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# CSIR NEWS

*Progress, Promise and Prospects*

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## C O N T E N T S

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*Visits CGCRI, Kolkata*



*Equity in Healthcare*



*Video Conferencing Facility  
at NGRI*



*Wishes  
its Readers a Very  
Happy New Year 2010*

website: <http://www.csir.res.in>



### Her Excellency Mrs. Pratibha Patil, the President of India Briefed on Coral Transplantation Initiative of NIO

Her Excellency Mrs. Pratibha Patil, the President of India, during her visit to the Lakshadweep, took keen interest in knowing about the diversity of the corals, their biology including ecological and economic importance.

During her visit, Dr. M. V. M. Wafar, a senior scientist (now retired) at the National Institute of Oceanography (NIO), Goa, explained to her about corals and accompanied her along with other officials of Lakshadweep Administration to the reef and lagoon. Dr Wafar also explained the initiatives taken by NIO for the restoration of the reef by coral transplants that are being carried out at Lakshadweep.

Her Excellency Mrs. Pratibha Patil, was appreciative of the steps that have been taken by NIO and UTL to survey the reefs, create manpower and restore the reefs by coral transplantation. She and her team were also presented the copies of a book, entitled *101 Questions on Corals*.

Coral reefs in India have been under stress for quite some time. Lakshadweep reefs bore the brunt of coral mining, souvenir coral collection, ground water pollution and mechanical damages owing to activities like dredging. While efforts led by scientists could identify these issues and suggest remedies, NIO realized that the conservation of coral reefs at Lakshadweep could be only successful if the local populations are involved in the project.

As corals are distributed below water surface, at a depth of 50 m, assessment of their well-being and management requires competence in SCUBA diving and observation skills. In order to achieve these two objectives, NIO created dive centres in Lakshadweep, acquired diving kits, trained a broad spectrum of stakeholders ranging from officers, wardens, scientific staff to unemployed local youth from all 10 islands of Lakshadweep.

A basic training was focussed on coral reef monitoring that does not require extraordinary skills but still could produce adequate data for the management policies. The output of all these activities is the creation of a community team that is competent to monitor their own ecosystem on a regular basis and report damages to the managers. This has enhanced awareness on the importance of coral reefs and societal commitment to conserve them.



Picture A was taken during December 2004 when the experiment was initiated whereas Picture B, taken in December 2007, indicates the growth of corals and restoration of the reef

The current initiative, with the societal target, is focussed on the transplantation of corals in order to repopulate damaged coral reef areas. During the last two years, the





technique has been tested and found to be suitable. It is also simple enough to be used by the local population with limited or no knowledge of corals. On the occasion Dr Wafar expressed, "I am in the process of transferring this to a community-involved exercise in all

islands so that reef restoration is enhanced and additional income generated for the local population by way of fish catch from near the transplantation site."

The project that began in the year 2000, has made a noticeable impact in

the relationship between the local population of Lakshadweep islands and their immediate environment, the coral reefs. NIO hopes that such efforts would bear fruits in the form of restoration of our damaged environment which is otherwise very difficult to recover.

## Shri Prithviraj Chavan, Minister of State (I/C), Science & Technology and Earth Sciences, Government of India, Visits CGCRI, Kolkata



Shri Prithviraj Chavan, Minister of State (I/C), Science & Technology and Earth Sciences delivering his address at CGCRI, Kolkata

**S**hri Prithviraj Chavan, Hon'ble Minister of State (I/C) for Science & Technology and Earth Sciences, Government of India and Vice-President, CSIR, visited the Central Glass & Ceramic Research Institute (CGCRI), Kolkata, on 7 December 2009. The Minister met the senior scientists and unit Heads of the Institute. During the meeting, Dr. D.K. Bhattacharya, Director, made a presentation on the recent achievements and the future plans of CGCRI.

While interacting with the scientists, the Minister conveyed the key message

that CSIR brand should be developed and be known to all. He also emphasized that it was crucial for a CSIR laboratory to make the costing about a technology developed by it in an appropriate manner, and make the recipients of the technology pay accordingly. This should be true even if the recipient is the strategic sector.

The Minister further stressed that more than papers and even patents, it is the technology for the masses and the general industry that were important.

During the visit, the Minister was taken to the following laboratories/



Hon'ble Minister during the visit: **Left:** Having a discussion on the need of technology development in a business-like manner. On his left is Prof. I. Manna, Director Designate. **Right:** Dr. Sibdas Bandyopadhyay, Head, Ceramic Membrane Division explaining the Minister regarding the achievements of CGCRI in water



## MINISTER S&T & EARTH SCIENCES' VISITS



Hon'ble Minister during his visit: **Clockwise from top left:** Standing in front of the exhibition stall specially made for him by the Non-oxide Ceramics Division (NOCD) and Refractories Division along with others; Examining a specialty fibre optics produce developed by CGCRI; Visiting the semi-automatic plant for the fabrication of RSW blocks; Dr. D. Basu, Head, Bioceramics & Coating Division, explaining the achievements of the Division

facilities: Fibre optics laboratory; Ceramic Membrane Division; Non-oxide Ceramics & Fabrication Building; Bioceramics Division and Glass Division. At the Bioceramics Division, an exhibition was arranged to showcase the achievement of the following three Divisions: Bioceramics & Coating Division, Sensor & Actuator Division and Nano-structured Materials Division. During the visits, the Minister took active interest to know and understand various activities.

The address made by the Minister,

was an educative one. He explained the Government policy on the need for the development of relevant technologies and the expectations that the Government was having on the roles that CSIR should take. Particularly, he mentioned on the thrust areas such as Solar Mission, Water Mission, and Environmental issues. He reiterated that CSIR must find and develop its own brand name, which should be known and appreciated by the society and the nation.

At the end of the visit, the Minister

made the following remarks in the Visitor's Book of CGCRI:

“Long overdue visit to CGCRI has materialized today. The Institute over the years has produced very rich research and produced critical technology. It has served an important strategic sector. With the emerging challenges in the area of Fuel Security and Water, CGCRI can play a vital role. I am sure the Institute will focus on critical areas more sharply. My best wishes to the Director, HoDs and Staff”.





## CSIR Paves the Way for Equity in Healthcare Open Source Drug Discovery (OSDD)

*Dr P. Cheena Chawla*

Countless diseases afflict humankind all over the globe. What differentiates one individual from another with respect to tackling the menace of myriad illnesses is the sheer access to healthcare. Social injustice in health arises primarily due to lack of information and financial barriers that invariably deprive the poor, in any community, from a fair opportunity to attain good health. Needless to say, for enhancing equity in healthcare, it is crucial to have effective health policies that timely bring the fruits of modern technologies to improve the health of the financially weaker individuals of society.

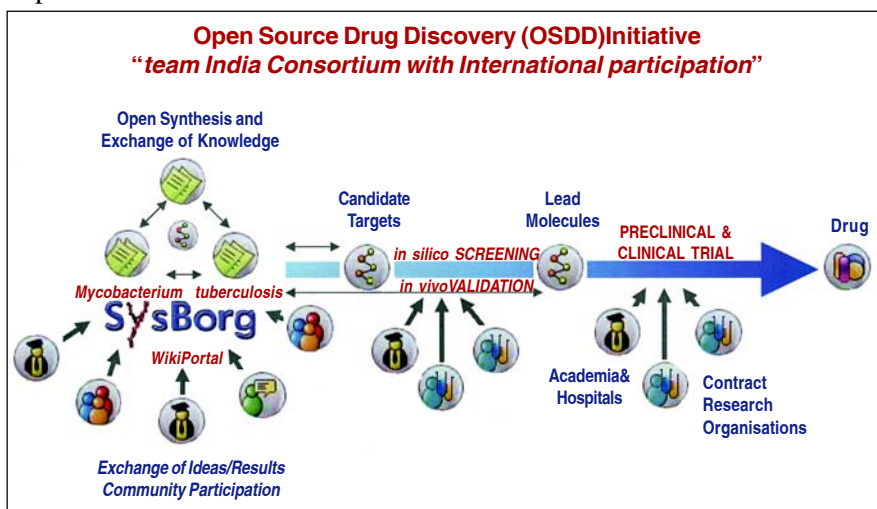
The high cost of a drug is mainly due to the huge monetary investment that has gone into developing that formulation. It is a hard fact that pharmaceutical companies go through a long, tough struggle to bring a brand new drug in the market, which may or may not become the standard treatment for a major disease. The journey of a new drug formulation from the laboratory to the market takes normally more than a decade of research involving both arduous bench work and millions of dollars, with no guarantee of success, as many a times even after years of investment of time and money, the new drug is unable to hit the market.

