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CSIR NEWS

Progress, Promise and Prospects

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C O N T E N T S

CIMAP Organizes Kisan Mela



CPYLS at CECRI and NISCAIR



Appointments

- Dr. S. Srikanth Takes Over as Director, NML



- Prof. Indranil Manna Takes Over as Director, CGCRI



- Dr. Y. J. Bhaskar Rao Takes Over as Acting Director, NGRI



*Wishes
its Readers a Very
Happy New Year 2010*

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



Jai Hind to Jatropha **CSIR Fuels Research on Biodiesel Production**

Dr P. Cheena Chawla

Nature has it all. Whether it is food, fibre, fuel or a drug formulation, Nature has an answer to all our needs. It is only the judicious use of the myriad gifts of Nature that is important for our sustenance and well-being. Alas, it does not always happen. Take for example, the Earth's rich reserves of petroleum: a product of ancient biomass transformed, over geological time, under high temperature and pressure. The increasing use of these fossil fuels the world over today grimly reminds us of the fact that the finite reserves of such fuels may exhaust sooner than later. Besides, oil extraction and refining procedures are costly. Reflected in the rising price of petrol and diesel, the challenge of excessive demand of these fuels over their limited supply has today severely hit the country's economy.

The solution to the challenge of depleting natural reserves of oil has

come from Nature again. Thanks to the naturally gifted crop, *Jatropha curcas*, which is today well recognized as the source for producing biofuel that is significantly cheaper than crude oil. Although a native to Central America, *Jatropha* is a small tree of Euphorbiaceae family that today grows in many tropical and subtropical areas, including India, Africa, and North America. The mature trees bear separate male and female flowers. Fruits are ovoid in shape and the seeds on maturation are dried before oil extraction.

The prime ingredient in the manufacture of biodiesel is vegetable oil like sunflower, soya or peanut oil. But as these oils are edible and expensive, they are not used for biodiesel production. On the other hand, *Jatropha* produces oil-rich seeds from which oil can be easily extracted and processed for producing biodiesel. The

seeds contain about 30-35% of oil. Amazingly, *Jatropha* may yield more than four times as much fuel per hectare as soybean and more than ten times than that produced by maize. Moreover, as *Jatropha* contains several toxic compounds, such as lectin, saponin, carcinogenic phorbol, and a trypsin inhibitor, its untreated seeds are not fit for human consumption. As *Jatropha* oil burns with a clear smokeless flame, it can also be used as a kerosene substitute.

Jatropha is a hardy plant that is resistant to drought and pests. Moreover, it can be grown in soils having low fertility, although crop yield can be enhanced using fertilizers containing magnesium, sulphur, and calcium. The yield of seeds from *Jatropha* cultivation can range from 1,500 to 2,000 kilograms per hectare that corresponds to extractable oil yield of about 540 to 680 litres per hectare.



Jatropha trees (far left) produce ovoid shaped nuts that contain seeds laden with oil



Mature seeds are dried before oil extraction

From Biodiesel to Biodegradable Plastics

In a major discovery, the Bhavnagar-based CSMCRI has found a microbe useful in the manufacture of biodegradable plastic from a side-stream product of jatropha called 'glycerol', which is found during extracting biodiesel from the plant seeds. The Institute is all set to scale up its commercial production. Surely, it is a revolutionary advancement that is poised to tackle the challenge of ever-increasing environmental pollution posed by non-degradable plastics.

As part of the Budapest Treaty on international recognition of deposit of microorganisms for patent procedure, the identified microbe has been deposited by CSMCRI with a repository.

The remaining press cake of jatropha seeds after oil extraction can also be used for energy production. The processed oil from *Jatropha* seeds can be used in compression-ignition (diesel) engines. It can also be blended with conventional diesel to avoid the need for engine modification. The process of converting vegetable oil into biodiesel fuel is called 'transesterification'. An important by-product of biodiesel refinement is glycerol.

The National Botanical Research Institute (NBRI), Lucknow, is today a

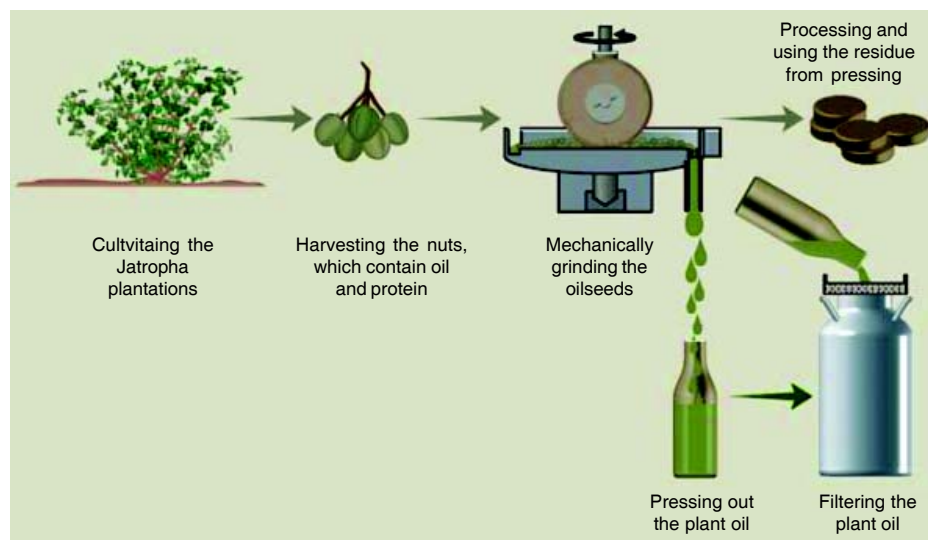
forerunner in biodiesel and other hydrocarbon plants research. The focus on harvesting energy from biomass began with the initiative of Prof. T. N. Khoshoo, who encouraged scientists to initiate collection of germplasm. Dr. H. M. Behl, who had done extensive work on guayule (*Parthenium argentatum*) also joined this Project. Under the guidance of Dr. P. Pushpangadan, former Director, NBRI, the team ventured further in harnessing the potential of oil crops for production of biofuels.

NBRI scientists have today

developed protocols for extraction of oil from the seeds of *Jatropha curcas*, *Madhuca indica*, *Salvadora* species and *Pongamia pinnata* for use as biodiesel. The extracted oil is transesterified and tested as biodiesel. It is tested for use in stationery motors as well as for automobiles. The oil is also processed for removal of gums, free fatty acids, water and other suspended or solid particles.

For screening the germplasm of this oil crop, NBRI scientists collected the seeds of *Jatropha curcas* and *Pongamia pinnata* from various parts of the country and evaluated them for their morphological traits, oil quantity and quality using specialized techniques. Nursery experiments such as inoculation with microbes, hardening of the saplings for long distance transportation and raising healthy plants have also been attempted.

NBRI is also developing mass multiplication by macro-propagation techniques. Besides the numerous projects on indigenous biofuel production, NBRI also organizes training programmes for farmers, as agroforestry models for oil rich crops like *Jatropha* need to be developed in



Producing oil from *Jatropha* seeds



Dr P. Pushpangadan Honoured with *Padma Shri* Award

Prof. Palpu Pushpangadan, presently the Director General of Amity Institute for Herbal & Biotech Products Development (AIHBPD), Thiruvananthapuram received the *Padma Shri* Award from Honorable President Pratibha Patil on 31st March 2010 for his multifaceted achievements in Plant Sciences spanning over 37 years.



He served as Director, National Botanical Research Institute (NBRI) from February 1999 to February 2006 and Director, Tropical Botanic Garden & Research Institute (TBGRI) from November 1990 to February 1999. He also held additional charges as Director of Rajiv Gandhi Centre for Biotechnology (RGCB) in 1994 and Central Institute for Medicinal & Aromatic Plants (CIMAP) in 2000-2001.

Dr. Pushpangadan has carried out research in Cytogenetics & Plant Breeding, Biotechnology, Molecular Taxonomy, Ethnobiology, Ethnopharmacology and Bioprospecting. He has published over 400 research papers, and has about 95 patents to his credit.

Prof. Pushpangadan has been a consultant to WHO, DANIDA, UNESCO, UNDP, UNEP and NAM S&T Centre for developing countries and UN-CBD. He has received many national and international medals/awards including the prestigious UNEP Borlaug Award in 1998 and the UN-Equator Initiative Award-2002 at World Summit at Johannesburg, South Africa in September 2002.

Prof. Pushpangadan is a fellow of the National Academy of Sciences, Fellow of the National Academy of Agricultural Sciences and also Fellow of four other Scientific Bodies in India. He is also the President of National Society of Ethnopharmacology.

conjunction with awareness campaigns for achieving large-scale plantation of such crops in the country.

