SAHAYOG

UGC-DAE CONSORTIUM *for* SCIENTIFIC RESEARCH

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Orientation Workshop on RADIATION SCIENCE and APPLICATIONS

An Orientation Workshop on Radiation Science and Applications was held from February 10-11, 2012 at Christ Church College, Kanpur organised jointly by UGC-DAE CSR, Kolkata Centre and Christ Church College, this workshop aimed to highlight research facilities at the Centers of the Consortium mainly Indore, Mumbai and Kolkata and the associated DAE institutions. This was done with the thought of making young students from colleges and universities and researchers aware of the immense possibilities of research using radiation and at the same time to identify research areas of overlapping interest to finally culminate into collaborative research projects between Kolkata Centre and the Universities and colleges represented in the workshop.

The workshop was attended by around 150 delegates including 20 Invited speakers. The selected participants were from different Universities and adjoining colleges in and around Kanpur like IIT Kanpur, Allahabad University, DAV College Kanpur, Sacred Heart College Kanpur, Andhra University, Manipur University, J K Institute of Radiology & Cancer Research Kamla Nehru Institute, Sultanpur, AIIMS, New Delhi, Panjab University.

The workshop was inaugurated by the Vice-Chancellor, CSJM University, Kanpur, Prof Ashok Kumar. Prof.V.K.Srivastava welcomed the delegates on behalf of the Christ Church College. Dr.A.K.Sinha, Centre Director UGC-DAE CSR Kolkata Centre gave a short overview of the workshop highlighting the role of the Consortium in reaching out to the Universities and colleges through such workshops resulting various academic. This was followed by the Presidential address by Dr. Pervez E Deen, the Principal Christ Church College. Prof. Ashok Kumar delivered the key note address, where he highlighted the importance of radiation in our lives.

The technical session had some interesting presentations, started off with a very lucid and interesting talk by Prof. H.C.Verma from IIT Kanpur. He spoke on the applications of Focussed ion beams, with a catchy title –"Hit a hanging film and it bends towards you-an application of focused ion beams". Dr.A.Malhotra spoke at length on the clinical applications of radioisotopes in the management of cancer and cardiac diseases. Dr.B.K.Banerjee, from NBRI, Lucknow spoke on genetic improvement of ornamental plants using radiation. Dr.V.Siruguri, Centre Director of the Consortium's Mumbai Centre gave an overview of the facilities at UGC-DAE CSR, Mumbai Centre and Dr.V.R.Reddy highlighted the facilities and research programs of the Indore Centre. Dr.V.S.Pandit and Dr.Sujit Bandopadhyay from Variable Energy Cyclotron Centre spoke on the Ion beam facilities at VECC and particle irradiation studies of super conductors. Dr. Sudeep Bhattacharya fromIIT Kanpur spoke on the use of micro and nano focused beams for new physics and applications while Dr. S.K.Tripathi gave a talk on ion beam induced modifications. Scientists of UGC-DAE CSR, Kolkata Centre made presentations highlighting the various facilities and research programs of the Centre. The workshop ended with a valedictory session conducted by the Principal of Christ Church College Dr.Pervez E Deen followed by distribution of certificates.

Theme Meeting on MATERIALS CHEMISTRY

Shri S.C.Chetal, Director, IGCAR, Dr. P. Chaddah, Director, UGC-DAE CSR, Dr. P.R.Vasudeva Rao, Director, Chemistry Group, IGCAR and Dr. G. Amarendra, Scientist In-Charge, Kalpakkam Node during the theme meeting. (Left); Delegates of TMMC-2012 theme meeting (Right)

A theme meeting on Materials Chemistry (TMMC-2012) was organised at the node during Feb 13-15, 2012 in collaboration with the Chemistry Group of IGCAR. About 30 faculty members from various colleges/educational institutions and 30 Scientists from IGCAR and UGC-DAE CSR had participated in the meeting. The workshop was inaugurated by Shri S.C.Chetal, Director, IGCAR with his inaugural address. Dr. P. Chaddah, Director, UGC-DAE CSR gave an overview of the activities of the Consortium in promoting University-DAE academic linkages. Dr. P. R. Vasudeva Rao, Director, Chemistry Group, IGCAR had outlined various research opportunities for collaborative research. The academic faculty have been exposed to frontier research being carried out in selected areas of materials chemistry at IGCAR through various focussed talks. The workshop concluded with detailed discussions between academic faculty and the scientists of IGCAR/UGC-DAE CSR for identification of possible areas of collaboration.

