FTIR),Field emission scanning electron microscopy (FESEM) and Energy dispersiveX-ray spectroscopy (EDS) techniques.The results of all these analysis confirmed the formation of stable and small AgNPs. The size of the nanoparticles obtained was in the range of40–60 nm. Thesynthesized nanoparticles showed good antimicrobial activity.

PA-6

Gas Sensing Properties of Nnanocrystalline $Zn_{1-x}Co_xMnCrO_4$ System Prepared by Sol-gel Autocombustion Method

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Abstract

Nanocrystalline $Zn_{1-x}Co_xMnCrO_4$ system was prepared by Sol-gel auto-combustion method. The synthesized material was characterized for their phase and morphology by X-ray diffraction and Transmission electron microscopy respectively. Conductance responses of the $Zn_{1-x}Co_xMnCrO_4$ system were measured towards various gases like hydrogen sulphide (H_2S), LPG, Co_2, ethanol, H_2, NH_3, H_2S, C l_2. The gas sensing characteristics were obtained by measuring the sensitivity as a function of various controlling factors like operating temperatures and concentrations of gases. It was found that the sensor exhibited various responses towards these gases at different temperatures. Furthermore, the based sensor exhibited a fast response and a good recovery towards ammonia at room temperature. The results of the response towards ammonia reveal that ($Zn_{0.50}Co_{0.50}MnCrO_4$) synthesized by a simple Sol-gel autocombustion method, would be a suitable material for the fabrication of the ammonia sensor.

Keywords: Sol-gel autocombustion method; Gas sensor, Chromites; X-ray diffraction and Transmission electron microscopy.

PA-7

Separation of Oil-Water Mixture by Using Superhydrophobic Sponges and Membranes

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Abstract

With the increasing awareness of environmental protection and need for water recycling, there is a growing demand for technologies that can efficiently absorb, remove, and transfer oil spills or organic contaminants from water. For example, accidents of ships in the sea can often result in release of spill oil in seawater and rivers can also be contaminated by wastewater from industry. Porous materials such as sponges, textiles, and metal meshes are good candidates for oil-water separation, due to their large pore volume, flexibility, and commercial availability.

PA-8

An Efficient Protocol for the Synthesis of Pyrido [2, 3-d] pyrimidines in Glycerol-Water Medium: Assessment by Green Chemistry Metrics

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Abstract

A clean and eco-friendly approach for the catalyst-free synthesis of pyrido[2,3-*d*]pyrimidine derivatives by one-pot three-component condensation of aromatic aldehyde, malononitrile and 6-aminouracil or 6-amino-1,3-dimethyluracil using glycerol-water (3:1) as green reaction media has been developed. Catalyst-free synthesis with high to excellent yields and use of glycerol-water system as an environmentally benign reaction condition are the prominent features of this strategy. Moreover, excellent outcomes from the calculations of green chemistry metrics reveal the greenness of the protocol.

Keywords: Pyrido [2,3-d]pyrimidine; glycerol; 6-aminouracil; green chemistry metrics

PA-9

Thermal and Frequency Variation of Permeability for Samarium–Dysprosium-Magnesium Ferrite

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Abstract

Samarium – Dysprosium - Magnesium ferrite materials has been prepared by chemical combustion method. The effect of Samarium – Dysprosium rare earth ions on loss factor, real and imaginary part of permeability has been studied for $Mg[(Sm)_{0.6}(Dy)_{0.4}]_xFe_{2-x}O_4$ (for x=0.01 and x=0.03) ferritematerials with temperatureand frequency by using a HiokiLCR-Q meter. From thermal variation of loss factor of prepared ferrite materials,it is revealed that ferrite must be used below Curie temperature for low loss factor. The real part of initial permeability initially increases with frequency and for higher frequency its value almost remains constant. Frequency variation of imaginary part of permeability and loss factor of the ferrite materials decreases with increasing frequency.

Keywords: Combustion; Ferrite; Permeability; Frequency; Thermal

PA-10

Nesting Site and Nesting Material of House Crow (*Corvusslendens*) in Jawala Bazar Aundha, (NAG)

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Abstract

Jawala bazaar village is 20 km away from Aundha Nagnath Tehsil. The total geographical area of village is 1013.55 hectors. Total 49 nests were reported to identify the nest materials. Out of these 4 nests on neem tree, 12 on Nilgiri, 1on peepal, 8 on babul, 1 on coconut, 8 on teak, 4 on electric tower, 4 on building, 7on old mill. The majority of nests which were observed on nilgiri trees in between 2 to 3 branches. The observed nest materials are twigs, dried large sticks, dried grass, paper piece, wire, plastic threads, fibers of coconut tree. Plant leaf and unidentified material are also present inside of the nest. The majority of material which is used for constructing the nests are dried sticks and grasses. To identify the nest materials Canon camera with zoom lens 5x420 IS (42X) and Binocular 20x50X magnification was used. The present work is focused on nesting sites and nesting material of *Carvus splendens* at Jawala bazaar because there is no detail study available in this area.

Keywords: Nesting site, nesting material, Jawala bazaar, Maharashtra.

PA-11

Synthesis and Characterization of α-MnO_2 by Hydrothermal Method for Ions Storage Device

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Abstract

Highly crystalline α-MnO_2 nanostructure was synthesized by a hydrothermal method. The method based on redox reaction between the permagnate anion MnO_4^- and H_2O In mixture containing $KMnO_4$ and HCl. The solution transferred to a Teflon and kept in oven to heated 120˚C for 12 hours. After that it dried at 80˚ C for 1 hour. Washed the collected powder with distill water and dry it in oven. The synthesized product were characterized by X- ray diffraction (XRD) , scanning electron microscopy (SEM), Cyclic voltametry (CV). XRD which shows diffraction peaks can be indexed to α- MnO_2 Phase , high purity of sample. SEM shows low magnification panoramic morphology. The result shows that the prepared MnO_2 nanostructure and good for electrochemical properties.