In a significant development, General Motors in partnership with the US Department of Energy (DOE) is developing two *Jatropha* farms in India for biodiesel production: A 16-hectare plot in Bhavnagar and a 38-hectare plot in Kalol, near GM's India Car Manufacturing plant. An existing 30-hectare *jatropha* farm in Bhavnagar will also be managed under this project. The joint DOE-GM funding would enable the Central Salt & Marine Chemicals Research Institute (CSMCRI) to manage various activities at these farms. It is envisaged that lab-optimized strains of *jatropha*, produced through selective and marker-assisted breeding, would be cultivated at these farms. A complete life cycle analysis of *Jatropha* plant would also help in evaluating the environmental impacts on this oil-yielding crop.

Production of biofuels holds enormous potential for farmers, as the basic source of such fuels is crops. This would help farmers to not only grow their income but also generate their own supply of affordable energy, thus boosting rural economy. As biofuels produce fewer emission of carbon monoxide and toxic chemicals that cause vehicular pollution, they are called 'green fuels' that are a safer option to petrol and diesel, while having a potential to lower global warming. Moreover, biofuels would reduce the burden of importing huge quantity of crude oil. Undoubtedly, production of biofuels is poised to benefit one and all.

Currently the oil from *Jatropha curcas* seeds is used for making biodiesel fuel in Philippines and in Brazil. *Jatropha* oil is being promoted as an easily grown biofuel crop in many countries including India. Interestingly, the first successful trial run of passenger trains on 5% biodiesel was conducted in 2003 with the Delhi-Amritsar Shatabdi Express with a 4000 HP engine. Southern Railways, at its Perambur Loco Works Laboratory, Chennai, has set-up a pilot plant for biodiesel production and has been using 5% biodiesel in some of its locomotives since July 2004. The railway line between Mumbai and Delhi is planted with *Jatropha* and the train itself runs on 15-20% biodiesel.

It is also a heartening fact that biofuels have also been tested as a substitute to aviation fuels. Air New Zealand successfully completed a test flight in 2008 from Auckland using a 50/50 mixture of *jatropha* oil-derived biofuel and Jet engine fuel, while in a similar feat in early 2009, Continental Airlines completed such a successful two-hour test flight, signifying the importance of cheaper, environment-friendly alternatives to fossil fuels.



NIO Acquires New Research Vessel

RV Sindhu Sankalp

The research vessel *RV Sindhu Sankalp* that has been recently acquired by the National Institute of Oceanography (NIO), Goa, is now undergoing tests and checks for obtaining statutory



clearances before beginning its voyages. After obtaining the clearances, the ship will undertake trial research cruises during the next few months, when various newly installed facilities on the ship will be tested, besides collecting data for research. Once NIO is fully satisfied with the handling of the gear and management of the vessel, the latter will be formally dedicated to the nation.

RV Sindhu Sankalp is a 56.3 metre vessel with a cruising speed of 11.5 knots. It has a range of 20,000 nautical miles and endurance of 30 days. It can carry 35 persons: 16 scientists, 4 supporting staff and 15 crew members. The vessel has undergone extensive refitting at the Cochin Shipyard Ltd, Kochi, where it has been equipped with modern research equipment for studying physical, chemical, biological, geological, and geophysical oceanography.

The equipment on board *RV Sindhu Sankalp* can record profiles of temperature and salinity in the water

column, collect high-resolution data on ocean bottom topographic features, and profile geophysical structure below the ocean floor. The vessel has equipment to collect water samples at different depths for studies on water column biology and chemistry, and can deploy and retrieve moorings for long-term data recording at sea.

The ship is equipped with three laboratories to conduct on-board analysis and for processing of data. Other equipment on board includes a towing magnetometer, a sparker system, a side-scan sonar system, an automated weather station and seabed samplers.

The new ship has arrived at a time when NIO's research programmes are midway through the 11th Five Year Plan (2007-12) and have been facing shortage of ship-time due to paucity of research vessels in the country. With acquisition of the new vessel, NIO now has two vessels, the second being the 23 meter coastal research vessel, *Sagar Sukti*, which operates

MoU signed between CBRI, Roorkee and IIT Roorkee

An MoU was signed between Central Building Research Institute (CBRI) Roorkee and Indian Institute of Technology (IIT) Roorkee on 17th February 2010 to steer the R&D activities and common goals of both the Institutions in the area of Building Science & Technology.

The MoU covers the modalities and general conditions regarding availability of highly qualified manpower in the area of Civil Engineering, Building Science & Technology, Engineering Geology, Architecture & Planning and other areas of Engineering.

The MoU also covers exchange of personnel through deputation for limited period on mutually agreed terms and conditions besides the organization of joint Conferences and Seminars, Training of IIT students at CBRI, admission of CBRI Scientists/ Technical Officers to the Postgraduate Programmes at IIT, Roorkee.

mainly in the vicinity of India's coastline. The ship that has now been renamed *RV Sindhu Sankalp*, earlier served as a fishery training vessel *Chishio Maru* for Japan and operated in the Pacific Ocean. NIO acquired this Ship in November 2008 and has now completed its conversion to a multi-disciplinary oceanographic research vessel.



R&D at NIO

Fungal Diversity in Oxygen-Depleted Regions of the Arabian Sea

In order to study the fungal diversity in oxygen minimum zones of the Arabian Sea, scientists working at the National Institute of Oceanography (NIO), Goa, have analyzed 1440 cloned small subunit rRNA gene (18S rRNA gene) sequences obtained from environmental samples using three different PCR primer sets. By Restriction Fragment Length Polymorphism (RFLP) analysis, 549 distinct RFLP patterns were obtained, out of which 268 RFLP patterns could be assigned to fungi (*Dikarya* and zygomycetes) after sequence analysis. The remaining 281 RFLP patterns represented a variety of non-fungal taxa, even when using putatively fungal-specific primers.

A substantial number of fungal sequences were closely related to

environmental sequences from a range of other anoxic marine habitats, but distantly related to known sequences of the described fungi. Community similarity analysis has suggested the presence of distinctively different structures of fungal communities from normoxic sites, seasonally anoxic sites and permanently anoxic sites, which indicates different adaptation strategies of fungal communities to prevailing oxygen conditions.

Additionally, the scientists also obtained 26 fungal cultures from the study sites, most of which were closely related (497% sequence similarity) to well-described *Dikarya*. This indicates that standard cultivation mainly produces more of what is already known. However, two of these cultures were highly divergent to known

sequences which apparently represent novel fungal groups on high taxonomic levels.

Interestingly, none of the cultured isolates was found to be identical to any of the environmental sequences obtained. This study demonstrates the importance of a multiple-primer approach combined with cultivation for obtaining deeper insights into the true fungal diversity in environmental samples and for enabling adequate intersample comparisons of fungal communities

Authors: Jebaraj, C. S.; Raghukumar, C.; Behnke, A.; Stoeck, T.
Citation: FEMS Microbiology Ecology, 2010, Vol.71(3); 399-412
Publisher: Blackwell Publishing

Geochemical Characterization of Oceanic Basalts Using Artificial Neural Network

The geochemical discriminate diagrams help to distinguish the volcanics recovered from different tectonic settings. However, these diagrams tend to group the ocean floor basalts (OFB) under one class that is, mid-oceanic ridge basalts (MORB). Hence, a method is specifically needed to identify the OFB as normal (N-MORB), enriched (E-MORB) and ocean island basalts (OIB).

Artificial Neural Network (ANN) technique as a supervised Learning

Vector Quantization (LVQ) is applied to identify the inherent geochemical signatures present in the Central Indian Ocean Basin (CIOB) basalts. A team of NIO scientists used a range of N-MORB, E-MORB and OIB dataset for training and testing of the network. Although the identification of the characters as N-MORB, E-MORB and OIB is completely dependent upon the training data set for the LVQ, this method was found to be successful in identifying the characters within the

CIOB basalts. The study helped to geochemically delineate the CIOB basalts as N-MORB with perceptible imprints of E-MORB and OIB characteristics in the form of moderately enriched rare earth and incompatible elements.

Authors: Das, P. Iyer, S.D.
Citation: Geochemical Transactions, 2009, Vol.10; doi:10.1186/1467-4866-10-13; 11 pp
Publisher: BioMed Central Ltd.



Monitoring Tsunamis Through Underwater Communication Network

A novel study reveals that tsunamis send electric signals through the ocean, which could be sensed by the vast network of communication cables on the seabed.