School on THIN FILM MAGNETISM

The UGC-DAE Consortium for Scientific Research (CSR), has established a series of front-line experimental facilities in the area of Thin film preparation and its characterization at its Indore Centre. On the preparation side, facilities include ultra high vacuum electron beam evaporation, Pulsed laser deposition (PLD), Ion beam sputtering, magnetron sputtering, Langmuir Blodgett technique etc. The prepared films can be characterized using several state of art facilities such as grazing incidence and normal 4-circle x-ray diffraction, x-ray reflectivity,

magneto-optic Kerr effect, Mossbauer spectroscopy, photo electron spectroscopy, Scanning Probe Microscopy, Raman spectroscopy, low temperature resistivity and magneto-resistance set up, magnetization measurements etc. In the last few years many researchers from the university system have utilized these facilities. Apart from these, new facilities viz. SQUID-VSM, FTIR and UV spectroscopy, scanning hall microscopy and ultra high vacuum scanning tunneling microscopy are recently added. In view of the increasing number of researchers working in thin films and their magnetic properties, CSR Indore Centre organized a school on Thin Film magnetism, during March 14-16, 2012. The objective of this school was to make potential users from universities and other academic institutions aware of the research possibilities using facilities established as said above. A total of about 50 participants attended this school. The participants virtually represented the whole country with participation from number of states across India. Pedagogical lectures culminating in the highlights of typical research works resulted from these facilities were discussed with a focus on future possibilities. Areas covered include GMR and CMR materials, dilute magnetic semiconductors, multiferroics, ferrites, inter metallic compounds and nano-structures.

After a brief welcome by Dr. D. M. Phase, the workshop was inaugurated by Dr. P. Chaddah, Director of the Consortium with some introductory remarks. Prof. Ajay Gupta, Centre-Director Indore provided an overview of historical development of thin film program at CSR Indore. Dr. R. J. Choudhary discussed about the utility of PLD technique in growing thin films of magnetic oxide materials. Dr. V. Ganesan introduced the fundamentals of scanning probe microscopy especially AFM and MFM techniques. Dr. T. Shriptahi highlighted the use of photo-electron spectroscopy for chemical analysis studies on thin films and nanostructures. Continuing the discussion, Dr. D. M. Phase elaborated the importance of Indus-1 synchrotron radiation source for photo-electron spectroscopic studies on thin films. Dr. A. Banerjee covered the basics on magnetic measurements and magnetic properties in reduced dimension. Dr. N. P. Lalla described about the electron microscopic studies on thin films and multilayers. Basics of Mossbauer spectroscopy were covered in detail by Dr. V. R. Reddy. Dr. R. Rawat detailed about the utility of scanning Hall microscopic studies on magnetic materials, while Dr. M. Gupta discussed about depth profiling of thin film multilayers using reflectometry (x-ray, neutron) and secondary ion mass spectroscopy. Dr. S. R. Barman briefed about surface studies using ultraviolet photoemission spectroscopy, inverse photoemission spectroscopy and scanning tunneling microscopy. Dr. V. Sathe explained the Raman spectroscopy technique and its importance in investigating the spin-lattice coupling in thin films. Dr. U. P. Deshpande covered the UV-Vis and FTIR spectroscopy, while Dr. S. Pandey discussed about angle-resolved photoemission spectroscopy. Dr. D. Kumar discussed in detail about the importance of magneto-optical Kerr effect as a non-destructive surface sensitive tool for investigating magnetic properties of the thin films and multilayers. Apart from the lectures, there were extensive lab visits where various demonstration of thin films preparation and characterization experiments were shown to the participants. There was a lot of time for the participants to discuss with the experts and among themselves.CSR students also participated in the school in the form of small academic presentations highlighting their research findings. In essence, the three day school was received well and appreciated by all the participants.

Awareness Workshop organised at Department of Physics, Utkal University

An awareness workshop on "The facilities of UGC-DAE Consortium for Scientific Research (UGC-DAE CSR)" was held at the Department of Physics, Department of Physics, Utkal University, Bhubaneswar, Orissa during March 23-24, 2012.

The workshop started with a brief inaugural function. Prof. P.K.Sahoo, Vice Chancellor, Utkal University inaugurated the workshop. Prof. P.K. Sarkar, Chairman PG Council, Utkal Univ., welcomed the gathering. Prof. S.Mahapatra, Head, Department of Physics presided over the inaugural function of the workshop. Prof. N.C. Mishra proposed the vote of thanks. Prof. Ajay Gupta delivered his inaugural address highlighting the motive of the workshop and invited researchers from universities and colleges to actively participate in the research programs of CSR that will be a mutually beneficial one. About 60 participants attended the workshop from all the major academic institutions of region close to Bhubaneswar, apart from the local participants.