New drug research involves several stages of pre-clinical and clinical trials. Only on successful completion of all these studies, which evaluate the efficacy and safety of the new drug, that the latter gets the final stamp of approval from the drug regulatory authorities of the country. It is all for this jubilant moment – akin to winning a jackpot – that pharmaceutical companies heavily invest and patiently wait for years, as the market returns from the sale of a new drug would be stupendous. However, only a few contenders in this race of new drug development succeed to reach the endpoint. No doubt then why most pharmaceutical companies prefer to just license the marketing rights of a drug from the original discoverer

or they create and market generic versions of drugs developed by others.

In this light, just imagine a scenario where scientists from various research institutions worldwide, both public and private, join hands to collaboratively work to discover new drugs for a target disease. This is open source model of drug discovery that is poised to give even brilliant young researchers in colleges and universities an opportunity to contribute to the design and development of new drugs. Undoubtedly, the free flow of information amongst different sources on diverse aspects of drug discovery research would speed up the unraveling of new molecules that could become components of novel drug formulations to fight a particular disease. Sure, this model involves the coordinated activities of scientists from different areas like molecular biology, biophysics, biochemistry, chemistry and genetics to name a few.

Thanks to the Open Source Drug Discovery (OSDD) initiative of CSIR, today it is possible to establish a novel open source platform for both computational and experimental technologies to discover new drugs for infectious/neglected diseases that are affordable to the poor populations of the developing world. According to Prof. Samir K. Brahmachari, Director General CSIR and Chief





## OSDD project Work Packages

WP1	Targets all nontoxic sites
WP2	Expression of targets
WP3	Screen development
WP4	Insilicodocking, identify a library of chemicals for specific screen
WP5	Microarraygene expression for human cells tissues with the best inhibitors
WP6	Lead optimization on the non-toxic hits
WP7	Medicinal chemistry Synthesis of analogues which have nanomolecular binding to the target
WP8	Proteomics based lead affinity column to check for human cellular protein binding
WP9	Preclinical Toxicity of the Lead Compounds
WP10	Clinical Development of New Molecular Entities

Coordinator and Mentor, OSDD, not even a single new drug molecule against tuberculosis could come up despite over a decade of effort by Industry and R&D Laboratories, after the complete genome sequencing of *Mycobacterium tuberculosis*. This was because of lack of knowledge sharing among researchers as they worked as isolated groups.

IPR protection does not allow free knowledge sharing for drug discovery and also increases the cost of the drug. This patent-protected route of discovering new drugs, in the long run, suits only the rich who can afford those high-priced drugs. "I believe that affordable healthcare is a right for all. But, pragmatically speaking, when it comes to health, we need to have a balanced view between health as a right and health as a business," says Dr Brahmachari. "With respect to diseases of the poor, like tuberculosis, where the market incentive is very small, it is not possible to convince the pharma-ceutical companies to work on these drugs. Therefore, it is the responsibility of public-funded institutions to participate in this area in an open collaborative mode," Dr. Brahmachari further adds.

In other words, for drugs that are

led Team India consortium with a global partnership. For popularizing the concept of OSDD, Prof. Brahmachari clearly explains through a simple analogy: "The strategy used to protect a factory is different from the strategy used to protect a paddy field. It might be worth building a wall around a factory and restricting access, but one does not build walls around paddy fields. If you do, then the cost of building and maintaining the wall will add to the price of rice, and the poor will no longer be able to buy it. Open source is for the 'paddy fields' that everyone needs, not for the luxury goods factory."

OSDD aims to provide a global platform where the best minds can collaborate to solve the complex problems associated with discovering novel therapies for neglected tropical diseases like malaria, tuberculosis, leishmaniasis, etc. This joint endeavour

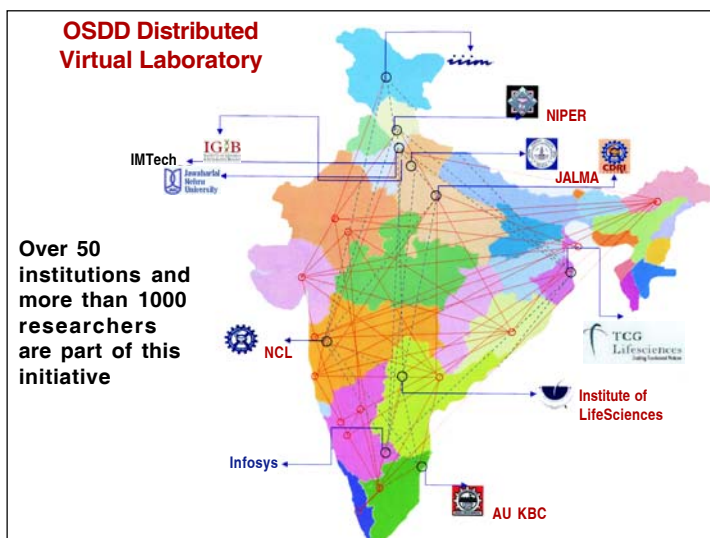
primarily meant to be consumed by the poor, open source drug discovery is the right route. It is a heartening fact that the Government of India has already committed Rs. 150 crores (US \$38 million) towards the OSDD Project.

OSDD is a CSIR-

promises to provide a unique opportunity for scientists, doctors, technocrats among other experts to work for a common cause.

In the first phase of OSDD, drugs against *M. tuberculosis* including drug resistant and latent tuberculosis would be developed. The objective is to develop a web-based portal for data deposition, exchange, evaluation and tabulation for analysis. The basic idea is to encourage collaborative sharing of know-how for the entire spectrum of processes in discovering new drugs for this age-old scourge that has one-third of the entire human population on Earth under its grip, particularly in the developing countries.

OSDD functions by breaking a large complex problem into simpler, smaller set of activities that have a clearer scope. Called 'work packages', the smaller sets of activities clearly specify the task to be carried out during the implementation of the Project. The timelines for the execution of such tasks is also well defined. Affordable drug development would thus be possible by concerted efforts on various work





packages by all the contributing partners. For contributing to OSDD one simply needs a login followed by acceptance of 'terms and conditions', and depending upon one's expertise, he/she could contribute to any of the work packages.

In this endeavour, an idea, a software, an article or molecule(s), etc., that help in expediting the process of drug discovery are treated as a contribution. The various challenges in drug discovery research are posted on the website, for anyone to take up and find relevant solutions, which would be peer-reviewed. Appropriate rewards would be given to select contributors in the form of credit points, for solving a defined problem. Based on the points accrued by the contributors they would be awarded four levels of Membership

cards (Blue, Silver, Gold and Platinum), providing the contributors of each card certain rights, privileges and responsibilities.

Explaining the essence of OSDD, Dr Samir K Brahmachari says that, "Most of the drug discoveries are made in a closed door environment, where highest degree of secrecy is maintained resulting in the lack of open participation of the entire academic world. The Open Source Drug Discovery Programme aims to establish a novel web-enabled open source platform – both computational and experimental – to make drug discovery cost effective and affordable by utilizing the creative potential of college and university students along with senior scientists, a collective approach to drug



development." As the mastermind behind the OSDD Project, Dr. Brahmachari is also working on to establish an International Collaborative Centre for Affordable Health (ICCAH), which would operate with Government, International and Philanthropic funding.

## R&D Efforts at NIO

### Effect of Sublethal Doses of Organochlorine Pesticide (Endosulfan) on the shrimp, *Metapenaeus monoceros*

**E**ndosulfan, a broad-spectrum non-systemic organochlorine (OC) pesticide is extensively used to control a wide variety of pests in agriculture, horticulture and public health programmes. Biochemical changes occurring in the metabolically active tissues of gills, hepatopancreas and muscle of the penaeid shrimp, *Metapenaeus monoceros* (Fabricius) on exposure to two sublethal doses (40 and 60 ng L sup<sup>-1</sup>) of endosulfan were studied for 23 days of exposure. Sublethal doses of endosulfan significantly (P is less than 0.05) altered the levels of protein (TP), total

carbohydrates (TC), glycogen (GLY), free sugars (TFS) and (TL) lipids in test shrimps. Concentrations of biochemical components significantly varied with the days of exposure but were dose-independent. Percent decrease in all biochemical components increased with the progress of the days of exposure irrespective of the exposure concentrations. The order of percent decrease in the concentrations of the TP, TC, GLY, TL and TFS in different tissues namely, gills (GL), hepatopancreas (HP) and muscles (MU) at the end of 23 DoE was found to be MU > GL > HP, HP > GL > MU, MU > HP > GL, HP > MU >



GL and MU > GL > HP, respectively. The results of the study revealed that sublethal doses of endosulfan significantly alters the proximate composition of major tissues, particularly the TP levels in the MU tissues, thereby





reducing the nutritive value of this economically important penaeid shrimp. Since *M. monoceros* exhibits significant biochemical changes on exposure to endosulfan, this species could possibly be used as a biosensor of coastal marine

and estuarine pollution by organochlorine pesticides.