C. Manoj Nair and T. Harinarayana of the National Geophysical Research Institute, Hyderabad; Alexei Kuvshinov of the Swiss Federal Institute of Technology, Zürich; and S. Neetu of the National Institute of Oceanography, Goa used computer models to estimate the size of an electric field created by the force of the 2004 Indian Ocean tsunami as it travelled over major submarine cables.

Salty seawater, a good conductor of electricity, generates an electric field as it moves through Earth's geomagnetic field. "We estimate that the 2004 tsunami induced voltages of about 500 millivolts (mV) in the cables. This is very small compared to a 9-volt battery, but still large enough to be distinguished from background noise on a magnetically quiet day. By monitoring voltages across this network of ocean cables, we may be able to enhance the current tsunami warning system", said the researchers.

Tsunamis are created by a large displacement of water resulting from earthquakes, landslides, volcanic eruptions, and even meteors hitting the ocean. Vessels far out at sea may not notice the waves passing underneath at the speed of a jetliner, because the wave heights are very small in the deep ocean. This makes their detection and monitoring a challenge.

The current tsunami warning system relies on a global seismometer network to detect earthquakes that may indicate an impending tsunami. Deep-ocean pressure sensors and coastal tide gauges are the only tools available to detect and measure an actual tsunami. The electric current induced in submarine cables may provide an additional way to confirm and track a tsunami.

Since the 2004 tsunami, the international warning system has expanded to include 47 deep-ocean pressure sensors, most of them in the Pacific area. After an investment of more than \$100 million and strong support of Congress, National Oceanic and Atmospheric Administration (NOAA) has made tsunami warnings and education a priority. Within the United States, real-time data from these deep ocean sensors are used to forecast the impact of the tsunami on U.S. shorelines.

Paleomagnetic Laboratory Adds to NIO's Infrastructure

The National Institute of Oceanography (NIO), Goa, recently developed a Paleomagnetic Laboratory for analyzing data pertaining to magnetic stratigraphy and environmental magnetism. The researchers use the magnetic data together with geochemistry and/or sedimentology data for meaningful geological interpretation.

The magnetic measurements are rapid and are non-destructive in nature and can be carried out with minimal sample preparation. This laboratory facility now available within the Institute is expected to be used frequently for detailed magnetic measurements of the sediment cores for understanding depositional environment and authigenic mineralization.

The laboratory is equipped with sophisticated instruments like Spinner Magnetometer, Alternating Field Demagnetizer (AFD) with ARM attachment, MS2B Dual Frequency Susceptibility Meter, Pulse Magnetiser and MS2 Temperature Susceptibility System. This facility would accelerate the analytical processes in a big way. Researchers working on sedimentology and gas hydrates related projects are likely to use this facility to maximum.

It is at present limited to the users within NIO, since there are several samples queued up for analysis, and possibly for students doing their projects at NIO. However, if any user in any other Institute/University needs such support, they can contact Dr. Pawan Dewangan (email: pdewangan@nio.org) or Dr. Pratima Kessarkar (email: pratimak@nio.org) with their requirements.





NCL-UoG Workshop on Catalysis

A two-day Indo-German joint Workshop on the *Emerging Areas of Catalysis* was held at the National Chemical Laboratory (NCL), Pune, in the recent past. The University of Göttingen (UoG) team comprising five members was lead by Prof. Ulf Diederichsen. About 25 participants attended the Workshop.

Dr. S. Sivaram, Director, NCL, welcomed the participants, and briefed them on the genesis of the Workshop. Dr. Ganesh Pandey from NCL in his introductory remarks, detailed about the conceptualization of the Workshop and also about the resources and the persons instrumental in organizing the same.

Prof. Ulf Diederichsen from UoG provided a short overview of the UoG in general and about the origin of Catalysis for Sustainable Synthesis (CaSuS) funded by the Ministry for Science and Culture of Lower Saxony at Georg-August-University Göttingen, Germany. This is continuing with the objectives of this center and various research programmes where external collaborations are sought.

It was followed by a comprehensive presentation by Dr. Sivaram on NCL providing strengths of various disciplines, existing national and international collaborative programmes, and about the forthcoming areas where the potential collaborations are sought.

Prof. L. F. Tietze from UoG, in his welcome remarks elaborated on the frontier areas of biological and material sciences where the innovations can be provided by organic synthesis. An elegant introduction to his prodigy "*Domino Reactions*" was given. This

was followed by some examples of total synthesis where the use of multiple Pd-catalyzed transformations for the efficient synthesis of α -tocopherol, steroids, diversonol and molecular switches was presented.

Dr. C.V. Ramana from NCL presented some of his recent contributions to the area of Pd-mediated catalysis. His presentation was focused on developing catalytic methods that address the natural products molecular complexity. Total syntheses of natural products such as didemniserinolipid B, cyclodidemniserinol and cephalosporolides -E and -F were presented.

Dr. A. Sudalai from NCL presented synthetic methodologies which involve the co-catalyzed reductive cyclization of suitably substituted azido/cyano α , α -unsaturated esters to synthesize α -lactams, nitrocyclic sulfites and tetrahydroquinolin-3-ols.

Prof. Ackermann from UoG presented the details of his group's research that focus on, "*Transition Metal-catalyzed C-H Bond Functionalizations*". Details about the direct arylations of arenes and heteroarenes by employing various ruthenium or palladium complexes for efficient and generally applicable C-H bond functionalizations were given.

After this, Dr. A. P. Singh from NCL presented glimpses of research activities that focus on the synthesis and characterization of metal complex heterogenized organo-functionalized mesoporous materials. A couple of examples showing the applicability of these catalysts for various oxidations were given. The details of the molecular

beam instrument (MBI) fabricated at NCL, and its use in studying the gas/vapour phase reactions on metal surfaces was narrated by Dr. C. S. Gopinath. Some model experiments on the nitric oxide (NO) reduction with ethanol blended gasoline revealed that relatively oxygen-free surface is an essential factor to manage NO-reduction under net-oxidizing conditions.

Prof. Stalke from UoG gave an interesting presentation about cryocrystallization *cum* X-ray crystal structure determination of reactive intermediates. The importance of these techniques in understanding the charge density in molecules to gain insight in the reactivity and coordination behaviour of metal centers was exemplified.

Dr. Shubhangi from NCL presented research activities that focus on the "*Synthesis of Novel Catalysts for Organic Transformations and Environmental Catalysis*". Details about the synthesis and characterization of various $\text{MoO}_3/\text{SiO}_2$, WO_3/ZrO_2 , $\text{V}_2\text{O}_5/\text{TiO}_2$ catalysts and heteropoly acids such as STA, TPA, PMA supported on mesoporous silica, zirconia, titania and their use for various organic transformations was given.

Dr. P. L. Dhepe from NCL gave a comprehensive introduction to the techniques available for the conversion of biomass into value added products. He provided the glimpses of his research that attempt to convert easily available oligo-polysaccharides into furan derivatives by employing heterogeneous catalysts.

Scientific session of the second day started with presentation by Prof. Meyer



from UoG. He provided an elegant explanation about how the enzymes take advantage of the cooperative action of two proximate metal ions within their active site, and how such natural systems represent a great inspiration for, *inter alia*, the development of novel bioinspired catalysts. His talk highlighted some selected bi- and oligometallic systems that are currently being studied in his laboratory, focussing on cooperativity patterns of the proximate metal ions.

Dr. S. S. Tambe from NCL provided the details about a wide variety of artificial intelligence formalisms that have been employed for modelling, optimization, control and soft-sensor development of catalytic systems with selected examples. This was followed by another presentation from the scientific computing group of NCL.

Dr. Vanka Kumar presented the details of the investigation of the asymmetric hydroformylation of styrene that has been performed using the $\text{HRh}(\text{CO})_2[(\text{R})\text{-BINAP}]$ catalyst,

aiming to gain insight into the structure-activity relationships that influence the catalysis and the rate determining step(s) in the reaction cycle. By employing the TZVP basis set for all the atoms, various stationary points and transition states have been characterized along the reaction pathway.

In post-tea session, Prof. Ulf Diederichsen spoke on, "*Catalysis Using the Three-Dimensional Topology of Bio-oligomers*". Initially, he presented how his group has addressed the mechanism of conversion of orotidine-5'-monophosphate (OMP) to uridine-5'-monophosphate (UMP) by the enzyme orotidine-5'-monophosphate decarboxylase. In the second part, he explained how the various bio-oligomer topologies could potentially be used as scaffold in catalysis.