Lectures were delivered by the Scientists of Consortium. Prof. Ajay Gupta delivered a talk covering "Overview of facilities at UGC-DAE CSR, Indore centre". Dr. V. Siriguri delivered a talk covering "Overview of facilities at UGC-DAE CSR, Mumbai centre". Dr. A. Banerjee delivered two talks covering "Low temperature and high magnetic field facilities & Scanning Probe microscopy". Dr. N.P. Lalla delivered a talk on "Transmission Electron and Scanning Electron Microscopy". Dr.R.J.Chourdhary delivered two talks on "Photoelectron microscopy" and "Thin film preparation and characterization-I". Dr.A.Saha delivered a talk on "Overview of facilities at UGC-DAE CSR, Kolkata centre". Dr.V.R.Reddy delivered two talks on "Mossbauer and Raman Spectroscopy" and "Thin film preparation and characterization-II".

Dr. M.V. Rama Rao of ITER, SOA delivered a talk on "Electronic Properties of disordered Transition Metal alloys" and Dr. T. Som of IOP delivered a talk on "Experimental Condensed Matter Physics Research at Institute of Physics". The participants raised questions about various current scientific issues that were answered by the speakers and senior scientists in the gathering.

National Workshop on Experimental Proposals and Possibilities for the NUCLEAR STUDIES WITH INGA AT VECC

The current campaign of the Indian National Gamma Array (a multi clover array set up as a National Collaboration between the Universities & the Institutes) at TIFR is likely to be completed around this year end. The next campaign of INGA, in part, is being considered to be at VECC for experiments using the light ion beams. Routinely protons (~ 7–20 MeV) and alpha (~ 28 - 65 MeV) beams are available from the recently upgraded room temperature K130 Cyclotron at VECC.

A thematic user workshop National Workshop on Experimental Proposals and Possibilities for the Nuclear Studies with INGA at VECC was organized at VECC, during May 22-23, 2012 to deliberate on the possible experiments for the VECC campaign.

The envisaged configuration of INGA at VECC would have about 12-14 Clover detectors with the possibility of replacing a few clovers with LEPS detectors. The workshop commenced with a brief introduction to the various elements of the array when housed at VECC, by Dr. S. R. Banerjee, the User Co-ordinator, VECC and Prof. A. Goswami, Dr S. S. Ghugre and Dr Sarmistha Bhattacharya, members of the local PICC for

INGA at VECC.

This was followed by two days of intense discussion on the various facets of nuclear structure physics using light ions planned to be pursued in the aforesaid INGA campaign. There were around 29 presentations of which 15 were from the Universities (including IIT) and the rest were from the Institutes.

A few of the presentations highlighted the unique possibility of accessing the exotic nuclear shapes of contemporary interest such as tetrahedral symmetry using light ions. A few presentations emphasized the interesting physics in the Rare earth region such as the possibility of condensation of octupole phonons in ^{150}Sm, or the observation of octupole excitations around ^{146}Gd, hitherto inaccessible using the heavy-ion accelerator facilities available in the country. Some of the presentations also brought out the possibilities for pursuing experiments with cross-disciplinary impacts, one of them being spectroscopy of ^{136}Cs that has implications on neutrino less double beta decay. One presentation highlighted the use of standard gamma ray spectroscopy in Perturbed Angular Correlation measurements which is of relevance in disciples such as Material Science, Chemistry.

A salient feature of this workshop was that a majority of the presentations were from young faculties from the Universities, most of whom had used the INGA facility as research scholars for their respective Doctoral thesis.

Awareness Workshop – GITAM Institute of Science, GITAM University, Visakhapatnam June 26 – 27, 2012

A two day awareness workshop of UGC-DAE CSR was organized by the Mumbai Centre of the Consortium in association with GITAM Institute of Science, GITAM University, Visakhapatnam during 26 – 27 June, 2012. The main objective of the workshop was to create awareness among researchers from various universities, colleges and other academic institutions in the region on the kind of research that can be carried out using the highly sophisticated research facilities available at the different Centres of the Consortium with special emphasis on neutron scattering facilities at the Dhruva reactor, BARC available through the Mumbai Centre. About 50 participants registered for the workshop. There were about 27 faculty members and 23 students including those from GITAM University. The speakers for the workshop were drawn from the faculty of all three Centres of the Consortium and DAE Institutions; BARC and RRCAT, and GITAM University. The workshop was formally inaugurated Prof. D. Harinarayana, Pro-Vice Chancelor of GITAM University. Dr. V. Siruguri, Centre Director, Mumbai Centre of the Consortium explained briefly the mandate of UGC-DAE CSR and, in particular, that of Mumbai Centre. Dr. P. D. Babu, one of conveners, explained the purpose of the workshop. Prof. N. Lakshmana Das gave a vote of thanks.