PA-12

Electrochemical Performance of Branched Nanofibrous PANI Thin Film

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Abstract

In present report we have synthesized nanofibers of Polyaniline (PANI) by *in situ* oxidative polymerization on stainless steel substrates by a dip coating technique. The deposited thin films were characterized for their optical, morphological and compositional studies using UV–Vis Spectrophotometer, Field Emission Scanning Electron Microscopy (FE-SEM) and Fourier Transform Raman Spectroscopic (FT-Raman) Spectroscopic studies. Based on FE-SEM analysis, the spongy and branched Nanofibrous nature of PANI with average diameter of 45 nm was confirmed. Electrochemical properties of PANI thin film were studied by cyclic voltammetry, galvanostatic charge/discharge and electrochemical impedance measurement. The electrochemical performance was tested in 1 M H_2SO_4 aqueous electrolyte. The highest specific capacitance of 534 Fg^{-1} at 5 mV s^{-1} was observed. The electrochemical performance reveals potential application of nanofibrous PANI in the field of electrochemical supercapacitors.

Keywords: PANI; branched nanofibers; electrochemical supercapacitors.

PA-13

Self-cleaning Photocatalytic TiO_2 Coating on Marble

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Abstract

Marble is used for its beauty in architecture and sculpture. Taj Mahal is one of the famous historical monuments in the World, made up of marble. Increase in pollution has adverse effects on it, such as acid rain has corrosive effect on marble leading to permanent damage, dense smog decolouring the Taj Mahal to shade of yellow. We can use TiO_2 nanoparticles coating to protect and maintain the original appearance of such historical monuments. TiO_2 nanoparticles coating exhibits photo-induced effects which degrades the pollutants and lead to self-cleaning effect by reducing the pollutants on the surface. It enhances the durability of marble surface towards UV aging too. So, TiO_2 nanoparticles can be prepared by different methods including Sol-Gel, Solvothermal and Hydrothermal methods and the coating of prepared nanoparticles by Spray Coating technique can be applied on marble surfaces to prevent from losing shining. The aim of this paper is to synthesize the TiO_2 nanoparticles by different methods and its coating on marble by studying various parameters, such as size, photocatalytic effects, contact angles, superhydrophilicity, self-cleaning properties of the synthesized TiO_2 nanoparticle coating.

Keywords: Self-cleaning; Wetting; Superhydrophilic; Contact angle; Photocatalytic.

PA-14

Dielectric Studies of Lanthanum doped $BaNd_2Ti_3O_{10}$

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Abstract

The microwave dielectric ceramics are having increasing demand in electronics and telecommunication field due to the important properties like high quality factor, high dielectric constant, low dielectric loss and small temperature coefficient of resonant frequency. Taking into consideration the hazardous nature of lead based ceramics, many scientists are paying their attention to synthesize non-lead based ceramic materials. In our research we have synthesized $BaNd_{2-x}La_xTi_3O_{10}$(for x = 0.02 and 0.04)material by choosing the method which is low cost and easy. In characterization, the X- ray diffraction (XRD) pattern confirms that the synthesized material is orthorhombic in nature. The Scanning electron microscopy (SEM) photographs gives the grain size less than 2 μm. The dielectric study reveals the temperature independency in the range from room temperature to 500 K.

Keywords: Ceramics, Dielectric constant; Barium neodymium titanate; temperature coefficient.

PA-15

Synthesis and Characterization of Polypyrrole thin film by SILAR method

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Abstract

The SILAR is very simple, inexpensive and less time consuming method for the deposition of thin film. In this method we can deposit a film at controllable temperature in solution based process. The SILAR method is commonly used to depositthin film on different type of substrates. Thin films has various applicationssuch as in solar panels, semiconducting devices, gas sensor and so on. We may change dipping time and number of cycles to achieve the required thickness of films. The cationic and anionic solutions are prepared by dissolving the Pyrrole into Sulphuric acid and Ammonium per sulphate. The dipping time and number of cycles are varied to achieve thin, adherent and uniform film on the glass substrate. The structural, optical and electrical properties are supposed to be studied for the part of this paper.

Keywords: SILAR; Thin film.

PA-16

Self-Cleaning Superhydrophobic Coating on Marble Using Spray Technique

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Abstract

A water contact angle greater than 150° and rolling angle less than 10° is observed on the water repellent lotus leaf. The lotus leaf is the best example of self - cleaning superhydrophobicity. We can attain artificial superhydrophobicity on the substrates of any size and shape. We aim to prepare the superhydrophobic coating on marble. Marble can be used to prepare statues, temples, floor tiles and many. The superhydrophobic coating can be prepared by spray coating technique. The hydrophobic SiO_2 nanoparticles were prepared by Stober method to coat on marble. Taj Mahal is one of the most beautiful and famous building which is made up of marble. The pollution in the air can affect the appearance of the marble. Once carbon dioxide, sulphur dioxide from the polluted air and UV rays comes in contact with the marble, its appearance changes to black and yellow colour. Due to these reasons, self-cleaning superhydrophobic coating on the marble can be applied.

Keywords: Superhydrophobic; Lotus effect; Self – cleaning; Wetting; Spray deposition.