Dr. Sayam Sengupta from NCL in his talk on, "*Clickable Mesoporous Materials as Scaffolds for Site-isolated Catalysts and New Transition Metal Catalysts for Oxidation*

Reaction" explained details about the design of clickable mesoporous materials and techniques that were used to synthesize and characterize the same. The presentation of Dr. N. N. Joshi from NCL comprising his research group efforts in providing effective ligands and catalysts for the asymmetric pinacol coupling reaction completed the final session of the Workshop.

In the concluding session, Prof. Tieze captured the salient features of the Workshop and stressed on the need for establishing collaborative research relationships between UoG and NCL. He also emphasized the need for putting up a joint grand proposal in the area of C–C bond formations via C–H activation. He highlighted the benefits of having student exchanges and the need to establish programmes to accomplish these goals. Dr. Pandey underlined the productive nature of the event. He also highlighted how such collaborations and ideas can be turned into reality by the one-to-one collaboration basis.

Training Course on *Sampling, Analytical Techniques of Water Samples and Quality Control*

The National Geophysical Research Institute (NGRI), Hyderabad, conducted a five-day Training Course on, '*Sampling, Analytical Techniques of Water Samples and Quality Control*' during 14-18 December 2009. The training programme was sponsored by the Central Pollution Control Board (CPCB), Delhi, and was inaugurated by Dr. Y. J. Bhaskar Rao, Acting Director, NGRI. About 20 participants from different State Pollution Control Boards, CPCB Head Office, Delhi, and from its Zonal Offices viz., Kolkata, Lucknow, agencies working on environmental problems such as EPTRI, Hyderabad and CMPID, Ranchi participated in the training.

The Training Course was mainly focused on the current trends and conceptual framework related to quality control aspects in monitoring of water. Eminent speakers from different Universities, CSIR Labs, GSI, Hyderabad and Directorate of IIP and PH Labs, Hyderabad, delivered lectures in their respective fields. Dr N. N. Murthy, Scientist, NGRI, coordinated the Training Course.

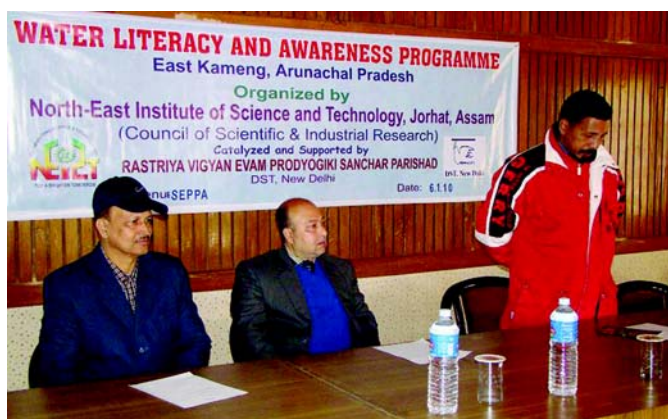


Awareness Programmes on *Eco-Water and Sanitation Literacy by NEIST*

The North East Institute of Science and Technology (NEIST), Jorhat, organized six awareness programmes during 21-23 December 2009 and 4-7 January 2010, in East Kameng District of Arunachal Pradesh, on Eco-water and Sanitation literacy, under a Project catalyzed and supported by *Rastriya Vigyan Evam Prodyogiki Sanchar Parishad*, Department of Science and Technology, Government of India.

The Programmes were organized in district sub-division Seijosa and district headquarter Seppa of East Kameng District of Arunachal Pradesh. These programmes, were specifically targeted at PHE department, common people and the student communities, in addition to district administration.

Talks were delivered on general awareness on various water borne diseases, importance of safe drinking water, general and water related sanitation, prevention of water-borne diseases, environmental sanitation, protection of water resources and low cost home treatment techniques and methods for safe drinking water. To make the programmes more effective and useful for the common man a specifically prepared booklet, 'Water is Life' was distributed besides the display of attractive posters and banners.



A dais view

All the programmes were well-attended and the response from teachers, students and district administration was very encouraging. In both the Sub-Divisions, people highly appreciated the Institute's societal work, as such programmes had not been organized earlier in these remote parts of the country. In both these subdivisions of East Kameng District there were no water treatment plants available for public distribution of water due to which the incidence of water borne diseases was very high.

NEIST also established two microbial water testing laboratories, along with the awareness programmes — one at Seijosa Government Higher Secondary School and the other at Seppa Government Higher Secondary School for the benefit of the people of the district, there were no water testing laboratory facilities available in the

district.

To study the chemical and physical parameters of water, a Testing Kit was also provided to the respective schools. To carry out the chemical and microbial testing of water, necessary training was provided to the teachers on the spot and also in NEIST laboratory. These awareness programmes were conducted by Dr. B. K. Gogoi, A. K. Sarmah, Dr. R. L. Bezbaruah, M. Khongsai and Salam Pradip Singh of Biotechnology Division, NEIST.



A view of the audience



Demonstration of Rose water distillation unit ĆCIMAP Asvikaĳ

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, imparted technical training on rose water making using *CIMAP Asvika*, a small low cost unit developed by CIMAP, to a group of women in Dargah Khwaja Garib Nawaz (Ajmer Sharief) during 27-28 January 2010.

The training was organized by *Parivartan Vikas Sansathan* under a DBT funded project with the support of HESCO, and Dargah Committee. The training gave emphasis on the income and employment generation opportunities utilizing flowers post-offered at the shrine, for rose water distillation. Dr Atique Ahmad and Shri Jamil Ahmad of CIMAP organized this demonstration of rose water production.



Rose water distillation unit being demonstrated

Prof. J. N. Goswami delivers a talk on, ĆExpedition to Moon by Chandrayan-1ĳ



Prof. J. N. Goswami, Director, Physical Research Laboratory, Ahmedabad, and Principal Scientist of India's Moon Mission visited North East Institute of Science & Technology (NEIST), Jorhat, on 12 January 2010, and delivered a talk on the '*Expedition to Moon by Chandrayan-1*' for the scientific staff of the Institute. Prof. Goswami apprised the audience about current global status of R&D in this pioneering area of science.

Earlier, Dr. P. G. Rao, Director, NEIST, welcomed Prof. Goswami and greatly appreciated his valuable contributions to the country in this prestigious project. Dr. B. G. Unni, Sr. Scientist, NEIST, gave a brief introduction about Prof. J. N. Goswami before the talk and Dr. A. Goswami, Scientist, proposed the Vote of Thanks.

Prof. Collin Roesler, Bodwain College, USA, delivers Lecture at NIO

Prof. Collin Roesler of Bodwain College, USA, delivered a Lecture on, *Bio-Optics from Ships and Coastal Ocean Observing Systems for Monitoring Harmful Algal Blooms*, at the National Institute of Oceanography (NIO), Goa. The Abstract of the Lecture is given below:

The colour of ocean waters varies from the bright, clear blue of the

oligotrophic gyres to the darker, turbid green of eutrophic coastal waters. The variations in clarity are determined by the scattering properties of the suspended particulate matter, which is a function of their concentration, composition, and size distribution. The variations in colour are determined by the absorption properties of the constituents, which is a function of the

relative concentrations of water, coloured dissolved organic matter (CDOM), non-algal particles (NAP, including detrital organic and mineralic particles), and phytoplankton.

Recent technological advances now permit the observations of the inherent optical properties (IOPs, absorption and scattering) from a variety of platforms, resolving



variations on time scales of minutes to years, and spacial scales of cm to thousands of km. Analytic and semi-analytic inversions of the IOP observations yield estimates of the concentration, composition and size distribution of the dissolved and particulate constituents.

Of particulate interest is the application of these inversion techniques to *in situ* observations to resolve the concentration and composition of harmful algal blooms (HABs). One method that has shown great promise is the definition of pigment-based phytoplankton functional types (PFTs), which served to distinguish the major phytoplankton groups based upon taxon-specific pigmentation that leads to resolvable variations in the phytoplankton absorption coefficient.

When the blooms are dominated by a single noxious species, or when the concentrations are extremely high, the inversions are very robust. Of even more interest is the capability of resolving minor components of phytoplankton community.

CIMAP Organizes *Kisan Mela*

The Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow, organized *Kisan Mela 2010* in its campus, which was attended by about 1600 participants hailing from different States like UP, MP, Maharashtra, Bihar, Haryana, Punjab, Chhatisgarh and Andhra Pradesh.