The workshop consisted of 12 lectures spread over two days. The first lecture was given by Dr R. Mukhopadhyay, BARC, who gave an overview of National Facility for Neutron Beam Research (NFNBR) and described various neutron scattering facilities at BARC. Following this, Dr. Siruguri gave a lecture on basics of neutron scattering, where he explained the various scattering processes and the interaction mechanisms of neutron with condensed matter. Prof. Ajay Gupta, Centre Director, CSR Indore, gave an overview of thin film and multilayer research activity at Indore. He described with several examples how x-ray reflectivity could be used to study various thin films and multilayers. Dr. V.K. Aswal, BARC, delivered a lecture on small angle neutron scattering and its applications, especially in soft mater and biological systems. This was followed by an energetic talk on overview of Indus synchrotron facilities by Dr. Tapas Ganguly, RRCAT along with the results obtained using these facilities. He also gave details of various instruments that are already operational and those which would be available soon. The last session on day one was on neutron activation analysis (NAA). While Dr. R. Acharya, BARC talked about the basic principles and methodology of neutron activation analysis, Prof. Lakshmana Das dwelt on the applications of NAA to archeological studies, mainly related to earthenware samples excavated from Buddhist sites around Visakhapatnam and other parts of Andhra Pradesh.

The second day of the workshop began with the lecture by Dr. S.K. Deshpande, CSR Mumbai on broadband dielectric spectroscopy facility at Mumbai Centre. He gave details of various features of the facility and described results using several examples. This was followed by a lecture by Dr. P.D. Babu on the neutron powder diffractometer built and installed by the Mumbai Centre. He explained various aspects of the diffractometer and unique sample environment of low temperature and high magnetic fields with several results obtained using this facility. He also described the newly installed 9 Tesla PPMS based vibrating sample magnetometer with resistivity option. The next talk was given by Dr. S. Rayaprol, CSR Mumbai Centre on the Reitveld refinement method. He described the Rietveld method and demonstrated with number of examples how it can be effectively used to extract information from x-ray or neutron powder diffraction data. Dr. V. R. Reddy, CSR Indore, described various low temperature facilities that available at Indore Centre giving brief description of each facility with examples. The last talk of the workshop was given by Dr. J.B.M. Krishna, who described the radiation based research activity at CSR Kolkata Centre.

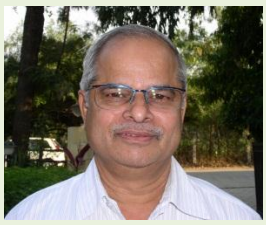
The workshop ended with a feedback and concluding session where participants gave their feedback and certificates of participation were distributed. This session was preceded by presentations by three participants, who described their research activity. Participants felt that the workshop was very useful and many of them were made aware of the facilities that are available at CSR centres.

Student awareness programme: Summer Training in Physics and Chemistry (STIPAC-2012)

A visit to the UGC-DAE CSR, Kalpakkam Node facilities was arranged for the students from different institutes undergoing summer training projects at IGCAR, Kalpakkam on 30th of June, 2012. The visiting students were graduates and undergraduates from both physics and chemistry background and from different institutes and colleges from across the country. A talk on the introduction to a career in scientific research was delivered by Dr. G.Amarendra. He also elaborated on the various opportunities available to pursue a career in science. Subsequently, the students were shown around the laboratories and introduced to the various existing instruments. They were also briefed about the various applications of the various instruments.

Students of STIPAC-2012

Editorial



One of our mandates is to create awareness of the facilities available in the Consortium as well as the "big-science" facilities of Department of Atomic Energy among the university research community of the country. We also hold thematic workshops to motivate young researchers to carry out their research programme by utilising the expertise available in the Consortium. This issue briefly reports seven such workshops held in various cities during the last six months period. We also keep adding new state-of-the-art instruments for our user community, and this issue of our ***Newsletter*** *announces addition of two more instruments – 9-Tesla PPMS-VSM and FIB-SEM at our Mumbai Centre and Kalpakkam Node, respectively.*

There is also a report on National Science Day activity.