For more information read: Suryavanshi, U.; Sreepada, R.A.; Ansari, Z.A.; Nigam, S.; Badesab, S. A Study on Biochemical Changes in the Penaeid

Shrimp, *Metapenaeus monoceros* (Fabricius) following Exposure to Sublethal Doses of Organochlorine Pesticide (Endosulfan). *Chemosphere*: 77(11); 2009; 1540-1550.

### Benthic Fluxes in Tropical Estuary

*In-situ* measurements of benthic fluxes of oxygen and nutrients were made in the subtidal region of the Mandovi estuary during premonsoon and monsoon seasons to understand the role of sediment-water exchange processes in the estuarine ecosystem. The Mandovi estuary is a shallow, highly dynamic, macrotidal estuary which experiences marine conditions in the premonsoon season and nearly fresh water conditions in the monsoon season.

The benthic flux of nutrients exhibit strong seasonality, being higher in the

premonsoon compared to the monsoon season, which explains the higher ecosystem productivity in the dry season inspite of negligible riverine nutrient input. Macrofaunal activities, especially bioturbation, enhanced the fluxes 2-25 times.

The estuarine sediment was observed to be a huge reservoir of NH sub(4) sup(+), PO sup(4) sup(3-) and SiO sub(4) sup(4-) and acted as a net sink of combined N because of the high rate of benthic denitrification as it could remove 22% of riverine DIN influx,

thereby protecting the ecosystem from eutrophication and consequent degradation. The estuarine sediment was responsible for approximately 30-50% of the total community respiration in the estuary.

For more information read: Pratihary, A.K.; Naqvi, S.W.A.; Naik, H.; Thorat, B.R.; Narvenkar, G.; Manjunatha, B.R.; Rao, V.P. Benthic Fluxes in a Tropical Estuary and Their Role in the Ecosystem. *Estuar. Coast. Shelf Sci.* 85(3); 2009; 387-398.

### A Thermostable Metal-Tolerant Laccase from a Marine-Derived Fungus

Laccase, an oxidoreductive enzyme, is important in bioremediation. Although marine fungi are potential sources of enzymes for industrial applications, they have been inadequately explored. The fungus, MTCC 5159, isolated from decaying mangrove wood and identified as *Cerrena unicolor* based on the D1/D2 region of 28S and the 18S ribosomal DNA sequence, decolourized several synthetic dyes. Partially purified laccase reduced lignin content from sugarcane bagasse pulp by 36% within 24 hour at 30°C.

Laccase was the major lignin-degrading enzyme produced when

grown in low-nitrogen medium with half-strength seawater. Three laccases, Lac I, Lac II, and Lac III, of differing molecular masses were produced. Each of these, further resolved into four isozymes by anion exchange chromatography. The N-terminal amino acid sequence of the major isozyme, Lac II<sub>d</sub> showed 70-85% homology to laccases from basidiomycetes. It contained an N-linked glycan content of 17%.

The optimum pH and temperature for Lac II<sub>d</sub> were 3 and 70°C, respectively, the half-life at 70°C being 90 min. The enzyme was most stable at

pH 9 and retained greater than 60 % of its activity up to 180 min at 50°C and 60°C. The enzyme was not inhibited by Pb, Fe, Ni, Li, Co, and Cd at 1 mmol. This is the first report on the characterization of thermostable metal-tolerant laccase from a marine-derived fungus with a potential for industrial application.

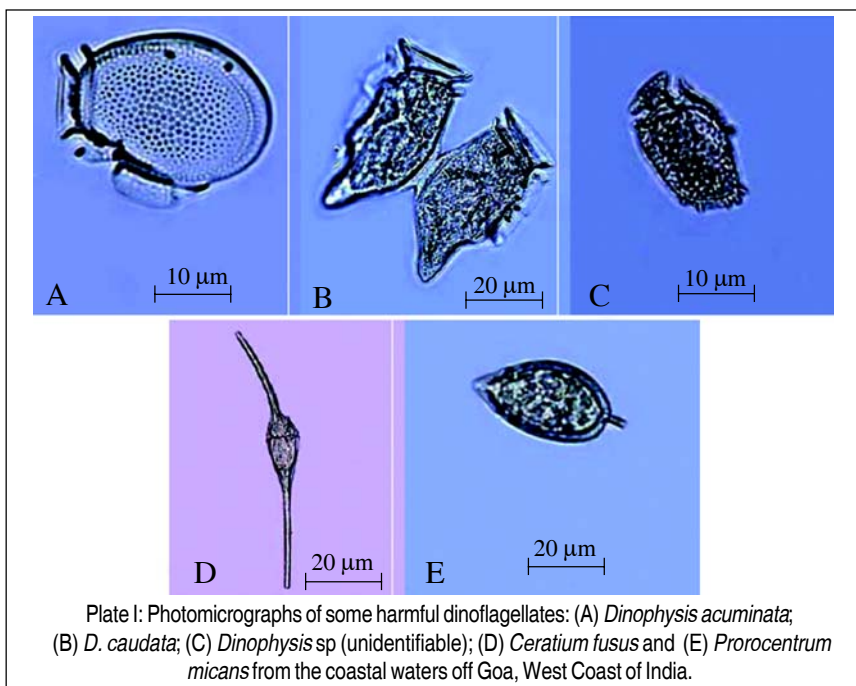
For more information read: DeSouza-Ticlo, D.; Sharma, D.; Raghukumar, C. A Thermostable Metal-Tolerant Laccase with Bioremediation Potential from a Marine-Derived fungus. *Mar. Biotechnol.*: 11(6); 2009; 725-737.



## Spatio-Temporal Variability of Dinoflagellate Assemblages in Different Salinity Regimes

General abundance and species composition of dinoflagellate community in different salinity gradients along the coast of Goa (west coast of India) were studied by the scientists at NIO, with a view to understand the annual variations, in particular by the toxic species. The effect of physical and chemical parameters were observed on dinoflagellate assemblage at four disparate locations in terms of their salinity.

From this 13-month study, a total number of 25 dinoflagellate species were identified. Of these, 10 are known toxic species. *Ceratium furca* was the most dominant dinoflagellate species at all four sampling locations throughout the year. Its highest number, was observed during September 2008 at the estuarine sampling location off Siridao. The toxic species, *Alexandrium minutum* followed by *Dinophysis acuminata* were found to attain maximum cell numbers among the 10 different toxic species detected from the study area. It is apparent from these results that the distribution of both general and toxic dinoflagellate species in the study area is affected due to variations in physico-



chemical parameters, in particular temperature, salinity and nitrate that, in turn, are governed by the monsoonal dynamics. For more information read: Alkawri, A.A.S.; Ramaiah, N. Spatio-Temporal Variability of Dinoflagellate Assemblages in Different Salinity Regimes in the West Coast of India. *Harmful Algae*: 9(2); 2010; 153-162.

## Effects of Sudden Stress Due to Heavy Metal Mercury on Benthic Foraminifer, *Rosalina leei*

Laboratory culture experiments were carried out to understand the response of benthic foraminifer, *Rosalina leei*, to gradual as well as sudden addition of heavy metal mercury (Hg) into the media. When mercury was added, specimens did not show any change in morphology during the initial 40 days. However, later on, out of all the specimens subjected to mercury concentrations up to 150 ng/l, 75% developed deformities, whereas all the specimens subjected to 150–275 ng/l Hg concentrations, had deformed chambers.

All specimens kept at 300 ng/l Hg concentration died within 20 days. In addition to this, irregularities were also observed in the rate of reproduction, number of juveniles

produced and the survival rate of juveniles. Whereas in an earlier experiment where Hg concentration was increased gradually, irregularities in the newly added chambers were noticed only in case of specimens subjected to very high (180 ng/l) Hg concentration. However, during this experiment, growth was found to be inversely proportional to the mercury concentration.

For more information read: Nigam, R.; Linshy, V.N.; Kurtarkar, S.R.; Saraswat, R. Effects of sudden stress due to heavy metal mercury on benthic foraminifer *Rosalina leei*: Laboratory culture experiment. *Estuarine Coastal and Shelf Science* 85; 2009; 601-608.



Monitoring of seismic activity in the vicinity of Koyna region in Maharashtra is an ongoing activity of the National Geophysical Research Institute (NGRI), Hyderabad, where artificial water reservoir triggered earthquakes continue to occur since 1960. Several of these earthquakes are preceded by precursory nucleation. Recognition of the precursory nucleation well in advance has been a major objective of the work being carried out. Earlier, the NGRI scientists succeeded in making a couple of forecasts during the last three years and the one which was made on 9 July 2009 for a possible occurrence of an  $M \sim 3.0$  earthquake, occurred on 19 July 2009 within the forecasted parameters.