PA-17

Preparation of TiO_2 gel for Spin Coated Thin Films

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Abstract

Many scientist prepared TiO_2 thin films. They used technique of sol-gel spin coating method. For example, Lourduraj S. prepared nanostructural titanium dioxide. Further, he doped Fe in TiO_2 thin film. He used the speed of spin coater to be 4500 rpm for 60s. Another scientist I. Karabay prepared titanium dioxide. He doped cobalt in TiO_2. One more scientist A. Akabar had doped Fe in TiO_2 thin film on glass substrate with thickness 200 nm. They showed the formation of rutile phase and brookite phase. After studying the all this literature, we decided to synthesize TiO_2 thin film. We are proposing the sol-gel technique with spin coating to prepare the thin film on a glass substrate. We use the mixture of titanium tetra isopropoxide 0.8ml and isopropanol 2.3ml. Then above mixture was stirred at 60°C for 10 min. Then add 2.6ml acetic acid in above stirred the mixture for 15 min. The mixture stirred 2 hour after adding 6ml of methanol. But we are not able to form the gel, which could be able to put on glass substrate for spin coating. Again, we repeat same procedure but stirring time is varied for 4 hours. The trials of sol-gel preparation is still under the process by varing the stirring time.

Keywords: TiO_2 Thin film; spin-coating; sol-gel technique.

PA-18

Synthesis and Characterization of Chromium Oxide (Cr_2O_3) Thin film for Supercapacitor Application

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Abstract

The present paper report, synthesis and characterization of chromium oxide (Cr_2O_3) thin films by electrodeposition method. The synthesized Cr_2O_3 thin films have been studied by different characterization techniques. The crystal structural and surface morphological behavior of deposited Cr_2O_3 thin films have been studied by using X-ray diffraction(XRD) and Scanning electron microscopy (SEM) techniques. The supercapacitive behaviour of the deposited Cr_2O_3 thin films have been analyzed by using cyclic voltammetry (CV) and galvanostatic charging-discharging (GCD) techniques. The value of specific capacitance was found to be 184 F/g in 0.5 M Na_2SO_4 aqueous solution at scan rate of 5 mV/s.

Keywords: Supercapacitor; Electrodeposition; X-ray Techniques; Electrochemical Properties.

PA-19

Synthesis of Xanthenediones by Silica Supported Orthophosphoric Acid (H_3PO_4. SiO_2)

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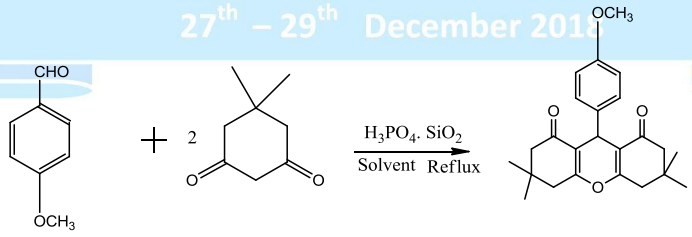
Abstract

Xanthene fascinated considerable interest in medicinal properties, such as antibacterial, antiviral, anticoagulant, anticancer, diuretic. Moreover, their applications are explored in cosmetics, pigments, laser technologies and in fluorescent material for revelation of biomolecules. In literature different methods have been reported for synthesis of xanthenediones such as condensation of active methylene compounds with aldehydes catalyzed by sulfuric acid or hydrochloric acid, TiO_2/SO_4, polyaniline p-toluenesulfonate, PPA–SiO_2, Amberlyst-15, Fe^{+3}–montmorillonite, $NaHSO_4$-SiO_2 or silica chloride. So we have developed a simple and efficient protocol for the synthesis of xanthenediones by silica supported orthophosphoric acid (H_3PO_4. SiO_2) as a heterogeneous catalyst. The (H_3PO_4. SiO_2) catalyst demonstrated excellent catalytic activity for various substituted aromatic aldehydes. This catalyst can be reused four times without much loss in catalytic activity.



PA-20

Structural Properties of La^{3+} Substituted Mg-Zn Ferrite Nanoparticles by Co-precipitation Method

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Abstract

Nanoparticles of Lanthanum substituted 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 synthesized using co-precipitation method. XRD Patterns are studied for sample prepared by sintering temperature at 700 ^{0}C for 5h. Phase formation was investigated using X-ray diffraction and Infrared absorption technique. The 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

Keywords: La^{3+} substituted magnesium zinc ferrites; co-precipitation metho; EDAX analysis; TG-DTA analysis etc.

PA-21

Diversity of Fleshy Mushroom in Taluka -Sangola District-Solapur, 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. *Mycena arcangeliana* Bers. (1904). 2. *Coprinus niveus* Fr. 1838.3. *Coprinus plicatilis* (O. F. Mull.) Gray (1797). 4. *Amanita inaurata Secr.* (1833). and 5. *Laccaria laccata* (Scop.) Cooke. 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.

Keyword: Mushroom.

PA-22

Effect of Contact and Collisional Quenching Model on2-Bromophenyl Boronic Acid Using Positive Deviation S-V Plots

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Abstract

The Steady state studies of fluorescence quenching of excitation energy of heterocyclic compound namely 2-Bromophenyl boronic acid (2BPBA) by aniline was carried out in 1, 4 dioxane (DX), toluene (TL), methanol (ML), heptane (HP), nonane (NN), butanol (BL) and propanol (PL) solvents with a view to understand the role of quenching mechanism. The quenching process is studied in all solvents using steady state method 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.