Online edition of ***SAHAYOG*** *now has a large reader-base in the world research community. It is a matter of great pride to us that scientific articles which appear in our* ***Newsletter*** *are being cited in research publications. One such instance from Princeton University was brought to our notice recently by Dr. V. Siruguri. We invite brief articles from our user community with interesting results obtained utilizing the Consortium facilities.*

I acknowledge all our contributors and the Director of the Consortium for encouragement and support.

T. Shripathi

Talks by CSR faculty / Students:

1. Dr. D. Das: "57Fe Mossbauer spectroscopy : a microscopic technique to evaluate nanomegnetism" at Second International Conference on Nanomaterials-Synthesis, Characterization & Applications held at Mahatma Gandhi University, Kottayam, Kerala, January 12-15, 2012.
2. Dr A. Saha :"Functional Luminescent Quantum Dots: Synthesis and Biological Interfacing", International Conference on Nanomaterials: Synthesis, Characterization and Applications, held at Mahatma Gandhi University, Kerala on January 12-15, 2012.
3. Dr. P. Chaddah: "Slow decay studies across 1st order magnetic transitions", at the conference on "Contemporary Issues in C ondensed-matter Science", Bangalore, January 30–February 1 2012.
4. Dr. D.M. Phase: "Development of Magnetic Circular Dichroism beamline on Indus-2" at International Conference on Recent Trends in Physics, Dept. of Physics, DAVV, Indore, Feb. 4, 2012.
5. Prof. Ajay Gupta: "X-ray study of interfaces in magnetic materials" at International Conference on Recent Trends in Physics held at School of Physics, DAVV, Indore, February 4-5, 2012
6. Dr. Mukul Gupta: "Surfactant Mediated Growth of Magnetic Multilayers: A Neutron Reflectivity Study", International Conference on Recent Trends in Physics, SOP, DAVV, Indore February 4 – 5, 2012,.
7. Dr. P. Chaddah:"Glass-like arrested states across 1st order magnetic transitions", at the J.A.Krumhansl Symposium on "Unifying Concepts in Materials: 2012" (JAKS 2012) at Bangalore, February 6- 8, 2012.
8. Dr. S.R. Barman: "Bulk electronic structure of quasicrystals studied by hard x-ray photoemission" at workshop entitled Hard X-ray Photoelectron Spectroscopy and Standing Waves : Status and Trends, ESRF, Grenoble, France, February 6 & 8, 2012.
9. Dr. S. Rayaprol: "Magnetism of Novel Oxide Compounds" in Physics Colloquium arranged by Solid State Physics Division, B A R C - Mumbai on February10, 2012.