[illegible]

As forecasted, an earthquake of 5.0 magnitude occurred in Koyna within the predicted cluster at 5.21 p.m. on Saturday, 12 December 2009.

The Government of Goa constituted the Canacona Flash Floods Study Committee with the following two objectives: (1) Assemble and analyze available information to describe and identify causes behind the flash floods in Canacona Taluka on 2 October 2009, and (2) Suggest measures to be adopted in Goa to minimize damage arising from similar episodes in future.

7 hours, on 2 October 2009. While this long precipitation event was the direct cause, there were also indirect causes that set the stage for the flash floods. These were:

- Talpona and Galjibag rivers which got flooded on 2 October 2009 are located in an area with an average rainfall of 2953 mm during June–September. This area had a normal





rainy season in 2009 with 2875 mm of rain. As a result, by end-September, the soil is expected to have had high amounts of moisture.

- Between 8.30 a.m. on 29 September and 8.30 a.m. on 2 October 2009, Canacona Town rain-gauge recorded 252 mm of rain. This spell is expected to have saturated the soil in the entire Canacona Taluka with moisture, and river channels would have been full with water.
- About three-fourths of the catchment area of the upper Talpona river is located on mountain slopes. Galjibag river too flows through a valley surrounded by mountains. The mountain slopes of such areas are vulnerable to mudslides and the plains or valleys amidst mountain ranges are vulnerable to flooding.

The water reaching the surface owing to the 7 hr precipitation event on 2 October cascaded down the slopes whose soil was already saturated with water. The resulting damage at a location depended on altitude of the location. On steep slopes with altitude in excess of 300m, the cascading water led to mudslides.

At altitudes of about 50m or more, agricultural and horticultural areas were submerged and cattle were washed away. At lower altitudes (about 50 m or less), where topography is flatter, accumulation of water submerged buildings, and as the water made its way towards the sea, the flow destroyed houses and commercial establishments, particularly those that were weak like mud houses.

There are no records to suggest that flooding of this magnitude ever occurred

in Canacona taluka in recorded history. Nevertheless, the elements that contributed to the event are not uncommon in Goa. Hence, this incident of intense precipitation is best looked upon as a warning on what can happen. The Committee suggested that because such events cannot be prevented, the State of Goa should focus on awareness and preparedness for minimizing the impact of an intense precipitation event of the above nature.

The Committee suggested one general recommendation and four specific recommendations. The general recommendation has been that the well known practices in forest management for preventing mudslides like afforestation of mountain slopes, and in river management such as, de-silting of river bed should receive emphasis and increased investment. These measures should be able to minimize damage from precipitation events of lesser intensity, but higher frequency that occur in Goa.

The specific recommendations which emerged based on the studies are:

- The areas vulnerable to mudslides should be mapped and site-specific disaster management plan to face them should be in place at each location with high vulnerability;
- Areas with high vulnerability to flooding owing to an intense precipitation should be identified and a disaster management plan should be evolved at such locations;
- A mechanism for keeping a careful watch should be in place whenever a situation arises with high potential for an intense precipitation event in a

vulnerable area. The Meteorological Centre of the India Meteorological Department (IMD), Panaji, should form the nerve centre of such a watch;

- The State of Goa should make IMD's 'Cyclone Warning Dissemination System' operational in the State.

In order to enlarge the State's awareness for damage from precipitation events, the first two recommendations should be carried out using the services of faculty and students from Goan undergraduate and postgraduate institutions, and then circulated widely amongst local policy and decision makers.

To assist this process, the NIO team should prepare one report on one site on each of the two aspects described in these two recommendations. These reports could then be used as a model for carrying out case studies by undergraduate and post-graduate institutions in Goa to examine other vulnerable locations.

The Department of Science, Technology and Environment, Government of Goa, should provide funding for such research by Goan institutions. The NIO team should also prepare a report on the third recommendation to assist the government to set up watch-keeping for intense precipitation events.

The feedback in the form of comments and views on the report may be communicated by e-mail to Dr. S.R. Shetye (shetye@nio.org), Chairman of the Committee and Director, NIO.



### The NIO-ONGC Project

In a significant development, the National Institute of Oceanography (NIO), Goa, has been awarded a Rs. 10.37 crore Project by the Oil and Natural Gas Corporation (ONGC), India's largest public sector petroleum company, to collect environmental data from their oil field in the Krishna-Godavari basin, off the east coast of India. In monetary terms, this is the largest ever industry sponsored project taken up by NIO.

The Project involves continuous recording of data on currents, winds, waves, and tides at specified locations in waters with depths ranging from 100-700 m. In addition, the profiles of temperature and salinity in the water column will be collected together with turbidity near seabed. The data will help ONGC to lay pipelines for transporting gas from their Vashista and S-1 gas fields. The Project, which is being carried out by NIO's Regional Centre at Vishakapatnam, is led by its Scientist-in-Charge, Dr. V. S. N. Murty.

### MoU signed between NGRI & OGS, Trieste, Italy

An MoU was signed between National Geophysical Research Institute (NGRI), Hyderabad, and Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS, Trieste, Italy on 30 November 2009 to establish a firm collaboration among the scientists of these two Institutes for research in 'Gas Hydrates'. The leaders of the activities are Dr. Kalachand Sain from NGRI and Dr. Umberta Tinivella from OGS.

Dr. U. Tinivella and Dr. M. Giustiniani — the scientists working on gas hydrates research — from OGS, Trieste, Italy, visited NGRI from 21 November to 1 December 2009. During their sojourn, they installed the ISTRICI software at NGRI, free of cost, for processing the marine Multi-Channel Seismic (MCS) data for the investigation of gas-hydrates, and imparted training to the personnel working in gas-hydrates project. Their visit has enhanced the capabilities of NGRI scientists in handling the marine MCS data, and producing better image and velocity model of hydrate-bearing sediments. Dr. V. P. Dimri, the then Director, NGRI, honoured the visiting experts with mementos.

### NCL-IGCAR Joint Research Programs

The National Chemical Laboratory (NCL), Pune, signed a Memorandum of Understanding (MoU) with the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, on 24 July 2009 to offer its competencies by undertaking joint research programmes in the areas of Chemistry, Chemical Engineering and Material Sciences, relevant to the fast breeder reactor (FBR) programme. The efforts are expected to provide basic science understanding to the complex technological challenges associated with the DAE's FBR programme.

IGCAR is a premier research institution of the Department of Atomic Energy (DAE), with broad-based multi-disciplinary competencies in science, technology and advanced engineering directed towards the development of



Dr. Sivaram and Dr. Baldev Raj exchanging the MoU documents





technologies for FBR with associated Fuel Cycle (FR & FC). NCL will bring its competencies in the areas of computational science, polymer science, thermodynamics, organic chemical process design and engineering, as well as chemical engineering and separation science to bear on problems of relevance to IGCAR's efforts in the area of FBR technology.

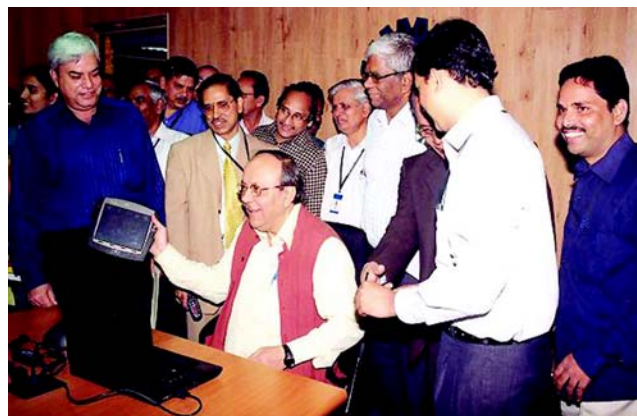
One of the key focuses of the joint programme is to train high quality PhDs and post-doctoral students at NCL on such joint research problems linked to the nations' programme on FR & FC. The students will have an opportunity to work at IGCAR labs for extended periods on joint research programmes,

thus, enriching their learning experience. This effort will contribute to development of human capital that will address some of the S&T challenges associated with critical technology needs of the nation.

Research projects being covered under this collaboration will serve as valuable input to FR & FC programme running at IGCAR. Key research problems proposed to be addressed relate to the design and synthesis of solvents and resins, large-scale production of solvents for separation of actinides and lanthanides, *ab initio* design of extractant system, modeling-directed synthesis of ionic liquids, ion exchange separation, thermodynamics and CFD modeling.