PA-23

Synthesis, Characterization and Catalytic Properties of Cobalt Doped Nickel Aluminate Spinel Systems

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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 heatingmethod with the use of glycine fuel. The nanostructured nickel aluminate, cobalt aluminate nono-materials and their variable component spinel systems confirmed by the calcination reaction temperature. The influence of Co^{++} ions over $NiAl_2O_4$ forces system, leads to the great position inthe substitution and development on thermal, spectroscopic,structural, morphological then catalytic behaviors ofcobalt 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.

PA-24

Synthesis of Acid Doped Polyaniline its Characterizations Using Raman and FTIR Spectroscopy

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Abstract

Polyaniline (PANI) is a π conjugated polymer. It is possible to control the morphology of PANI when we chemically treated them with the various concentrations of hydrochloric acids. PANI is synthesized by oxidative polymerization of aniline and ammonium peroxydisulfate, results of polymerization are the formation of a micro fiber structures. On the doping with HCl microfiber structure is flourished into fine porous type of microfibers compare with undoped PANI. We have doped PANI with HCl using different concentrations as 0.5, 0.25 and 0.1 M which gives monotonically fine porous microfiberal structures. HCl doping is not only just change the morphology of PANI but benzene ring structure of PANI also changed. Fourier Transform Infra-Red (FTIR) and Raman spectra verify these changes.

Keywords: Polyaniline; doping; HCl and Raman shifts.

PA-25

Preparation of Adherent Superhydrophobic Surface Using Candle Soot

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Abstract

In this communication,we fabricated of superhydrophobic surface using candle soot by simple and efficient method. The candle soot layer was deposited on glass slide by holding at tip of candle flame. A layer of adhesive glue was applied on another glass slide. Putting together the candle soot deposited and adhesive glue layer applied glass slide in iron clamp for overnight. In process glue layer was completely covered by candle soot particles. The loosely bounded candle soot particles on glue layer were removed by flowing the water. The candle soot in glue layer was exhibit water contact angle ~160º, stable for water jet impact test. Such highly water repellent surface are useful in practical application including industrial and academic research.

Keywords: Superhydrophobic; candle soot; adhesive glue.

PA-26

Synthesis and Charecterization of cds Thin Film by Microwave Assisted Chemical Bath Deposition

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Abstract

Cadmium sulphide (CdS) thin films were deposited by using microwave oven on glass substrates from aqueous solution. Cadmium sulphate, ammonia and thiourea were used as the source materials for the preparation of the thin films sources. These films were then characterized using UV spectroscopy for studying the optical properties. XRD were used for structural studies. SEM and EDAX revealed the morphological characteristics. The X-ray diffraction (XRD) analysis showed that the prepared CdS films were polycrystalline with hexagonal as well as mixtur of cubic and hexagonal structure. CdS thin films were obtained with (002) preferred orientation and having crystallite size 50 nm. It was determined from the broadenings of corresponding X-ray diffraction peaks by using Debye Scherrer's formula. Band gap of CdS thin film by UV spectroscopy was 2.3to 2.42 eV.

Keywords: CdS thin films; UV spectroscopy; SEM; EDAX.

PA-27

Cyclic Voltammetric Study of CuO Thin Film Electrodes Prepared by Automatic Spray Pyrolysis

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Abstract

Present work deals with the study of effect of scan rate on the cyclic voltammetric performance of cupric oxide CuO electrodes prepared using automatic spray pyrolysis. For the synthesis via aqueous route, 50ml of 1M $Cu(NO_3)_2.3H_2O$ was used as a precursor solution and stainless steel (SS) plates were used as a conducting substrates. The spray rate was maintained at 2.5 ml/min, decomposition temperature was kept at 673.15 K. In the analysis, XRD patterns clearly substantiate the formation of CuO on SS. Cyclic voltammetric analysis of the prepared electrodes has been carried out in 1 M KOH at various scan rates from 2mV/s to 100mV/s. In CV study electrode shows decrease in specific capacitance(SC) values with increase in scan rates indicating reversible nature.

Keywords: CuO, X-Ray diffraction; cyclic voltammetry

PA-28

Effect on Avifauna Due to Dumped Waste Material in Birnal Reservoir, Jat, Dist-Sangli, Maharashtra

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Abstract

Birnalreservoir is located at 6k.m west at the outskirt of jathtahasil.Jath utilizes 62.84 %water from birnalreservior. The reservoir is situated latitude 17^0 3^1 N and longitude 75^0 10^1E. The water of reservoir is used for various purposes such as drinking, washing, bathing, agriculture,andfishing.Birnalreservoir shows diversity in flora, fauna,and weeds.

The wetlands having abundant food availability that harborsa variety of bird's species. Due to human anthropogenic activities such as washing, bathing and dumping waste material like non-degradable of plastic bags, plastic bottles, waste flowers,Ganeshemission, waste clothes, useless or unwanted net material or gears is the number of avifauna decreasing.

Keywords: Birnal; harbors; anthropogenic non-degradable; emission.

PA-29

Study of Interaction between Human Hemoglobin and Antitubercular Isoniazid Drug with its Detection

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Abstract

The intake of antitubercular isonicotinyl hydrazide (INH) will be higher, it hazardous to human body. Hence there is a need of its detection. For this reason, we study interaction between human hemoglobin (HHb) and INH by applying fluorescence and UV-visible spectroscopic techniques. Fluorimetric as well as UV-visible results showed that formation of complex between HHb and INH. The proposed HHb based fluorescence method applied directly for the determination of INH in pharmaceutical sample.

Keywords: Analytical detection; Fluorescence; HHb; INH; UV-visible study.