10. Dr. D.M. Phase: “Photoelectron studies using laboratory and synchrotron sources” at DAE-BRNS theme meeting on Materials Chemistry (TMMC-2012) at UGC-DAE CSR, Kalpakkam Node, IGCAR, Feb. 13, 2012.
11. Dr. D.M. Phase: “Pulsed laser deposition of magnetite thin films” at “Workshop on Nanotechnology and Intellectual Property Rights and Patents in Science and Technology from Nanotechnology Perspectives” at Dr. Babasaheb Ambedkar Marathwada University, Aurangabad February.16-17, 2012.
12. Dr V. Siruguri: “Probing structure of condensed matter with neutrons” 3rd National Conference on Condensed Matter and Materials Physics, Sardar Patel University, Anand, March 1, 2012.
13. Dr. V. Ganesan: “Current Trends in Low Temperature Physics” at the National Workshop on “Functional Oxides, Nanomaterials and Devices” at Saurashtra University, Rajkot, March 1-2, 2012.
14. Dr. R. Rawat: “Magnetotransport studies of glass like magnetic states” at National Workshop on Functional Oxides, Nanomaterials and Devices held at Saurashtra University, Rajkot, March 1-2, 2012.
15. Dr A. K. Sinha: "Ion Beam Assisted Surface Nano patterning", in the "Conference on Advanced and Functional Materials", S N Bose National Centre for Basic Sciences, Kolkata, March 01-12, 2012
16. Dr. T. Shripathi: “Electron Spectroscopy for Chemical Analysis, Part I: Basics” at Refresher Course, DAVV, Indore, March 3, 2012
17. Dr. D.M. Phase :“Resonant photoemission studies of dilute magnetic semiconducting oxides thin films” at “National Conference on Characterization techniques for Physical, Chemical and Biological analysis” at Waghire College, Saswad, by BCUD, Univ. of Pune, Pune, March 3, 2012.
18. Prof. Ajay Gupta: “Nanoripple formation on Si(100) surface using low energy ion irradiation” at National workshop on Applications of Ion Beam in Device Fabrication and Technology” held at School of Instrumentation, DAVV, Indore, March 5-6, 2012.
19. Dr. Mukul Gupta: “Self-Diffusion Measurements Using Secondary Ion Mass Spectroscopy (SIMS)”, Applications of Ion Beam in Device Fabrication and Technology” held at School of Instrumentation, DAVV, Indore, March 5-6, 2012.
20. Dr A. K. Sinha: “Spectroscopy near the Island of inversion”, at Frontiers in Gamma Ray Spectroscopy 2012, held at the IUAC, New Dehi, March 5 – 7, 2012
21. Dr S. S. Ghugre: “Shell Model Calculations for N ~ 20 , A ~ 30 nuclei approaching the island of inversion”, at Frontiers in Gamma Ray Spectroscopy 2012, held at the IUAC, New Dehi, March 5–7, 2012.
22. Dr. T. Shripathi: “Electron Spectroscopy for Chemical Analysis, Part II: Applications” at Refresher Course, DAVV, Indore, March 9, 2012
23. Dr V. Siruguri: "UGC-DAE CSR: an Indian NMI3 with a difference” DAE-BRNS Theme meeting on Neutron Scattering Science and Applications, BARC, Mumbai, March 12-13, 2012.
24. Dr. Mukul Gupta: “Recent studies in thin film multilayers using neutron reflectivity”, DAE-BRNS Theme Meeting on Neutron Scattering Science and Applications,, BARC, Mumbai, March 12-13, 2012.
25. Dr. D. Das: “Defect Characterization on ZnO nanostructures by positron annihilation and photoluminescence spectroscopy” at Trombay Meeting on Positrons in Materials, Medicine and Industry at BARC, Mumbai March 12- 14, 2012.
26. Dr. R. Raut: “Nuclear Structure Pursuits in India : Aspirations, Endeavours and Achievements” at “Opportunities for Nuclear Physics Research in India”, Raniganj Girls College, Burdwan, March 15, 2012.
27. Dr. G.S. Okram: Thermoelectricity in nanostructure, National conf. Adv. Mater. Engg. Technology, Nagpur, March 16, 2012.
28. Dr. V. Ganesan: “Correlated Electron Systems – Some Interesting Examples” during the National Conference on “ Current Trends in Materials Research” during Mar 17-19, 2012.
29. Dr. P. Chaddah: “Research in institutes of higher education: Some new challenges”, at the National Seminar on Innovations, Opportunities & Challenges in Technical Education, at SGSITS Indore, March 24-25, 2012.
30. Dr. M. Sudarshan: “Trace Elements Research using Low energy Accelerators” at the Two day National Workshop cum Theme meeting on Accelerator based Interdisciplinary Research in Basic Sciences held at Guru Ghasidas University, Bilaspur, March 28-29, 2012.
31. Dr. G.S. Okram: Tapping electricity from waste heat, Physics Department, Tezpur University, Tezpur, May 3, 2012.

32. Dr.S.K.Deshpande: "X-ray Analysis of Thin Films" at the Workshop on Powder X-ray Diffraction and Small Angle Scattering held at IISER Pune, during May 15-16, 2012.
33. Dr. P.D. Babu: "study of magnetic materials through neutron diffraction" at the workshop on powder x-ray diffraction and small angle scattering held at IISER, Pune, organized jointly by IISER and NCL Pune, May 15-16, 2012.
34. Dr. G.S. Okram: Harvesting electricity from waste heat: A material's aspect, Physics and chemistry Departments, Manipur University, Imphal, May 16, 2012.
35. Dr. G.S. Okram: Electricity from waste heat: A Perspective, National Seminar cum Workshop on Physics for Cultural Heritage, DM College of Science, Imphal, May 25, 2012.