In a joint statement, Dr. S. Sivaram, Director, NCL and Dr. Baldev Raj, Director, IGCAR said that the MoU will enlarge the scope of the collaboration that will further synergize the strengths of both the organizations by engaging in a wide variety of R&D programmes across disciplines of interest to the mission of IGCAR with a focus on cutting edge science, technology and innovation and, in turn, to provide high quality human resources with advanced knowledge and skills in these disciplines. Dr. Baldev Raj, also emphasized the philosophy of collaborative research programmes in which the scientific capabilities of both IGCAR and NCL could be effectively combined to provide greater value and impact to the development of FBR technology.

## Video Conferencing Facility at NGRI



Prof. Samir K. Brahmachari, Director General, CSIR, inaugurating the Video Conferencing Facility at NGRI

The Video Conferencing Facility at the National Geophysical Research Institute (NGRI), Hyderabad, was inaugurated by Prof. Samir K. Brahmachari, Director General, CSIR on 17 December 2009. This well-designed Facility has a seating capacity of 36 persons. The Facility is equipped with the state-of-the-art technology in video conferencing with all processor controlled gadgets, which can be operated with a Wi-Fi touch panel. It is also equipped with near-end, far-end projections, 51" LCD, Interactive Whiteboard, Lighting Control, DSP Audio Mixer, and Document Camera.



### Upgradation of Hyderabad Magnetic Observatory

Hyderabad Magnetic Observatory was established in 1964, with La Cour torsion fibre variometers. It records continuously the changes in the Earth's magnetic field and regularly reports short period disturbances and magnetic storms. It was named a key Magnetic Observatory by the International Association of Geomagnetism and Aeronomy (IAGA).

An international cooperation agreement, between the GeoForschungs Zentrum, Potsdam (GFZ) and the National Geophysical Research Institute (NGRI), Hyderabad, was signed in 2007 to upgrade Hyderabad Magnetic Observatory to INTERMAGNET status. Modern digital variometers, 3-component Fluxgate from the Danish

Meteorological Institute, and Overhauser total field magnetometer, along with data loggers and requisite software were installed in the observatory in December 2007 by Dr. H. J. Linthe and J. Haseloff of Adolf-Schmidt Observatory (Niemegk), GFZ.

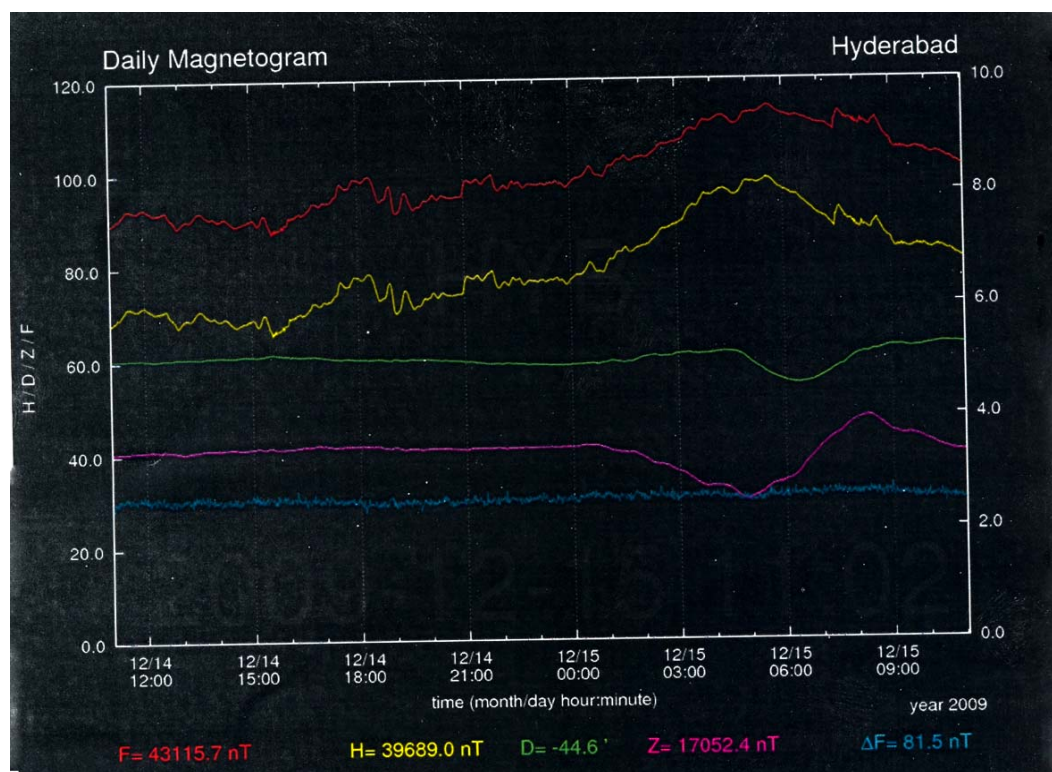
After the successful installation, recording commenced immediately and was compared with data from the analogue La Cour magnetograms that were obtained daily. Absolute experiments were carried out with increased frequency to check the stability of the recording. One minute digital recording commenced in January 2008.

The maintenance of baseline accuracy, undisturbed environment and

continuous recording were soon accomplished. During the September 2009 INTERMAGNET Meeting in Sopron, Hungary, the data accumulated by Hyderabad Magnetic Observatory for the year 2008 was examined and it showed satisfactory stability, based on which it was accorded INTERMAGNET status (IMO).

"I consider Indian observatories to be among the most important in the world, both because of their unique location and because of the long tradition in India for studying and measuring the Earth's magnetic field. I am, therefore, happy that Hyderabad has become an official Intermagnet observatory." says

Jeffrey J Love, Chairman, INTERMAGNET Executive Council





## International Symposium on *Carbon Management & Climate Change and Role of Applied Geochemistry in Mineral Exploration*

The National Geophysical Research Institute (NGRI), Hyderabad, hosted a three-day International Symposium on, '*Carbon Management & Climate Change and Role of Applied Geochemistry in Mineral Exploration*' during 25-27 November 2009, jointly in collaboration with the Indian Society of Applied Geochemists (ISAG), Hyderabad; Oil and Natural Gas Corporation Limited (ONGC); National Mineral Development Corporation Limited (NMDC); Atomic Mineral Directorate for Exploration and Research (AMD) and the Singareni Collieries Company limited (SCCL).

Dr. A. K. Balyan, Director, HRD, ONGC, New Delhi (Patron); Shri Rana Som, Chairman and Managing Director, NMDC (Chief Guest); Dr V. P. Dimri, Director, NGRI, (Patron); Prof. R. D. Schuiling, University of Utrecht, Netherlands (Guest of Honour); Dr. K. K. Dwivedy, Former Director, AMD (Chairman, Organizing Committee); Prof. K. Surya Prakash Rao, (Convener, Organizing Committee) and Dr. V. Balaram, Convener, (NGRI) were the dignitaries present at the Inaugural Function.

Dr A. K. Balyan released the Souvenir Volume and Shri Rana Som, released the Abstract Volume of the Symposium. In the Inaugural Address, Shri Rana Som appreciated the efforts of the ISAG and NGRI for holding this important Symposium when the whole world is intensely debating on climate change and its effects on the ecological



A dais view of International Symposium. Seated (from left ) Dr. K. K. Dwivedy, Dr. A. K. Balyan, Dr V. P. Dimri, Shri Rana Som, Prof. R. D. Schuiling, and Prof. K. Surya Prakash Rao

system of the Earth. He urged the scientists to come out with proper management system for CO<sub>2</sub>. He also pointed out the need for self-consciousness among the citizens to save mother Earth from harmful emissions.

Earlier, Dr. V. P. Dimri, in his Welcome Address, briefed about various R&D activities going on at NGRI, such as CO<sub>2</sub> capture and storage, role of CO<sub>2</sub> in enhanced oil recovery, alternative energy resources like geothermal energy studies and uranium and platinum group of element (PGE) exploration studies, etc., being pursued in association with different agencies. Dr Balyan, in his address, spoke about the steps taken by ONGC in CO<sub>2</sub> sequestration and other activities related to carbon management.

Dr K. K. Dwivedy briefed the audience about the activities of ISAG. He also emphasized on the use of nuclear energy and other alternative sources of energy to reduce CO<sub>2</sub> and elaborated the future programmes of the

Society.

Prof. K. Surya Prakash Rao in his speech highlighted about the International Symposium and its importance in the present scenario for the country especially in view of the forthcoming international gathering of world leaders in Copenhagen.