PA-30

Fluorescence Spectroscopic Studies On The Interaction Between 2,5-Diphenyl Oxazole And Triton X-100 Micelle

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Abstract

The interaction between Triton X-100 (TX-100) and 2,5-diphenyl oxazole (2,5-DPO) has been investigated successfully by fluorescence and UV-visible study. The fluorescence resonance energy transfer (FRET) between donor TX-100 and acceptor 2,5-DPO was examined. UV-visible study shows that there is no formation of ground state complex between donor and acceptor pair in solution. The fluorescence emission and energy transfer efficiency has been determined in both premicellar and postmicellar condition. The distances r = 3.23 and 2.79 nm were calculated in premicellar and postmicellar solutions respectively. The study indicates that energy transfer in postmicellar environment is remarkably higher than that in case of premicellar situation.

Keywords: 2,5-diphenyl oxazole; fluorescence; FRET; Triton X-100; UV-visible study.

PA-31

Aqueous Route Synthesis of PANI Electrodes in Acidic Ph by CBD and their Cyclic Voltammetric Analyses at Different Scan Rates

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Abstract

Present work elaborates the aqueous route synthesis of PAni electrodes for supercapacitors in acidic pH using chemical bath deposition (CBD) and study of effect of scan rate on the cyclic voltammetric (CV) behavior. In the synthesis work, 1M Aniline and 1M H_2SO_4 were taken in 2:2 ratio and kept for constant stirring and 1 M aqueous solution of $(NH_4)_2S_2O_8$ was added slowly in it. Stainless steel substrates were suspended immersed in the reaction bath at room temperature for 1 hr at 400 rpm. The formation of PAni was confirmed by FTIR. SEM shows mocrovilli like morphology with interconnected globules. Formed electrodes were subjected to cyclic voltammetric study at various scan rate from 5mV/s to 100 mV/s. Observed maximum specific capacitance was 516.34 F/g.

Keywords: PAni; FTIR; Thin films; electron microscopy; cyclic voltammetry.

PA-32

Synthesis of Spiro-fused Heterocycles under Aerobic Conditions by using Polymer Gel Entrapped Catalyst

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Abstract

Spiro-fused heterocycles were synthesized in good to excellent yields by a pseudo three-component reaction of an aldehyde, urea and Meldrum's acid or barbituric acid at ambient temperature.

Keywords: Aldehydes; Gel Entrapped-$ZnCl_2$; modified Biginelli reaction; recyclability.

PA-33

Wetting Properties of Plant Leaves found in Jath Tehsil

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Abstract

Nature has treasure of varieties of plants. Various plant leaves exhibits excellent and diverse wettability towards water. The surface of plant leaves show different kinds of wettability with water contact angle (WCA) ranging from 0° to 179°. The wettability of the plant leaves can be superhydrophilic ($\theta < 10°$), hydrophilic ($\theta < 90°$), hydrophobic ($150° > \theta > 90°$), and superhydrophobic ($\theta > 150°$). The wettability of various plants leaf surface found in Jath Tehsil was studied in detail. The wettability of leaf surface was determined by static and rolling contact angle measurements. The samples were horizontally attached on the glass slide and the 10 µl sized water droplet was dropped on the surface of the sample. The optical photograph of water droplet is captured by a CCD camera and then contact angle was calculated. After measuring the WCA, we found different wetting surfaces of leaves. Then we categorized these leaves into four wetting types as superhydrophilic, hydrophilic, hydrophobic and superhydrophobic leaf surface.

Keywords: Wettability; Plant leaves; Superhydrophobic; Hydrophobic; Hydrophilic; Contact angle.

PA-34

Synthesis of Tio_2 Thin Films by Using One Step Hydrothermal Method

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Abstract

The TiO_2 thin films were prepared by using simple, low cost and eco-friendly hydrothermal method. The 0.1M titanium is opropoxide was used as a starting precursor for deposition of TiO_2 thin films. TiO_2 thin films were deposited on glass substrates at the temperature 160˚C between the time intervals of one to six hours and annealed at 450˚C for 1 hour. It was observed that annealing removes the impurities and enhances the purity of TiO_2 thin films. These prepared films were characterized for various characterization techniques to study structural, morphological and optical such as XRD, SEM etc. The X-ray diffraction analysis showed that the prepared samples are polycrystalline in nature and it exhibits rutile phase. The SEM showed star like nanoflower morphology.

Keyword: Titanium dioxide; Hydrothermal; XRD; SEM etc

PA-35

Preparation of Hydrophobic coating based on MTMS by Sol-Gel Method

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Abstract

The hydrophobic or water repellent coating is one of the most important research area in wettability research. The water-repellent coating is useful in stain-resistant textiles, waterproof and fire-retardant cloths, prevention of deposition of snow on blades of wind millsand windows, anticontamination surface, the reduction of frictional drag on ship hulls, corrosion resistance and soon. In this work, we prepared hydrophobic coating using methyltrimethoxysilane (MTMS) by sol-gel method. The hydrophobic silica sol was prepared using MTMS, using following method. At first, the mixture of distilled water, ethanol and ammonium solution were stirred for 1 hr. Afterward, MTMS was added drop by drop and stirring was continued for 3 hr. The hydrophobic silica sol was deposited on glass slide by dipping in prepared silica sol with dipping and withdrawing rate 4 mm/s and dried at room temperature. This process was repeated at 20 time and finally dried at 150ºC. The wettability of prepared coating was analyzed by measuring water contact angle using contact angle meter. In this process we achieved water contact angle 98º.

Keywords: Hydrophobic; silica sol; coating.