Foreign Visits by Faculty and Students of CSR:

S No	Name	Place visited	Date	Purpose
1.	Dr. S.R. Barman	ESRF Grenoble, France	Feb. 5-9, 2012	To deliver a talk and to have discussions
2.	Mr. S. M. Amir	Photon Factory, Japan	February 28 – March 4, 2012	Anomalous X-ray reflectivity measurements at the Indian Beamline
3.	Mr. Satish Potdar	Photon Factory, Japan	February 25 – March 7, 2012	Anomalous X-ray reflectivity measurements at the Indian Beamline
4.	Dr.D.M.Phase	Photon Factory, Japan	April 20-23, 2012	To perform experiments at the Indian Beamline
5.	Ms. Komal Bapna	Photon Factory, Japan	April 20-23, 2012	To perform experiments at the Indian Beamline
6.	Dr. S.K. Deshpande	Elettra Synchrotron Facility, Trieste, Italy,	April 29-May 6, 2012	To carry out XAFS experiments under ICTP-Elettra Users Programme
7.	Mr. Gagan Sharma	ILL, Grenoble, France and DESY, Germany	May 3-10, 2012 and May 10-17, 2012	To carry out Neutron Reflectivity and Nuclear Forward Scattering Experiments.
8.	Prof. Ajay Gupta	ILL, Grenoble, France and DESY, Germany	May 4-10, 2012 and May 12-16, 2012	To carry out Neutron Reflectivity and Nuclear Resonance Scattering Experiments.
9.	Dr. Dileep Kumar	DESY, Germany	May 12 16, 2012	Utilization of the synchrotron radiation at PETRA-III,
10.	Mr. Sunil W. D'Souza	PSI, Switzeland	June 10-13	To attend Conference
11.	Dr. S. Rayprol	ILL, Grenoble, France	July 1-6, 2012	To carry out Neutron Diffraction Experiments.
12.	Dr. V. Siruguri	ILL, Grenoble, France	July 1-6, 2012	To carry out Neutron Diffraction Experiments.

New Appointments:

Mr. Uday Prabhakarrao Deshpande joined CSR Indore Centre in January, 2012 as Scientist-D.

He did his M.Sc. (Physics) from Marathwada University, Aurangabad and has submitted his Ph.D. thesis recently to DAVV, Indore. Synthesis and study of electronic and optical properties of metal oxide nanomaterials is his area of interest. From 1997 to 2002 he contributed to neutron beamline project and setting up light scattering facility at CSR Mumbai centre. Later, at CSR Indore centre, he has helped several university researchers in their XPS and optical charecterization (FTIR and UV-VIS spectroscopy). He has published several papers in reputed journals.

Dr. Sovik Chatterjee joined CSR Kolkata Centre in January, 2012 as Scientist-D.

He completed his PhD (science) degree (Thesis title: "Magnetic Behaviour of Transition Metal Based Heusler Alloys") under the supervision of Prof. Subham Majumdar at IACS, Kolkata. His research work dealt with unique physical properties of Heusler based alloys and some related materials with particular focus on the effect of the first order magneto-structural transition on electronic and magnetic state of the materials. His present research activity involve - Magneto-structural instability in Heusler type and other transition metal alloys, Giant Magnetoresistive and Magnetocaloric materials, Electronic phase separation in transition metal oxides, Investigations on iron based superconductors.

Mr. Bhushan Jain joined CSR Indore Centre in January, 2012 as Engineer-D

He has completed BE (Electrical Engineering) from SGSITS, Indore in year 2006. He has been working at Indore centre as Junior Engineer since 1997 and has been looking after new internal and external electrical works, installation and maintenance of 33 KV substation, Power distribution, Capacitor banks, Diesel Generator sets, UPS, Refrigeration, Air conditioning, EPABX, intercom, Fire alarm and detectors, lighting etc. for the CSR labs as well as at the guest house. His area of interest is electric supply system design, energy audit and power electronics.

University researchers are encouraged to submit collaborative research proposals for long term use of CSR facilities. Under the scheme, one can avail limited funding for research fellowships, consumable items and travel support.

Proposals can be submitted at any time of the year to respective Centre-Directors / Scientist in-charge in a prescribed format available in CSR website (www.csr.res.in).

Science Day 2012

National Science day 2012 was celebrated at the consortium on 28th February 2012. The event started with Dr. Sathe describing the Raman effect and historical events and importance of discovery of Raman effect. His short lecture gave illustrations of basic principles and equipments used by Raman and his co-workers.

Then two scientific lectures were delivered by the invited speakers, Dr. Alok Banerjee and Dr. N.P. Lalla of the Consortium.