Prof. R. D. Schuiling, a renowned researcher in the field of climate change and global warming, appreciated India's stand on global climate change and said that developed countries should take more responsibilities in combating climate change and advised the developing nations to be ready with the mitigation strategies. Dr V. Balaram, Scientist-G, NGRI, proposed the Vote of Thanks.

The Symposium had the participation of about 100 delegates from universities, research laboratories and mining companies from different parts of the country and abroad. The major themes of this international event were:



*Carbon Management and Climate Change and What Role India should Play in the Global Context, India's Role in Handling Future Challenges of Global Warming and CO<sub>2</sub> Management.*

This Symposium very effectively emphasized the role of applied geochemistry in carbon management as well as in mineral exploration studies. About 69 papers were deliberated in ten sessions under various themes. The Symposium provided a platform for earth scientists to build up their understanding and to share new ideas in the areas of

climate change, CO<sub>2</sub> management and mineral exploration.

For the Valedictory Function held on the third day, Dr. M. Sudhakar, Advisor, Ministry of Earth Sciences (MoES), New Delhi, was the Chief Panelist. Participants expressed their views regarding the need for making a consortium consisting of researchers from various research institutes, universities and industries, and taking up an integrated approach in combating climate change. Delegates also emphasized on the need of creating awareness among the common masses

about the adverse effects of climate change and the role of carbon sequestration, and suggested that the Government of India should go ahead in launching such awareness programmes. Dr. M. Sudhakar suggested that ISAG/NGRI could possibly coordinate such a programme.

It was unanimously agreed that ISAG should submit a consolidated recommendation incorporating all the above points to the concerned ministries and funding agencies. It has also been decided to intensify the activities on the exploration of strategic minerals at NGRI.

## International Seminar on *Mineral Processing Technology* - 2009

The Institute of Minerals & Materials Technology (IMMT), Bhubaneswar, hosted an International Seminar on *Mineral Processing Technology (MPT-2009)* during 28-30 October 2009 jointly with the Indian Institute of Mineral Engineers. The event witnessed a

congregation of more than 400 delegates, representing participation from over eight countries. The MPT-2009 was aimed at providing an ideal platform to the equipment manufacturers to showcase the latest developments in mineral technologies.

The mineral processing industries make a significant contribution to our economy. As a national laboratory, IMMT provides essential expertise to the mineral processing industry with technical solutions based on its strong R&D experience ranging from process



Dignitaries taking a view of the latest mineral technologies showcased on the event





development to equipment design. In this context, the MPT 2009's theme topic on, '*Recent Trends in Mineral Processing Plant Practices*' assumes great significance in providing the opportunities for scientists, policy planners, industry CEOs and entrepreneurs to a common international forum where the latest advances in this specialized field are shared amongst the participants.

The Seminar was inaugurated by Prof. J. D. Miller of the University of Utah, USA in the presence of other leading industrialists and academicians, including Dr. Mukesh Kumar, Chief Operating Officer, Vedanta Aluminium Ltd, Shri. A. D. Baijal, Vice President and Director, Tata Steel Group Global

Mineral Resources.

During the opening session, Prof. K. A. Natarajan of IISc, and Mr. L.B. Sukla of IMMT, were honoured for their contributions to the field of Minerals Science and Engineering. The Indian mineral industry provided a generous financial support. Others who provided major financial support were: M/s Essar Steel Ltd, M/s Jindal Steel & Power Ltd, and Vedanta Aluminium Ltd.

"Today the challenges faced by the mineral industry are quite different from those in the past. In recent times, mining and mineral industries worldwide have witnessed unprecedented growth, while facing continuous challenges in exploitation of complex as well as low-grade ores," said Prof. B. K. Mishra,

Organizing Committee Chair, MPT - 2009 and Director, IMMT. "Providing land and water will be our main constraint. Clean technologies and environment compliance will be dictating the choice of process and technology. Against these odds, of course, there is still exciting times ahead for those who dare to innovate," Prof Mishra further said. He showed his full confidence that the present Seminar would be professionally rewarding for the participants. MPT-2009 programme and follow-up deliberations were planned in such a manner that would help each delegate to network and make friends from the minerals processing community

## International Seminar on *Molecular Modeling and Drug Design*

An International Seminar on, *Molecular Modeling and Drug Design* was held at the North East Institute of Science & Technology (NEIST), Jorhat, on 17 December 2009. The Seminar was inaugurated by Dr. P. G. Rao, Director, NEIST. Dr. R. Raghu, Dr. D. Devleena Sivkumar and Dr. Ravi from Schrodinger, USA, were the invited speakers at the Seminar.

A total of about 60 delegates from various departments of NEIST; NEHU, Shillong; Assam Agricultural University, Jorhat and Dibrugarh University, IASST, Guwahati; attended the Seminar.



A dais view of International Seminar on Molecular Modeling and Drug Design

Dr. R. Raghu spoke on Computer-aided Drug Design, common errors on protein crystal structure, development in modeling of GPCRs and ensemble docking in lead identification.

Dr. Sivkumar's presentation was on prediction of cytochrome P450 mediated oxidation in lead optimization and demonstrated on structure based virtual screening on HMG CoA reductase.

Dr. Ravi spoke on recent advancements in chemoinformatics method, novel methods for generating structure-based pharmacophores and demonstrated on ligand based virtual screening. His presentation was followed by a live panel discussion between various speakers and the delegates from various R&D organizations and NEIST.



### Discussion Meeting on *Chemical Reactions in Unusual Media*

A two-day Discussion Meeting on, *Chemical Reactions in Unusual Media* was organized on 8-9 October 2009 at the National Chemical Laboratory (NCL), Pune, as a part of the events marking the Diamond Jubilee Year Celebrations of the Laboratory.

The study of chemical processes in unusual media has evolved into a rapidly changing frontier of research, which has constantly led to unexplored territories and challenging problems. Water, ionic liquids and supercritical fluids have emerged as promising answers to our environmental concerns, but their complete potential cannot be realized for the want of comprehensive understanding at molecular level.

The Meeting was organized with the aim to create a platform for exchanging ideas and fostering interdisciplinary collaborations dealing with unusual solvent media. The main areas of focus for the Discussion Meeting included modeling studies for water and aqueous solutions as reaction media, stimulation studies and applications of ionic liquids and their binary mixtures, and development and optimization of supercritical media.

The meeting comprised six sessions. A total of 65 participants attended the Meeting. Dr. Anil Kumar, Convener and Scientist, Physical and Materials Chemistry Division, gave initial remarks on the purpose of the Meeting. Dr. S. Sivaram, Director, NCL, delivered the Inaugural Address on *The*



Dr Sivaram giving inaugural remarks

#### *Role of Solvents in Chemical Processes.*

The session began with a Keynote Talk on *Chemical Reactions in Supercritical Fluids* by Prof. Giridhar Madras of IISc, Bangalore. Later, Prof. Anunay Samanta of the University of Hyderabad, delivered an interesting talk on, '*Photo-Physical Studies Involving Ionic Liquids*'. He elaborated on many unresolved research problems in the area of ionic liquids.

Theoretical modeling and simulation studies were discussed by Prof. S. Balasubramaniam, JNCASR, Bangalore. In his thought-provoking talk, he encouraged the participants to design new experiments in ionic liquids that could be used to contrast the theoretical models developed all over the world. Prof. N. Periasamy, Tata Institute of Fundamental Research, Mumbai, introduced the audience to chemical reactions taking place in organic



Prof. Giridhar Madras delivering the Keynote Address

electronic devices. The ion-ion and ion-solvent interactions in terms of enthalpies for several ionic liquids were delineated by Geetanjali Singh of NCL.

The talk of Prof. Siddharth Pandey, Indian Institute of Technology, Delhi, helped in understanding the interactions within complex fluid systems like ionic liquids. The important role of ionic liquids in electrochemistry, mainly on the diffusion process in ionic liquids through electrochemical quantification was discussed by Nagesh Khupse of NCL.

The practical/commercial aspect of using green reaction media in industrially important organic transformations was highlighted by Dr. Rajiv Kumar, Tata Chemicals Ltd, Pune. The vibrational spectroscopy of aqueous systems under normal and supercritical conditions was presented by Prof. Amalendu Chandra, Indian Institute of Technology, Kanpur.

Dr. Shraeddha Tiwari, Tata Institute of Fundamental Research, Mumbai,



gave an excellent talk on, *The Organic Reactions that Take Place at Water Interface*, followed by the talk of Dr. Sunoj, Indian Institute of Technology, Mumbai, who went deeper into the subject of *Stereoselectivities of Organic Reactions*.

A poster session displaying about 15 posters was also held. The posters included many experimental results carried out by students around the country. In addition to exploring the novel applications of unusual solvent media, the

emphasis was to develop a molecular-level understanding of the problem. While the last few years have seen an exponential rise in the interest of the scientific community in the applications of alternative solvent media, an insight into the mechanistic details of the medium effects is needed at this hour to ensure a rapid growth of the field.