PA-36

Application of Differential Pulse Polarography for Detection of Riboflavin from Pharmaceutical Samples and Vegetables

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Abstracts

Riboflavin (vitamin B_2) plays an important role in living processesas a precursor of coenzymes. The corestructure of riboflavin withisoalloxazine ring, participates inenzyme-catalysed electron transfer processes of many importantmetabolites.Several methodologies have been developed for the determination of riboflavin, but those methodshave disadvantages like long analysis time, consume a lot of reagents andexpensiveness. Hence, to overcome these problems, the DPP technique was proposed in this study. The DPP method was used for the quantitativeanalysis of riboflavin. The experimental conditions wereoptimised to obtain the best characterised peak in terms of peak height with analyticalvalidation of the method. The proposed methods were applied forthe analysis of riboflavin in pharmaceutical samples and vegetables. Theriboflavin was found to adsorb andundergo irreversible reduction reaction at the working mercury electrode.

Keywords: Riboflavin; DPP; Quantitative analysis; Application.

PA-37

An Investigation of Fluorescence Resonance Energy Transfer between Tryptophan and Quinine Sulphate

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Abstract

Fluorescence resonance Energy transfer (FRET) between Tryptophan (Trp) and Quinine sulphate (QS) has been investigated in aqueous medium at room temperature by absorption, emission and time resolved fluorescence spectroscopy. Absorbance spectral characteristics rule out the possibility of ground state complex formation between them. Time resolved decay indicates dynamic type of quenching. Saturation of efficiency of energy transfer reveals the existence of FRET. Efficiency of energy transfer and distance between donor (Trp) and acceptor (QS) pair were determined according to Forster's non radiative energy transfer theory.

Keywords: Quenching; Tryptophan; Quinine sulphate; FRET; Energy transfer efficiency.

PA-38

Exploration of Fluorescence Quenching Mechanism in Tryptophan Induced by Norfloxacin: Analytical Applications

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Abstract

Fluorescence quenching mechanism of Tryptophan (Trp) by Norfloxacin (NORF) was investigated by spectrofluorometric method.The Stern-Volmer quenching constant is positively related with the temperature shows the dynamic type of quenching. Life time of Trp decreases by the addition of NORF supportes dynamic type of quenching. Fluorescence quenching method was applied directly for the determination of Norfloxacin from pharmaceutical sample directly.

Keywords: Fluorescence quenching; Norfloxacin; Stern-Volmer quenching constant; Tryptophan.

PA-39

In-Vitro Study of Ethyl-4-(3,4.5-Trimethoxyphenyl)-2,7,7-Trimethyl-5-Oxo1, 4,5,6,7, 8-Hexahydro Quinoline-3-Carboxylate (ETMTMHQC) and Bovine Serum Albumin(BSA) Using Multi-Spectroscopic Techniques and Molecular Docking

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Abstract

The binding of quinolone derivative ETMTMHQC to bovine serum albumin (BSA) was investigated by various spectroscopic methods and molecular docking analysis. The fluorescence quenching spectroscopic results showed that ETMTMHQC bind to the protein BSA. The binding constant value was found to be $5.2x10^{-6}$ K (mol dm^3). The thermodynamic parameter of the system shows increase in temperature with gradual decrease in Stern-Volmer quenching constant thereby indicating Static quenching mode. Negative entropy and positive enthalpy indicates that the hydrogen bonding interaction. The (r) distance between BSA and ETMTMHQC obtained from FRET was found to be 7.0nm. The UV-visible spectra revealed the increase in absorbance on formation of BSA–ETMTMHQC complex. The CD spectral study indicates reduction of α-helical structure in BSA and small changes in the tertiary structure of the protein. ETMTMHQC interacts strongly with BSA and small changes in protein morphology was advised by molecular docking results. Moreover docking results show that the ETMTMHQC binds to BSA at ASN390 residue.

Keyword: Bovine serum albumin; Site selective binding; Förster resonance energy transfer.

PA-40

Gamma Irradiation Induced Structural and Magnetic Properties of Cobalt Ferrite

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Abstract

We have investigated the effect of gamma irradiation on the structural and magnetic propertis of cobalt ferrite nanoparticle prepared by the soultion combustion method. The cobalt ferrite was irradiated with ^{60}Co gamma source with energy ≈ 1.17 MeV and total dose received by the cobalt ferrites is 173.4kGy.The phase idenification and morphology studies were carried out by X- ray diffraction, Raman spectroscopy, scanning electrocn microscopy. Aftergamma irradiationmicro-strain generated in spinel structure of cobalt ferrite.Magnetic properties studyshows that magnetization and retenivity decreased while coercivity is remains unchangedafter of γ-irradiation.

Keywords: Gamma irradiation; XRD; VSM and Raman.

PA-41

Synthesis of MoS_2 Nanoparticles by Hydrothermal Method and its Characterization

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Abstract

This paper reports the hydrothermal synthesis of MoS2 nanoparticle using ammonium molybdate, hydrazine hydrate, PVA and thiourea as a sulfur source. The size ofnanoparticles was approximately 100 to 110 nm. The obtained nanomaterial powder wascharacterized using powder X-ray diffraction (XRD), scanning electron microscopy (SEM) andthe morphology of it was studied by scanning electron microscope (SEM). The X-raydiffractogram reveals that the powder is polycrystalline in nature and showing hexagonal phase.

Keywords: Hydrothermal method; MoS_2; nanomaterials; SEM; XRD.