While inaugurating the *Kisan Mela*, His Excellency, Governor of Uttar Pradesh Shri B. L. Joshi, in his Address emphasized that farmers are the life of the country and their progress can ensure the country's progress. He expressed satisfaction that farmers who attended *Kisan Mela* are actually utilizing



A view of dais

the medicinal and aromatic plants related technologies besides the cultivation of conventional crops. He further said that interaction of the farmers with the scientists at CIMAP will be useful in making strategies for future research programme in this area. He congratulated



Shri B. L. Joshi releasing the Improved Variety of Palmarosa 'CIMAP Harsha'



His Excellency visiting the stalls



Shri B. L. Joshi releasing the Mentha Variety 'CIMAP Saryui'



Demonstration of 'CIM Mahak' Agarbatti



Demonstration of 'CIM-ASVIKA' to His Excellency



Release of Souvenir 'Aus Gyanya'

CIMAP for organizing *Kisan Mela* and said that such events should be organized at frequent intervals to disseminate knowledge and technologies among the rural poor.

The Governor also emphasized the need for developing entrepreneurial skills among the farmers so that they could go beyond farming to augment their income. The Governor released two improved varieties of aromatic plants developed by CIMAP which are: '*CIMAP Sarayu*' of Mentha and

'*CIMAP Harsha*' of Palmarosa. The seeds of these varieties were handed over to a group of the farmers by the Governor. He also released the souvenir '*Aus Gyanya*' and CIMAP magazine '*Ausboond*'.

Earlier, Prof. Ram Rajasekharan, Director CIMAP, welcomed the Chief Guest Shri Joshi, and the guests, farmers and industry representatives present on the occasion. Prof. Rajasekharan said that CIMAP is committed to transfer the

knowhow and technologies for the welfare of the people, especially in the rural areas.

Dr. A. K. Singh, Head, Technology and Business Development, presented the

details of the *Kisan Mela* programme. He told that the special attractions of this *Kisan Mela* were the display and sale of planting material of improved varieties and training of women in making of agarbatti and rose water. The farmers present on the occasion praised CIMAP's efforts in organizing this unique annual meet, which was marked with the release of improved plant varieties and fruitful interaction with scientists of CIMAP.

Team CSIR Demonstrates PEM Fuel Cell Stacks at FUCETECH 2009

The CSIR Team comprising National Chemical Laboratory (NCL), Pune; National Physical Laboratory (NPL), New Delhi; and Central Electrochemical Research Institute (CECRI), Karaikudi; successfully demonstrated the performance of three PEM Fuel Cell stacks at FUCETECH 2009, an international symposium-cum-exhibition held at Mumbai, during 11-13 November 2009. The event was organized by Naval Materials Research Laboratory (NMRL), Ambernath.

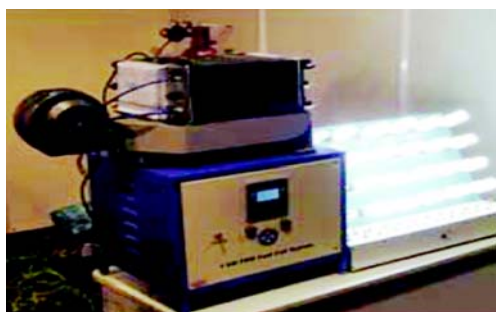
Two stacks employing commercially

available Nafion® membrane and one stack employing polybenzimidazole (PBI) membrane electrode assembly (MEA) were put on display. Amongst the Nafion® systems, one was a 30-cell stack giving a total power of 1kW, using H₂-air. The other was a 10-cell direct methanol fuel cell (DMFC) stack, which had a total power capacity of 20W. For the operation of the Nafion® based stacks, the heat generated during the cell reactions itself was utilized, without any external heaters, to maintain the required temperature.

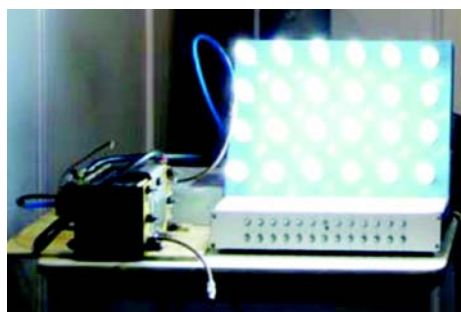
The PEMFC and DEMFC operations were performed at 55°C and 40°C, respectively. The system humidification was maintained with the help of an in-built unit which acted both as a device to collect the product water and a humidifier to establish the required humidity levels by utilizing the water produced from the cells. The power generated by the stacks was used to light up twenty four household bulbs (23W each) in the case of PEMFC, whereas three bulbs (15W each) could be lit by the DMFC stack.



EXHIBITIONS



1 kW PEMFC (Nafion®) stack



350 W PBI based PEMFC



CECRI Team



NCL team along with Prof. A.K. Shukla from IISc. Bangalore

The main attraction, however, was a 15-cell PBI stack which could generate a maximum power of 350W with improved efficiency. The distinguishing feature of this stack was that it was based on thermally stable and robust PBI membranes cast in NCL, while the molded composite bipolar plates and porous conducting carbon paper were fabricated by NPL and the stack was designed and assembled by CECRI.

The stack operation was carried out at 135-140°C using H₂-air. Twenty four household bulbs (15 W each) could be lit up for several hours without any interruption from the power generated by this PBI stack. The high temperature operation of the stack ensures higher levels of carbon monoxide tolerance in the H₂ fuel.

Furthermore, the PBI membrane

exhibits features such as, low fuel cross-over, nearly zero osmotic drag coefficient and proton conductivity without any external humidification. The system is expected to deliver superior performance in terms of cost, durability, better adaptability to feed purity levels and comparatively simple design aspects due to the absence of the external humidifier unit.

The three-day event was fruitful as it brought together various laboratories and companies, in and outside India working in the area of fuel cells. The exhibition undoubtedly revealed CSIR's collective strength and capabilities in the area of materials and component development as well as system integration in the competitive area of PEM-FC.

NAL Participates in the Pride of India Expo

The National Aerospace Laboratories (NAL), Bangalore, participated in the Pride of India Expo which was part of the 97th Indian Science Congress held during 3-7 January 2010 at Thiruvananthapuram.

The exhibitors from different government organizations which participated were ISRO, DRDO, GSI, BARC etc., in addition to CSIR.

NAL exhibited its achievements by displaying charts and models. Nine charts were displayed along with the models of *Saras* and *NM5*. NAL's contribution to space technology was showcased by displaying the VHRR mirror from SED and few Satcom products from FRP division.

On all the days, the expo was visited by thousands of students from both school level to college level and delegates of the Indian Science Congress. Over three lakh people visited during these five days of expo. Most of the visitors were curious to know about the achievements of NAL, including information about the VHRR mirror and its applications. There were queries made by some engineering students about the possibility of doing some projects at NAL. The visitors appreciated the achievements of NAL.

CSIR Programme on Youth for Leadership in Science (CPYLS), at CECRI and NISCAIR

Central Electrochemical Research Institute (CECRI), Karaikudi

The CSIR Programme on Youth for Leadership in Science (CPYLS), was organized at the Central Electrochemical Research Institute (CECRI), Karaikudi, during 3-5 December 2009. Twenty-three students, who were state level toppers in the school final examinations (X Standard) held in April 2009 and were currently studying in XI Standard, participated in the programme along with their parents/guardians/teachers.

Dr. A. Shenbagavalli, Registrar-in-Charge, Alagappa University, Karaikudi, who inaugurated the programme, asked parents and caretakers to develop scientific temper in young minds and motivate them to become scientists. She said that parents normally motivate their children to become doctors or engineers. Though there was nothing wrong in the trend, they should know that scientists as a profession, was not inferior to any other vocation. It was a step ahead in terms of earning or gaining name and fame. Several persons, including Prof. Ramakrishnan Venkataraman who has been recently awarded Nobel Prize for Chemistry, and others, achieved highest positions in their career simply by choosing science as their profession.



Dr. A. Shenbagavalli delivering the Inaugural Address

She further added that contemporary generation cannot imagine life without scientific inventions that have manifested in each and every function of our lives. Whether it is electricity, television, information technology, or health and medicine, advances in science & technology have percolated every sphere. Hence, students today should develop the aim of becoming scientific leaders.

Dr. N. Palaniswamy, Scientist 'G' and Head, Corrosion Protection Division, CECRI, in his Presidential Address, said it was an era of

Material Sciences. Opportunities were abundant for students to become leaders in science. Women could contribute much to the development of science. There were many instances where women have brought laurels to their country by excelling in scientific fields. Hence women should also come forward to engage in research activities.