The lectures by active researchers were coupled with interactive sessions. The sessions enhanced the fundamental understanding of chemical processes in

these media, which would help in expanding their applications in various fields.

At the end, a critical discussion was held among the participants on different basic aspects and their applications. Dr. S. Sivaram, Director, summarized the proceedings of the Meeting and encouraged the participants to come together and forge collaborations on the research problems of mutual interest. He also gave away poster awards to three students.

## Indo-Canadian Workshop on *Accelerating Innovation: Strategies for Collaboration and Commercialization*

A one-day Indo-Canadian joint Workshop on, *Accelerating Innovation: Strategies for Collaboration and Commercialization* was held at the National Chemical Laboratory (NCL), Pune, on 10 December 2009. The University of Toronto (UoT) team comprising eight members was led by Dr. Lorna Jean Edmonds, Assistant Vice President,



Dr. Lorna Jean Edmonds welcoming the participants

International Relations. About 30 participants attended the Workshop. The Workshop was funded by the Department of Science and Technology, New Delhi.

Dr. S. Sivaram, Director, NCL, welcomed the participants, and briefed them on the genesis of the Workshop and the crucial role of the UoT participants in making it happen. Dr. Lorna Jean Edmonds, in her Welcome Remarks, elaborated on the role of collaborations and how such interactions can be used to further innovation.

Prof. Cynthia Goh, Professor, Department of Chemistry and Associate Director, Institute for Optical Sciences, UoT and Co-Founder of Alexa Inc. and Vive Nano Inc., delivered the Keynote Address on, '*Creating Innovators in Science: Technopreneurship*'. She narrated her experience in creating innovators in science at UoT. She drew



Dr. S. Sivaram addressing the distinguished gathering

lessons and examples from various spin-offs resulting from the scientific research done in the Chemistry Department at UoT. She presented her experiences in training graduate level students to turn entrepreneurs and how that programme has succeeded in kindling students' interest in technopreneurship.

Dr. Darren Anderson, Chief Technology Officer, Vive Nano Inc. presented a case study on technology





Clockwise from top left: Prof. Cynthia Goh, Prof. K.N. Ganesh, Dr. Darren Anderson and Prof. David Macmillan, delivering their Keynote Addresses

start-up of Vive Nano at UoT. Vive Nano provides solutions based on nanoparticles. He profiled his company's experiences and how various partners contributed and benefitted from it.

The first panel discussion on, '*Innovation in Clean Technology*' was chaired by Dr. A. J. Varma of NCL. Prof. Mohini Sain and Prof. Sanjeev Chandra (both from UoT) presented the Canadian perspective on, '*Biorefinery, Biomaterials and Bioenergy*'. Prof. Sain presented the work done in the Center for Biocomposites and Biomaterials Processing at UoT, on wheat straw microfiber reinforced plastics, and how biomaterials can be utilized eventually to replace hydrocarbons in producing plastics. Prof. Chandra described the process of thermal spray painting and its use in creating metal foams.

The second panel consisting of Dr. A. J. Varma, Dr. P. P. Wadgaonkar (NCL), Dr. Sangeeta Srivastava (The Godavari Biorefineries Ltd.), Dr. Balu Sarma (Praj Matrix, Pune), and Dr. Rajiv Kumar (Tata Chemicals, Pune), presented the Indian perspective on bioenergy and biochemicals. NCL's work along with Godavari Biorefineries Ltd, in commercializing baggasse to cellulose was discussed, along with the NCL's technology to extract commercial products out of cashew nut shell liquid. Both academic and industry participants shared their views on the current status of biomaterials and bioenergy research in India. Dr. Rajiv Kumar and Dr. Balu Sarma elaborated on their corporate's plans to exploit the growing interest in these areas.

The post-lunch session had two

parallel group discussions. Mr. Sanjay Nene, NCL, chaired the group discussion on, '*Automotive, Energy and Biomaterials Innovation*'. There was a strong interest from both the Canadian and Indian participants for joint teaching programmes for undergraduate students for courses consisting of students and faculty from both countries. Representatives of Tata Groups showed interest in the organization of training courses by Indo-Canadian faculty for their new recruits in various sectors associated with their manufacturing activities.

Research interests in the area of biorefinery were also expressed. Some of the chemicals identified included biopolymers, specialty chemicals and biochemicals, cellulose nano-crystalline material, and nano-fibers, besides replacements for existing fossil fuel polymers. Utilization of biofuels in combustion engines and boilers and blowing agents (carbon dioxide) in the preparation of polymer foams, were discussed.

The other group, led by Dr. V. Premnath of NCL, discussed issues related to nanotechnology and technopreneurship. Some of the issues included: the funding requirements, funding mechanisms and technology transfer mechanisms for a technology start-up. Evolving a technology from the underlying science and the need and processes to do this were also discussed. The innovation propagation mechanism in private firms was discussed with insights from managers of Tata Group.

In the Plenary Session, Prof. K.N. Ganesh, Director, Indian Institute of Science Education and Research (IISER), Pune, delivered the Keynote



Address on, '*Genomic medicines and peptide nucleic Acids*'. Following this, Prof. David Macmillan, Department. of Chemistry, UoT, delivered the Keynote Address on, '*System and Synthetic Biology*' and elaborated on how the systems biology fits into the post-genomic scientific landscape and what roles synthetic and systems biology have in understanding the basics of the functioning of the cell and its constituents.

In the Concluding Session, Prof. Mohini Sain captured all the salient points discussed throughout the day and stressed on the need for establishing collaborative research relationships between UoT and CSIR. He also emphasized the need for running joint technopreneurship courses for CSIR

staff to sensitize them to the innovation potential. He also highlighted the benefits of having students exchange programmes and the need to accomplish these goals.

Dr. Premnath underlined the productive nature of the event. He also highlighted how India's changing economic landscape and the need to innovate requires India to partner with other knowledge and innovation leaders in the world, to chart new models to create an innovation-based economy in India. The Workshop ended with Dr. Sivaram highlighting the need for such collaborations, and how ideas can be turned into reality by the work of committed partners.

The organization of Workshop culminated in exploring and identifying

a few areas, given below, where concrete projects could be defined with a possibility of pursuing them further.

- Building-up of a hands-on scientist-led science entrepreneurship course targeting students in the Pune area;
- Collaborative research projects in the areas such as fuels, chemicals and materials from bioresources, nano-materials, systems and synthetic biology;
- Technology development and commercialization of diagnostic tools for viral diseases in low resource settings advanced coatings; and faculty and student exchange programmes.

## Workshop-cum-Training Programme on *Sericulture for Silkworm Growth and Enhanced Production of Cocoon Crop*

The Indian Institute of Chemical Technology (IICT), Hyderabad, in association with North-East Institute of Science & Technology (NEIST), Jorhat, organized the Fourth Workshop-cum-Training Programme on, '*Sericulture for Silkworm Growth and Enhanced Production of Cocoon Crop*' at the Regional Muga Research Station (RMRS), Central Silk Board (CSB), Boko, Assam, during 18-21 October 2009 under the CSIR RSW-NNET Programme.

The Programme envisaged dissemination of technologies developed by scientists of IICT and NEIST, and gave an overview of already available

technologies offered by Central Silk Board for boosting silkworm growth and cocoon production. Progressive Muga and Eri Sericulture farmers, silkworm seed producers and silk reelers from Assam, besides the scientific community from CSB units of Boko and Muga Silkworm Seed Organization (MSSO), Guwahati, and extension workers and representatives from various NGO's associated with sericulture participated in the Workshop.

The resource persons were Dr. U. S. N. Murthy, Nodal Scientist of the Programme from IICT; and Dr. B. G. Unni, Coordinator from NEIST; Dr. S. Mishra, IICT; Dr. A. K.

Sahu; RMRS Boko; Mr. P.K. Das, MSSO (CSB), Gauhati and Shri C. J. Prabhakar, Incharge, RMRS, Boko.

The topics discussed in the Training Programme included: seed production, rearing technologies of silkworms, disease and pest management, eco-friendly technologies, self-employment through sericulture for rural development in north eastern region of India and pupal oil production from muga pupae. Field visit to sericulture farm for live demonstration and as well as farmers interactive sessions with the resource persons were also arranged.



### Short Course on *Elemental Mass Spectrometry*

A three-day 'Eleventh Pre-TRICON Conference International Short Course on, *Elemental Mass Spectrometry* was organized by the National Geophysical Research Institute (NGRI), Hyderabad, in collaboration with Indian Society for Mass Spectrometry (ISMAS, BARC Campus), Mumbai, during 21-23 November 2009.