PA-42

Influence of DCCA on the Structural and Morphological Characteristics of Spin Coated Zirconia Films

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Abstract

The experimental results in this work represent the influence of glycerol as drying control chemical additive (DCCA) on the structural and morphological characteristics of spin coated zirconia films. It was observed that the DCCA helps to sustain the porous structure of films and hence reduces the cracking probability during drying. Therefore, zirconia films were prepared by adding glycerol in the sol during the sol-gel process and depositing the film by spin coating technique. The influence of varying molar ratio of GLY:Zr^{4+} (0.43 to 2.15) was studied. During the synthesis of zirconia films the molar ratio of Zirconium propoxide: PrOH: Acac.: H_2O was kept fix at 1:80.16:0.91:35.08 with 0.1 M HCl. The structural and morphological characteristics of zirconia films have been studied using X-ray diffraction (XRD) and scanning electron microscopy (SEM), contact angle (CA) measurement respectively. From these measurements it was observed that addition of glycerol enhances the porosity and hydrophobicity of zirconia films.

Keywords: Glycerol; Sol-gel; Spin coating; Hydrophobic; Zirconia films.

PA-43

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

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Abstract

Chemical deposition is a facile way to synthesize doped semiconductors. Present study discusses synthesis of cadmium selenide (CdSe) and indium doped cadmium selenide (In:CdSe) thin films on stainless steel (SS) and fluorine doped tin oxide coated glass substrates using chemical bath deposition method. During synthesis, various synthesis parameters are optimized using photoelectrochemical (PEC) method. 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 alterations in structural, optical and morphological properties induced by indium doping are studied. Structural study showsindium 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; chemical bath deposition; indium doping; FE-SEM; Optical studies.

PA-44

Solvent Effect on the Relative Quantum Yield and Preferential Solvation of Biologically Active Coumarin Derivative

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Abstract

This paper aims at the study the relative quantum yield and preferential solvation of biologically active coumarin derivative ethyl 8-methoxy-2-oxo-2H-chromene-3-carboxylate (8EMOHCC) in different solvents and solvent mixture acetonitrile and dioxane (ACN+DXN). It is observed that, the quantum yield of the title molecule increases with decrease in the solvent polarity which may be due to bathochromic effect and intermolecular charge transfer. Further, the ground state preferential solvation index (i.eδs_2) showed negative values in different binary solvent mixtures.

PA-45

Investigation on Growth and Characterization of Nonlinear Optical Single Crystal of Bisglycine Lithium Nitrate

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Abstract

Here we have presented a report for the effect of lithium nitrate on the growth of gamma-glycine by solvent evaporation technique. The mixture of glycine and lithium nitrate in equimolar ratio forms glycine lithium nitrate single crystal of centrosymmetric nature. But gamma-glycine (non-centro symmetric) crystal grows in the aqueous solution of glycine and lithium nitrate in 2:1 molar ratio. The single crystals of nonlinear semiorganic material gamma-glycine in the presence of lithium nitrate (abbreviated as Bisglycine Lithium Nitrate (BGLiN) have been grown by slow evaporation technique at constant room temperature. The solvent used was the double distilled water. After 52 days,a single crystal of dimension 35 x 28 x 20 mm^3 was found out. After recrystallization technique, a good quality transparent crystals were seen. Interesting spectrophotometric analysis and physical studies were carried out to determine polymorph and improved properties of the polymorph gamma-glycine. Glycine molecule exists in the zwitterionic form, which is observed from the molecular structure diagram and the stretching vibrations obtained in FTIR spectrum. . The crystal structure and the unit cell dimensions are studied under general heading of X-ray powder diffraction studies. The structural characterization of the grown crystals was carried out by powder X-ray diffraction (XRD) methods which revealed that it belongs to non-centrosymmetric orthorhombic structure. The presence of various functional groups in the grown crystal was confirmed by FTIR. UV–visible transmittance study was performed to analyze optical transparency of gamma-glycine crystals. The optical studies show that crystal has good transmittance in the entire visible region. Dielectric constant will depend on the manner in which the atoms are assembled to form a crystal. So dielectric studies of gamma-glycine crystal were carried out at various frequencies

and temperatures. The crystal shows a good thermal stability upto 150°c where the crystal begins to degrade. These properties are desirable and suggests that Bisglycine Lithium Nitrate is a promising material for future technological applications.

Keywords: Non-centrosymmetric; non-linear semiorganic; XRD; FTIR; UV-VIS; Dielectric etc.

PA-46

Heat transport properties of Nanofluids: A Review

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Abstract

Advanced cooling liquids are required in heat generating processes in different industries. Conventional heat transfer liquids such as water, various oils are having low thermal conductivity and other transport properties. A vast research on Nanofluids has been carried out by the people around the world in the past two decades. A giant increase in thermal conductivity for the carbon nanotube based fluids has been reported by the several authors. In metal nanoparticle based nanofluids the surface area, surface plasmon resonance, interfacial resistance were the some of the factors responsible for conductivity increase. some authors have reported chain like structure formation within the liquid is also responsible for the conductivity increase. The objective of this research is to search for the green methods to produce nanofluids. One has to also discover the recycling methods for this kind of fluids after their use. The data in the literature and in our own study shows enhanced heat transfer efficiency in Nanofluids. The Rheological studies shows that viscosity of nanofluids plays an important role where the flow properties needs to be tuned. The study shows the future prospects of use nanofluids in engineering, green methods of synthesis, recycling and its environmental impact.

Keywords: Nanofluids; Heat transfer; Green synthesis; Recycling.