Mr. S. Ramu, Scientist 'F', Head, Corrosion Testing and Evaluation Division and Chairman, CPYLS, said that CECRI has been organizing CPYLS since 1999 for the 50 toppers in the X Standard of CBSE, ICSE, Matriculation and State Board



Student participants in CPYLS at CECRI



Examinations annually and they were given an exposure to the laboratory facilities at CECRI. Dr. S. Syed Azim, Scientist 'F' and Head, International Collaboration and Publicity Division, introduced the participating students. The student participants were presented educational kits consisting of science books etc., as a token of appreciation of their excellent academic achievements.

On the first two days, the forenoon sessions were devoted to a series of popular science lectures, viz. '*Growth of Science*', '*Scientific Awareness*', '*Corrosion Science & Engineering*', '*Solar Energy*' and '*Advances in Scientific Studies*'. In the afternoon on both days, demonstration/hand-holding-

experiments/practicals on '*Principles of Galvanic Cells*', '*Optics & Electricity*', '*Hydrogen Generation by Water Electrolysis*', '*Electroplating*', '*Corrosion Rate Measurement*' etc. were conducted.

On the first day special lectures on '*Quality Leadership in Science*' and '*Wonders of Living Beings*' were organized. On the second day evening after the practical session, a Science Quiz and a lecture-cum-demonstration on, "*Scientific/Truth Behind Magic*" were organized.

On the third day, the participants were taken to Arignar Anna Science Center, Trichy, where a special show on planets, science concepts etc., was shown. They were also taken for a visit

to a nearby Heritage Centre, Chettinad Palace in Kanadukathan. In the afternoon, a lecture-cum-demonstration on computer and internet was conducted. In all the events, students took active part and cleared their doubts in science through discussion with CECRI's scientists.

The Valedictory Function was organized on 5 December 2009 evening, in which Dr. V. Yegnaraman, Acting Director, CECRI, distributed the certificates to the participating students, responded to their views and queries and delivered the Valedictory Address. At the end, Mr. R. Rajasekar, Convener, CPYLS, summed up the programme and proposed a Vote of Thanks.

National Institute of Science Communication And Information Resources (NISCAIR), New Delhi

The National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, organized CPYLS during 3-4 February 2010. The programme was attended by seven meritorious students from various schools of Delhi and Uttar Pradesh along with their parents.

Dr Dinesh Chandra Upreti, National Fellow and Emeritus Scientist, (ICAR), was the Chief Guest who presided over the Inaugural Function. The dignitaries present on the dais were Dr Gangan Prathap, Director, NISCAIR; Mrs Deeksha Bist, Scientist G & Coordinator, CPYLS and Dr K.Y. Kavathekar, Scientist G.

Mrs Deeksha Bist, in her Welcome Address introduced the gathering about

the theme of the programme. She outlined the importance of science in today's world and encouraged young students to discover science as an exciting, rewarding and fulfilling career. During her address, she described that the main objective behind this scheme of CPYLS is building up of the scientific temper in students at an early age and to instill a sense of pride in the achievements of Indian science through the unique 'hand holding' efforts made by CSIR through this programme.

Dr Upreti, in his Inaugural Speech, emphasized the relevance of global climate change research & technology. Specifically addressing students on the alarming rise in the levels of carbon dioxide in atmosphere, he clarified the

effect of global climate change on the production as well as physiology of various agricultural crops. Through the PowerPoint presentation, he highlighted the effect of high levels of carbon dioxide on stress physiology and photosynthesis in agricultural crops like mustard and rice. The various scientific equipments developed for maintaining the optimum levels of carbon dioxide in agricultural crops were also shown to students by him.

Dr Gangan Prathap, in his speech, talked about the passion of science in our day to day life. He emphasized, through examples and real stories, on the importance of science. He asked students to pursue career in science not as a profession only for monetary



purpose but to cherish it as bliss to humankind. He also appreciated the interest of participating students in varied scientific fields. Dr Kavathekar, proposed the Vote of Thanks.

The Inaugural Session was followed by the Introductory Session by Mr Rajiv Mathur, Scientist F and Head, Project Monitoring and Evaluation Division, where he briefed the students on various scientific activities being carried out at NISCAIR, Pusa Campus. The introduction was followed by an audiovisual session on '*CSIR Contribution for Sustainable Growth of Nation*'. The theory sessions were followed by the visit to all Divisions

involved in the publication of research journals in NISCAIR.

Mr C. B. Singh, Scientist, IT Division, pointed out the importance of information technology in today's world and discussed the flow of information on wireless networks. Mr H. Jawaid Khan, Editor, *Science Reporter*, talked on '*Popular Science Writing*'. During the visit to Art and Graphics Division, Mrs Neeru Sharma interacted with students on the use of multi-media in information science and technology and showed them the formatting of popular science magazines and books.

In the Printing Division, Mr Nagpal and Mr Pramod Sharma demonstrated

the various steps involved in printing, as well as the actual four-colour printing on the machines. Students also visited the Raw Material Herbarium Museum (RHM) where Dr. H. B. Singh, Head, RHM, discussed with the students about various exhibits of the museum.

On the second day, the students were taken to National Physical Laboratory (NPL), New Delhi, to visit the Time & Frequency Division, to see the "Atomic Clock". Mr A. K. Suri, Technical Officer E-I, NPL, demonstrated and discussed the importance of maintenance of Indian Standard Time at global level. After tea, students had an interactive session with



Mrs Kanika Malik, Scientist C, NISCAIR, on the role of intellectual property rights in the field of scientific research and technology. She talked about the importance of patents in the development of a nation.

The students were then taken on a visit to NISCAIR, S. V. Marg Campus. Mr G. Mahesh, Scientist, Education and Training Division at S. V. Marg Campus took students on the round of National Science Library (NSL) and SAARC Documentation Centre (SDC). He also discussed the role of SDC in India and its activities being carried out at NISCAIR. Mrs V. V. Lakshmi, Head, NSL and National Science Digital Library (NSDL), through a short PowerPoint presentation described the services provided especially for the students by NSL and NSDL. Mrs Nishy P. discussed about e-journal consortium and open-access activities of NSL for research students.

The visit was followed by the Valedictory Function at S. V. Marg Campus. The function was presided by Dr Gangan Prathap, along with other senior scientists from NISCAIR. Dr. Prathap in his speech called upon the young students to brighten their future in the field of science and technology. All the students expressed their views and appreciated the programme. Dr. Prathap felicitated the participating students with certificates and sets of books published by NISCAIR. Mrs Renu Arora, Head, Education and Training Division, proposed the Vote of Thanks. The programme concluded with a hope to have a prospering future of students in the field of science.

Dr. (Mrs.) Asha A. Juwarkar elected Fellow of National Academy of Sciences

Dr. (Mrs.) Asha A. Juwarkar, Scientist and Head, Environmental Biotechnology Division, National Environmental Engineering Research Institute (NEERI), Nagpur, has been elected the Fellow of the prestigious National Academy of Sciences in 2009, for her outstanding contributions to environmental biotechnological research in the country. She has several patents to her credit, and has published research papers in national and international journals.

Dr. S. Srikanth Takes Over as Director, NML

Dr. S. Srikanth, FNAE has taken over as Director, National Metallurgical Laboratory (NML), Jamshedpur, with effect from forenoon of 2 March 2010. Prior to his becoming Director, NML, he was working as Scientist 'G' and Head, NML Madras Centre, Chennai.



Dr. Srikanth (born 27 June 1960) did his B.Sc. (Engg.) (1st Class with Honours in Metallurgy (1982) from REC, Rourkela and M.E. (Metallurgy, 1984) 1st Class with Distinction from the Indian Institute of Science, (IISc.), Bangalore. He did his Ph.D. (Metallurgy) in 1990 from IISc., Bangalore. He started his career at NML as Scientist 'C' in September 1990 and rose to the position of Scientist 'G' in February 2005. He worked in the areas of process development for extraction of Cu, Ni & Co from sea nodules and for the production of Ca-Si alloys, thermodynamics and kinetics of processes, thermodynamics of non equilibrium phase transformations, mechano-chemical activation of minerals, high temperature corrosion, failure analysis and solid oxide fuel cells. He has more than 60 SCI research publications to his credit.

Dr. Srikanth visited the Department of Materials Science & Engineering, McMaster University, Canada as a Post Doctoral Fellow during December 1992 to November 1993 and worked on, *Thermodynamics of Intermetallic Compounds and Optimization and Calculation of Binary and Ternary Phase Diagrams*. He was also a visiting scientist to the School of Materials, University of Leeds, UK in 1997 and 1999 and worked on, *Oxygen Potential Measurement in Mattes and Gibbs Energy of Formation of Interoxide Compounds in Na₂O-Fe₂O₃ and Na₂O-Sb₂O₅ System by emf Techniques*.