Dr. G. Malakondaiah, Director, Defence Metallurgical Research Laboratory (DMRL), Hyderabad, inaugurated the Course. Dr. S. K. Aggarwal, Chairman Eleventh TRICON, ISMAS, Mumbai, was also present. Dr V. Balaram, Scientist-G, NGRI was the Convener of the Course. More than 35 participants from different research laboratories, institutes, universities, from all over the country such as NGRI; BARC; DMRL; SV University, Tirupati; and KATCO Research lab, Punjab participated in this event.



Seen on dais (from left) : Dr. V. Balaram, Scientist G, NGRI; Dr. G. Malakondaiah, Director, DMRL, Hyderabad and Dr. S.K. Aggarwal, ISMAS, Mumbai

The themes for the Course included various fundamentals and applications in different disciplines of S&T using various mass spectrometry techniques such as quadrupole, magnetic-sector and time-of-flight mass spectrometers. The faculty for the Course comprised Senior scientists from BARC and NGRI, (India), and also scientists from Israel. The talks by eminent scientists covered various topics on applications of mass spectrometry in contemporary research areas such as geological,

geochronological, food, environmental sciences, etc.

The Course also had practical demonstrations with hands-on training imparted to the participants on different practical aspects of mass spectrometers such as the inductively coupled plasma mass spectrometry (ICP-MS), laser ablation microprobe multi-collector inductively coupled plasma mass spectrometry (LAM-MC-ICPMS) and isotope ratio mass spectrometer

(IRMS).

The Course offered an opportunity to the research scholars and scientists to discuss their experiences and share new ideas and developments in the field of elemental mass spectrometry. The Course concluded with the distribution of certificates to all the participants. The participants expressed their satisfaction and requested the organizers to hold more such short courses in future, in different parts of the country.

### Prem Bahadur Varma Memorial Lecture

Dr. Kalachand Sain, Scientist and Head of Gas-hydrates group at the National Geophysical Research Institute, (NGRI), Hyderabad, delivered the Third Prem Bahadur Varma Memorial Lecture at a function under the auspices of the Indian Geological Congress (IGC) held at KDMIPE, ONGC, DehraDun on

14 November 2009. The lecture was on, '*Gas Hydrates – Future Potential Energy Source: Their Detection and Assessment Using Seismic Methods*. Dr Sain received a cash prize from Shri D. K. Pandey, President, IGC and Director (Exploration), ONGC, and a citation from the Executive Council of

IGC. Shri P. K. Bhowmick, Executive Director, KDMIPE, Shri S. N. Talukdar, Shri P. K. Chandra and many other former and present stalwarts of ONGC were present at the function. The lecture created great enthusiasm among the ONGC personnel.

Dr. Sain in his Lecture, proposed





several innovative approaches based on the state-of-the-art linearized and non-linearized inversion algorithms for the exploration of hydrocarbons and gas-hydrates, subvolcanic sediments, and understanding the geodynamics and earthquake processes.

The methods put forth by Dr. Sain, based on seismic attenuation, attributes, travel-time tomography, AVO modeling, full-waveform inversion and rock-physics modeling are being utilized for the identification and quantification of gas-hydrates along the margins of India and other countries. The drilling and coring of the Indian Gas Hydrates Programme have validated the ground truth, where gas-hydrates were identified from the surface seismic data in the Krishna-Godavari, Mahanadi and Andaman offshore regions.

Globally, half of oil resources are found in the Mesozoic sediments. A vast tract of Mesozoics is covered by flood-basalts, which make the routine geophysical methods incapable of probing them. Dr. Sain has imaged such sediments using joint inversion of seismic refraction and wide-angle reflection data in the Saurashtra peninsula, Central India and Tapti region. His 2-D waveform tomography has attracted oil industries for imaging stratigraphic



Dr. Kalachand Sain receiving the citation

horizons of sub-basal sediments. He has imaged sedimentary formations in the Mahanadi, Bengal, Vindhyan and Marwar basins from inversion of wide-angle seismic and modeling of gravity data, and provided their geological implications for hydrocarbon explorations.

Dr. Sain has attributed the crustal heterogeneities, moho-upwarp and deep faults to the 1997 Jabalpur earthquake, and the crustal-scale hidden faults and thickened crust to the 2001 Bhuj earthquake. He has suggested collision tectonics for the southern granulite terrain by delineating the oppositely dipping reflectors and 40-45 km thick crust from deep seismic reflection/refraction experiment. He has shown subduction phenomena by deriving the northward dipping (55-61 km) crust in the north-western Himalaya, and

evidence of ~ 10 km underplating basaltic materials at the base of the crust in the Mahanadi delta.

Dr Sain has 60 research papers published in peer-reviewed journals, 21 non-SCI articles and 10 technical reports to his credit. He is a highly motivated and well-recognized earth scientist and has received several honours and awards which include: Young Scientist Award and Raman Fellowship by the CSIR; BOYSCAST Fellowship and Swarnajayanti Award by the DST; Krishnan Gold Medal and Life Fellow by the Indian Geophysical Union; Associate Fellow and Best Paper Medal by the AP Akademi of Sciences; National Mineral Award by the Ministry of Mines, GoI. Besides, Dr Sain is a Fellow of the Geological Society of India; Member of Editorial Boards in *International Journal of Earth Sciences & Engineering*; and *Episodes and Geohorizons*; Bureau Member of International Lithosphere Program; Chief Scientist for a Cruise SK 232C in *Sagarkanya*; Guest Faculty at the University of Hyderabad; Best Paper Presenter Awardee by the Petrotech-2007 at the International Conference on Oil & Gas. In addition, he is a member of a number of scientific bodies, societies and technical committees.

## IMMT Scientists Awarded

The scientists of Institute of Minerals and Materials Technology (IMMT), Bhubaneswar, have received the following Awards:

Mr. L. B. Sukla has been awarded IIME Mineral Beneficiation Award: Academic/R&D for the year 2009 for his contribution to the development in the field of Mineral Engineering on 28 October 2009 at IMMT.

Dr. R. R. Nayak has received the Best Paper Award, for his research paper entitled, '*Plasma Induced Surface Modification of Silk Fibres*' at 23rd International Conference on Surface Modification Technologies (SMT 23), during 2-5 November 2009 at IGCAR, Kalppakam.



## ANNOUNCEMENTS

### COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH (HUMAN RESOURCE DEVELOPMENT GROUP)

CSIR COMPLEX, Library Avenue, Pusa, New Delhi 110 012

#### NOMINATIONS INVITED

### Shanti Swarup Bhatnagar Prizes in Science and Technology for 2010

The Council of Scientific and Industrial Research (CSIR) invites nominations for the Shanti Swarup Bhatnagar (SSB) Prizes in Science and Technology for the year 2010. The SSB Prizes are to be given for research contributions made primarily in India during the past five years. *The age of the nominee for the 2010 SSB Prize should not be more than 45 years as on 31.12.2009.*

The SSB Prizes are awarded for notable and outstanding research, applied or fundamental, in the following disciplines: (1) Biological Sciences, (2) Chemical Sciences, (3) Earth, Atmosphere, Ocean and Planetary Sciences, (4) Engineering Sciences, (5) Mathematical Sciences, (6) Medical Sciences, and (7) Physical Sciences. The SSB Prize carries with it a citation, a cash award of Rs.5,00,000 (Rupees five lakh only) and a plaque for each scientist selected for the Award.

Nominations addressed to **Head, Human Resource Development Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110012** should be sent as per the *prescribed pro-forma (25 copies)* along with one set of reprints of significant publications of the last 5 years' period on or before **31 March 2010**. The details of the SSB Prize and the prescribed pro-forma for nomination may be obtained from the above address or may also be downloaded from our website: <http://csirhrdg.res.in>

### Nominations invited for Prof. G. N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology ñ 2009

The Council of Scientific & Industrial Research (CSIR) invites nominations for the Prof. G. N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology for the year 2009. The Award is bestowed every year to an outstanding Indian scientist, who has made conspicuously important contributions, applied or fundamental, in the interdisciplinary subject/field of Biological Sciences and Technology. The Award would be given for the work done primarily in India during ten years preceding the year of the Award. Prof. G. N. Ramachandran Gold Medal is presented during the Inaugural Function of Indian Science Congress. Nominations must be addressed to the Head, Human Resource Development Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110 012 and should be sent as per prescribed proforma (Original + one copy) along with reprints of five most significant publications of the last 10-years' period by 31<sup>st</sup> March 2010. The details of the Award and the prescribed proforma for nomination may be downloaded from our website <http://csirhrdg.res.in>



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