PA-47

Synthesis and Characterization of Fe-Ni-Cu Thin Film by Electro Deposition using Potentiostat Method

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Abstract

In the present work thin film of ternary Fe-Ni-Cu using electro deposition method by alloying multiple compounds. Ternary and higher compositions allow adjusting simultaneously the band gap and the lattice constants, allowing increasing radiant efficiency at wider range of wavelengths. FeNi and Cu/Zn doped FeNithin films were therefore grown onto the FTO conducting glasses at the deposition conditions (time 10 min, current 0.1 mA) by electro deposition method. The equimolarsulphate solutions of Fe, Ni and Cu were used for the deposition. The source of Fe, Ni and Cu was AR grade and the calculated amount Cu was added directly in to the reaction bath. The deposited samples were thin, uniform, tightly adherent with black color. The X-ray diffraction revealed that the nature of thin films polycrystalline with cubic structure. Spectroscopic and optical characteristics have been investigated by Shimadzu spectrophotometer in the range 200 nm to 900nm.The surface morphology of thin film was observed by using SEM.

PA-48

FTIR Studies on PMMA-Lino$_3$ Polymer Electrolyte

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Abstract

In the present study, flexible and freestanding solid polymer electrolyte (SPE) film based on poly (methyl methacrylate) complexed with lithium nitrate ($LiNO_3$) has been developed by solution casting method. Fourier Transform Infra-Red Spectroscopy technique has been employed to study the complex formation between polymer and salt.

PA-49

Preparation of Superhydrophobic Surface Using Hydrophobic Silica Sol

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Abstract

Designing the self-cleaning superhydrophobic surfaces is the ultimate goal of the materials scientists. Many surfaces are naturally superhydrophobic such as the lotus leaf, rose petal, gecko feet, shark skin, and insect wings. Generally, the superhydrophobic surface is high water repellent having water contact angle greater than 150° and the sliding angle of less than 10°. The superhydrophobic coating has many applications in the self-cleaning, oil-water separation, drag reduction, anti-corrosive, and so on. Here, we prepared water-repellent coating on the glass using sol-gel process by the dip coating technique. The silica sol was prepared by Sol-gel method using tetraethyl orthosilicate (TEOS) is a precursor of the silica particles. At first, in a mixture of ethanol and ammonia, TEOS was added drop by drop and stirring was continued for 1 hr for preparation of hydrophilic silica sol. After octadecyltrichlorosilane (OTS) was added and stirring was continued for 8 hr for modification of hydrophilic silica sol to hydrophobic. The cleaned glass slide was dipped and taken out slowly from silica sol and dried at room temperature. This process was repeated 20 times. The superhydrophobicity was achieved after annealing coated glass slide at 100º C for 1 hr. The prepared superhydrophobic was analyzed by measuring the water contact angle, water jet impact test, and adhesive tape test. The prepared superhydrophobic coating exhibit water contact angle 154º and roll off angle ~ 8º. The superhydrophobic coating is stable for water jet impact test. The prepared superhydrophobic surface showed self-cleaning behavior. The water contact angle reduced to 152º after 5 cycles of adhesive tape test. The highwater-repellent superhydrophobic coating can applicable to vehicle glass, solar panel, fabric and so on.

Keywords: Superhydrophobic; Silica sol; self-cleaning.

PA-50

Synthesis of *Z*-type Hexaferrite Material for Fabrication of Integrated Inductors

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Abstract

Z-typehexaferrite material was synthesizedsubject tostructural, magnetic, electrical and high frequency permeability properties, with an aim of using with low temperature cofired ceramic (LTCC) substrate material. Here, we report the stoichiometric variation of *Z*- hexaferrite ($Ba_3Co_xZn_{2-x}Fe_{24}O_{41}$) material prepared by combustion synthesis of neutral precursor solution. The hexaferritecontaining 2 wt% Bi_2O_3assintering aidwas sintered at 900^{o}C. All sintered hexaferrite specimen exhibit bulk resistivity greater than 10^9 Ω-cmand sintered density as high as 95%. The optimum magnetic properties were obtained for $Ba_3Co_{0.8}Zn_{1.2}Fe_{24}O_{41}$. The ferrite material exhibit permeability up to 7 and cut-off frequency above 1 GHz. The result indicates that the low-temperature-sintered $Ba_3Co_{0.8}Zn_{1.2}Fe_{24}O_{41}$ powder is well suited for fabrication of integrated inductors in LTCC technology in the ultra-high frequency range.

Keywords: Z-type hexaferrite; LTCC; Combustion synthesis; Permeability.

PA-51

Synthesis and Characterization of (BaSr)$PbTiO_3$ Material Compositions

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Abstract

The ferroelectric composition Ba(0.8-x)SrxPb0.2TiO3 (BSPTx) with x = 0.2 to 0.4 are synthesized using ceramic route of synthesis. From XRD, it is observed that with increase in x the c/a ratio decreases. From the observations of variation of dielectric constant (ε) with temperature, it is revealed that for x = 0.3 and 0.2, the BSPTx shows a relaxor behavior. On the other hand for all other compositions the phase transition is a diffused phase transition (DPT). For x = 0.3 and 0.2 the variation of Curie temperature (Tc) with frequency obeys the Vogel-Fulchar relation. The present observations suggests that, the BSPTx could be a useful ferroelectric system.

Keywords: X-ray diffraction, Dielectric Properties, Relaxor, Ferroelectricity.

PA-52

Sulphated tin oxide: An immensely potent and reusable catalyst for the synthesis of benzimidazole derivatives

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Abstract

In this research, we have developed new strategy for synthesis of benzimidazoles via condensing o-phenylenediamine and substituted aldehydes by adopting sulphated tin oxide as catalyst in water ethanol system (1:1-v/v) at reflux condition. The reaction was optimized for different solvents and loading of catalyst. The Synthesized compounds were examined by spectral data. The use of catalytic amount of sulphated tin oxide, solvent system, good atom economy and environmental affordability, easy work up makes this protocol green.

Keywords: sulphated tin oxide, o-phenylenediamine, benzaldehyde, reflux.