Dr. Srikanth visited the Institute of Physics, Czech Academy of Science, Prague during October- November 1998 as a visiting scientist where he worked on, *Non-equilibrium Solidification and Kinetic Phase Diagrams*.

During February 2009 to January 2010, Dr. Srikanth



was on sabbatical leave from NML/CSIR as a visiting scientist to General Electric Global R&D, JFWTC, Bangalore, where he worked on, *Modelling of High Temperature Corrosion, Modelling Lattice Parameter in Super Alloys, Development of Pseudobinary Diagrams, and Whole-Cycle Energy Analysis of Hydrogen and Biomass.*

Dr. Srikanth has many Awards and academic distinctions to his credit. Mention may be made of a few, namely - Fellow of the Indian Academy of Engineering from January (2010); MRSI Medal (2006); Member of the National Academy of Sciences (2005); Metallurgist of the Year Award (2004) of Ministry of Steel & Mines, Govt. of India; CSIR Young Scientist Award (1995); Associate of the Indian Academy of Sciences (1992); and Young Metallurgist Award by the Ministry of Steel and Mines, Govt. of India.

Prof. Indranil Manna Takes Over as Director, CGCRI

Prof. Indranil Manna has taken over as Director of Central Glass & Ceramic Research Institute (CGCRI), Kolkata, with effect from 1 March 2010.

Prof. Manna is a metallurgical engineer, a renowned educator and a prolific researcher. His significant contributions to the studies of amorphous/nanocrystalline Al-alloys, nano-fluid and laser/plasma assisted surface engineering greatly inspired the scientific community. His early contributions to moving boundary phase transformation are still widely cited.

As a teacher, Prof. Manna has developed several new courses and taught subjects related to phase transformation, materials engineering, surface engineering, thermodynamics and X-ray diffraction. His research interest spans from structure-property correlation in engineering materials including synthesis/application of nano-materials and surface coating/engineering to phase transition, fuel cells, sensors, bainitic steel and mathematical modeling.

Born on 22 January 1961, Prof. Manna obtained his B.E degree from Calcutta University (B.E. College) in 1983 and M.Tech. degree in 1984 from Indian Institute of Technology (IIT), Kanpur. After a brief stint at Mishra Dhatu Nigam, Hyderabad, he joined IIT, Kharagpur in 1985 as Lecturer and rose to the position of Professor in 2003. He was in this position till he joined CGCRI as Director.

Prof. Manna has worked as a guest scientist in several institutions of excellence and universities abroad such as Max Planck Institute at Stuttgart, Technical University of Clausthal, Nanyang Technological University, Liverpool University, and University of Ulm to name a few.

Prof. Manna is a recipient of INSA

Medal for Young Scientists, Young Metallurgist and Metallurgist of the Year Awards, MRSI Medal, AICTE career award, DAAD and the prestigious Humboldt

Fellowships. He is also a recipient of the Acta Materialia Best Referee Award for years 1999 and 2003, respectively.

The German Academic Exchange Service (DAAD), Bonn, appointed Prof. Manna as Honorary DAAD Advisor in India for three years, INAE selected him for Indian National Academy of Engineering-All India Council of Technical Education (INAE-AICTE) Distinguished Industry Professorship for 2007-08 to work with Tata Steel, and the Indian Institute of Metals (IIM) conferred upon him the GD Birla Gold Medal for 2008.

He has published about 225 peer-reviewed papers, supervised 14 Ph.D, 35 M. Tech. and 50 B. Tech. theses, carried out 32 sponsored projects worth over Rs. 16 crore and also obtained a patent on amorphous AlCuTi alloy.

Prof. Manna is a Fellow (FNAE) of the Indian National Academy of Engineering, New Delhi; a Fellow (FNASc) of The National Academy of Sciences of India, Allahabad; and a Fellow (FASc) of the Indian Academy of Sciences, Bangalore. Prof. Manna was the President of the Materials Science Section of the 97th Indian Science Congress held in Thiruvananthapuram during 3-7 January 2010. The INAE has recently awarded him the prestigious 'INAE Chair' for two years. To date, he remains the third recipient of this prestigious chair.





Dr. Y. J. Bhaskar Rao Takes Over as Acting Director, NGRI

Consequent upon the superannuation of Dr. V. P. Dimri on 28 February 2010, Dr. Y. J. Bhaskar Rao, senior-most Scientist 'G' has assumed charge as 'Acting Director' on the afternoon of 28 February 2010.

Dr. Y. J. Bhaskar Rao obtained his M.Sc., (Geology) in 1975 and Ph.D. (Geology) in 1982 from the Osmania University, Hyderabad. He commenced his research career with a Junior Research Fellowship at the NGRI in late 1975. He was a Post-doctoral Research Fellow at the University of Minnesota, Minneapolis, USA during 1981-82.

With a basic fascination for geology, geochemistry and geochronology, Dr. Rao contributed significantly to our understanding of the formation and evolution of the Precambrian crust of India. Over the last decade, he also played an active part in establishing the state-of-the-art analytical facilities at NGRI, enabling high-impact research in petrology, geochemistry and isotope geochemistry, besides providing leadership in the formulation and execution of multi-disciplinary research programs. His scientific contributions are summarized below:

Precambrian Geology of the Indian Shield

Appreciating the vast and unique Precambrian geologic record of the Indian shield and its potential in providing rare windows into Earth's Crustal Evolution, Dr. Rao studied in detail the key sections of the Indian Precambrian period. His studies have integrated geological observations with new and precise Rb-Sr and Sm-Nd



geochronological and geochemical data on several key Precambrian rock units to contribute significantly to our understanding of the assembly and evolution of the Precambrian (>0.55 Ga or billion years) crust of south India.

Dr. Rao participated in several international field excursions and extensive discussion meetings with peers on granite-greenstone terrains of other continents such as Karelia (Russia) and Western Australia, which led to the description of unique features of the Precambrian geology of southern India.

Dr. Rao's studies have helped immensely in the delineation of the Archaean-Proterozoic terrain boundary in the SGT. His studies have demonstrated that the Archaean granulite terrain is indeed a collage of temporally distinct crustal blocks.

He has provided a detailed description of the contrasting geochemical and isotopic characteristics of Archaean and Proterozoic charnockites. This helped to understand the tectonic environment and P-T conditions of magma genesis and the evolution of deep-crust in south India in terms of crust formation and recycling.

More recent studies (in collaboration with colleagues from GEMOC,

University of Macquarie, Sydney, Australia) on the zircons from Indian rocks and river sands have led to the resolution of the basic framework of Archaean crust formation and reworking events in the Western Dharwar Craton.

Creation of New Microbeam Analytical Facilities

An Electron Probe Micro Analyzer (EPMA), Multiple-Collector Inductively Coupled Plasma Mass Spectrometer (MC-ICP-MS) and Quadrupole ICP-MS coupled to a Laser Ablation Microprobe (LAM) and a Clean Chemistry Laboratory are now operational at NGRI.

A research team under the leadership of Dr. Rao is pursuing several new lines of research at this facility, for example, zirconology and non-traditional stable isotope systematics in geological materials.

Dr. Bhaskar Rao has published about 50 research papers in peer reviewed SCI journals and presented over 120 papers at National and International Conferences. He is an Associate/Honorary Professor at several National and International Universities and a member of important committees of the DST and other agencies for establishment of laboratory facilities for studies in Geochemistry and Geochronology in India. He has a long standing affiliation with learned societies such as the Geological Society of India, Indian Geophysical Union, Indian Association of Mass Spectrometry and the Mineralogical Society of India. He is also a recipient of the National Mineral Award.



Dr Pandey Receives 2009 Eli Lilly Asia Outstanding Thesis Award

Dr Satyendra Kumar Pandey, a student of Dr Pradeep Kumar, National Chemical Laboratory (NCL), Pune, has been a recipient of the 2009 Eli Lilly Asia Outstanding Thesis Award (First Prize). The Award consists of a recognition plaque along with a cash award of US \$1500. The Award has been presented to Dr Pandey at the J-NOST Conference during 4-7 December 2009 at the Indian Institute of Technology, (IIT) Kanpur.