Dr. Banerjee gave a talk on "History dependent nucleation and growth across first-order transition : Relation to some real life phenomenon". At the outset, he highlighted the importance of inculcating scientific temperament in the general population, particularly in students. He started the lecture with a counter intuitive, age-old, observation of "hot water freezes faster than the cold". This folklore statement is analogous to a scientific situation when a system farther from equilibrium approaches equilibrium faster compared to a system that is closer to it. This scenario of "overtaking while approaching equilibrium" is recreated in the systems showing magnetic field (H) and temperature (T) induced magnetic first-order transition. He explained basic principles of first-order transition and brought out their importance in physics as well as in real life. He discussed in detail the nucleation and growth process and how the number and size of nucleation centres varies with external parameters like H and T. Initial states with different fractions of non-equilibrium phase are created at low-T by traversing different H-T paths. Then they are taken to some elevated temperature in fixed H and allowed to equilibrate with time. It is shown through magnetization measurement that, very often, the state with initially higher fraction of non-equilibrium phase approaches equilibrium faster and in the process meets and crosses the state initially having lower fraction of non-equilibrium phase, contrary to the expected process of meet and merge. This apparently counter intuitive observation is explained on the basis of H-T history dependent nucleation and growth process. The states initially farther from equilibrium will have nuclei of smaller sizes but larger surface area and would grow faster. The talk ended with lively discussion of the speaker with the audience.

The second talk was given by Dr. N.P. Lalla on "Kinetic arrest of first-order R-3c to Pbnm phase-transition in supercooled $La_xMnO_{3+\delta}$ (x= 1 & 0.9)". The speaker started with explaining the basic Landau theory of first order transition with special emphasis on supercooling and kinetic arrest. The phenomenon of "kinetic-arrest" plays a key role in the "glass-transition" in stable glass-formers. A "glassy-phase" is realized during a first-order liquid to solid phase transition, in which molecular motion gets kinetically arrested before crossing the supercooling spinodal. Thus during "kinetic-arrest" the relaxation rate of atomic-rearrangement of the parent liquid-phase lags behind the rate of latent-heat extraction resulting in a "frozen disordered arrangement" similar to that of the liquid and therefore, until recently, it as mostly been discussed in the context of disorder-disorder (liquid-glass) transition. But in recent past this very concept of "glass-transition" has been extended to order-order magnetic phase-transitions in a variety of materials ranging from intermetallics, manganites, magnetic-shape-memory alloys and multiferroics. In his presentation Dr. Lalla described the occurrence of "kinetic-arrest" of an order-order first-order structural phase-transition i.e. a R-3c to Pbnm phase-transition in a supercooled $La_xMnO_{3\pm\delta}$ (x= 1 & 0.9). Structural studies had been done employing low-temperature transmission electron microscopy (LT-TEM) and low-temperature x-ray diffraction (LT-XRD) techniques. It was shown that R-3c structure of $La_xMnO_{3\pm\delta}$, below its ferromagnetic transition temperature, is metastable and prone to transformation to a Pnma structure when initiated by e-beam trigger. The e-beam transformed Pnma phase was found to transform back to R-3c through a first-order phase-transition occurring close to T_C, during heating.

New Instruments

Re-liquefier based 9 Tesla PPMS –VSM:

The Physical Property Measurement System (PPMS) with VSM and resistivity probes, acquired from Quantum Design, USA, was installed in the first week of August, 2012 at Mumbai Centre. This facility requires an initial charge of liquid Helium (LHe) when started from warm condition as it is driven by a closed cycle refrigerator based re-liquefier to re-liquefy the evaporated gas and send it back into the system. The re-liquefier maintains the LHe level subsequently. Sample temperature can be varied from 1.9K to 400K and magnetic field can be varied from 0 to ±9Tesla at any temperature. The rated VSM sensitivity is $1x10^{-6}$ emu. Various types of samples in the form of powders, chunk/pieces and films can be handled for measurements, but the maximum size should be less than 5 mm.

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FIB-SEM AURIGA from M/S Carl Zeiss,Germany:

The new CrossBeam Workstation (FIB-SEM) from M/S Carl Zeiss uses the best-in-class FIB column and the proprietary GEMINI e-Beam column together with a completely new designed vacuum chamber for advanced surface characterization has been installed at the Kalpakkam Node of UGC-DAE CSR, in June 2012. Some of the important features are :

- Innovative FIB technology with best-in-class resolution (< 2.5 nm)
- High resolution live FE-SEM monitoring of the entire preparation process
- Advanced gas processing technology for ion and e-beam assisted etching and deposition

Photograph of FIB-SEM AURIGA instrument from M/S Carl Zeiss, Germany.

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