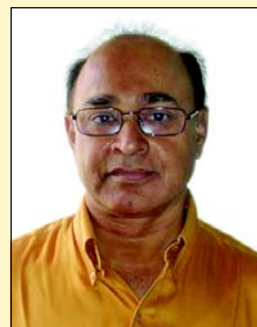
Dr Pandey did his M.Sc. from Gorakhpur University and joined Dr Pradeep Kumar's group in NCL in December 2002 and worked on "Enantioselective Synthesis of Biologically Active Natural Products Employing Hydrolytic Kinetic Resolution and Asymmetric Dihydroxylation". He obtained his PhD in 2008. At present he is doing his post-doctoral studies at the Purdue University, USA with Prof. Arun K. Ghosh where he is involved in medicinal chemistry work of pharmaceutical importance.

During the tenure of PhD programme at NCL, Dr Pandey worked on the total synthesis of several molecules of biological and pharmacological importance. He synthesized a large number of compounds mainly the macrocyclic lactones and amino alcohols of biological relevance. He employed the well established hydrolytic kinetic resolution (HKR) and asymmetric dihydroxylation (AD) as key chirality inducing step in the synthesis of various biologically active compounds which include compounds such as (-)-galantinic acid, a component of the peptide antibiotic galantin I and hydroxyornithines, potentially useful intermediates in the synthesis of important natural products like β -lactams and amino polyols. Similarly (-)-deoxoprosopinine and (+)-deoxoprosophylline synthesized by Dr. Pandey exhibit antibiotic, anaesthetic, analgesic and CNS stimulating properties while (+)- α - and (-)- β -conhydrine is a poisonous alkaloid.

As a PhD student at NCL, Dr. Pandey has published 10 papers in international peer reviewed journals. Dr. Pandey successfully accomplished the synthesis of several other biologically useful molecules such as (-)-colletol, iso-cladospolide B and cladospolide B which has inhibitory properties to shoot elongation of rice seedlings without damaging the cells.

Similarly, (-)-(3S,6R)-3,6-dihydroxy-10-methylundecanoic acid and (2S,4R)-4-hydroxyornithine synthesized by Dr. Pandey are constituent of a number of peptide natural products, such as the anti-fungal lipopeptides, echinocandin, pneumocandin, and macrocyclic antibiotics biphenomycin. These methods have contributed to advances in research not only in chemistry but also in biology and medicine.

NGRI Scientist Honoured with J. C. Bose National Fellowship



Prof. S. S. Rai, a Senior Scientist, National Geophysical Research Institute (NGRI), Hyderabad, has been honoured with the prestigious J. C. Bose National Fellowship by the Union Ministry of Science and Technology.

The Fellowship, initially awarded for a period of five years to Indian scientists of international repute below the age of 60 years, provides the National Fellow with a fellowship amount of Rs.20,000/- per month, in addition to the National Fellow's salary and a yearly contingency grant of Rs.five Lakh for the fellowship period.

Prof. Rai is fellow of all three national science academies of India and recipient of National Awards like the S. S. Bhatnagar Prize and National Mineral Award.



Dr. H. C. Kandpal Elected FNASc, Allahabad

Dr. H. C. Kandpal, Scientist G and Head, Optical Radiation Standards, National Physical Laboratory (NPL), New Delhi, has been elected Fellow of National Academy of Sciences, (FNASc), Allahabad, in the year 2009 for his extensive contributions to the area of optical radiation.

Dr. Kandpal has established at NPL, different primary standards of optical radiation namely, absolute radiometers, spectral radiance standards in the form of variable temperature black body, spectral irradiance standards and photon-correlation measurement standards. The spectral radiance and irradiance measurement facility has also been established at Kavaratti Island for calibrating the data obtained by the OCEANSAT-II for ocean colour studies. Several papers and research reports have been published on these standards.

The phenomenon of correlation-induced spectral shift, i.e. the change in the spectrum of a source depending on change in spatial coherence properties of light on propagation discovered in 1986 by E. Wolf, was

verified experimentally by Dr. Kandpal and his colleagues. These experimental observations provide basis for explaining discrepancies in the spectro-radiometric scales established by national laboratories in the world, and is a significant contribution to optical metrology.

Dr. Kandpal was responsible for conducting first experiment on *Spectral Switching* in partially coherent broadband spectrum, in the vicinity of phase singularities. He has also demonstrated its potential applications in optical information processing. Recently proposed unified theories on coherence and polarization, and generalization of one-point Stokes parameters as two-point Stokes parameters by E. Wolf and coworkers, have been verified experimentally for the first time by Dr. Kandpal and his colleagues.

Dr. Kandpal has more than 100 research papers to his credit. He has



supervised several students for their doctoral degrees. The research done by Dr. Kandpal and his colleagues is widely cited and had appeared in several books namely, '*Optical Coherence and Quantum Optics*' by L. Mandel and E. Wolf; '*Optical Interferometry*' by P. Hariharan; '*Principles of Optics*' by Max Born and Emil Wolf; and '*Introduction to the Theory of Coherence and Polarization*' by Emil Wolf.

Dr. Kandpal is a Fellow of the Optical Society of India, Metrology Society of India and is a Life Member of Laser Society of India. He is also a recipient of CSIR Young Scientist Award in 1990.

At the Bureau of Indian Standards (BIS), as the Chairman of the Sectional Committee on '*Lamp and Lighting Products*', Dr. Kandpal has been instrumental in developing several standards especially for energy efficient lighting products. As the Chairman of the Sectional Committee on Photography and Cinematography several standards for cinematography equipment have been developed under his supervision.

Dr. Swaranjit Singh Cameotra Awarded the Environmentalist Award

Dr. Swaranjit Singh Cameotra, Scientist F (Deputy Director), Institute of Microbial Technology (IMTECH) Chandigarh, was awarded the Environmentalist Award in recognition of his contributions to the field of removal of toxic pollutants viz. petroleum oil sludge and pesticides/herbicides from the environment, besides his work on Microbial Diversity and Culture Collection (MTCC) in IMTECH since 1987.

Dr. Swaranjit Singh was given a Citation, Certificate, Memento and a Gold medal by Dr. S. Z. Qasim ex-Secretary MOEF/DOD at a ceremony in the Convention Centre of Jamia Hamdard in New Delhi on 27 December 2009. Dr. G. N. Qazi, VC Jamia Hamdard, was the Chief Guest on the occasion.



Dr. T. Harinarayana Selected Independent Director of GSPC Ltd.

Dr. T. Harinarayana, Scientist-G of National Geophysical Research Institute (NGRI), Hyderabad, has been chosen by the Government of Gujarat as an independent Director for its State owned company: Gujarat State Petroleum Corporation Limited (GSPC). GSPC is a Rs 5000 crore oil and gas exploration and production company with more than 25 years of existence, doing pioneering projects in energy sector.

Dr. Harinarayana's selection is based on his significant contributions to the oil exploration upstream sector in different parts of the country. He is the leader of various geophysical investigations covering different regions of Gujarat such as Saurashtra, Kutch, Narmada, Cambay, and has been involved in various multi-disciplinary mega-projects related to oil industry. Based on his recommendations, a few blocks have been carved out for exploitation of hydrocarbons in Narmada-Cambay region.

Dr. Harinarayana is the Head of one of the major scientific projects of NGRI – Magnetotellurics – and has applied this technique for various geological problems such as earthquake and tsunami monitoring studies, geothermal exploration, seismotectonics and deep crustal studies. He has spear-headed international collaboration projects with GEMRC, Moscow, Bulgarian Academy of Sciences, Bulgaria and Scripps Institutions of Oceanography, USA. He is the Fellow of the prestigious Russian Academy of Natural Sciences (RANS), Moscow, and also the executive member of International Association of Geomagnetism and Aeronomy (IAGA). He is also an expert member of various national committees, and has recently become a member of IUGG committee.

Dr. Harinarayana's pioneering work in geothermal energy has opened up a new sector for power generation in different regions of the country namely,



Puga in Jammu and Kashmir, Tapovan - Vishnugad in Uttarakhand, Tatapani in Chattisgarh and Surajkund in Jharkhand.

Deep crustal studies in Narmada-Son Lineament zone has provided a strong evidence for the existence of mantlewarping and magmatic under plating.

He has received the prestigious National Mineral Award from the Union Ministry of Mines, Government of India; Best Scientist Award by the Government of Andhra Pradesh; Elected Fellow of A. P. Akademi of Sciences; Indian Geophysical Union and Geological Society of India. He has published more than 62 research papers in national and international journals with 20 technical research reports.

Dr. B. G. Unni Awarded Appreciation AwardñICCE 2009

Dr. B.G Unni, Scientist 'G', Biotechnology & Area Coordinator Biological Sciences, North East Institute of Science & Technology (NEIST), Jorhat, received 'Appreciation Award – ICCE 2009' for his research paper entitled, '*Environmental Health Implication of Pollutants from Oil Drilling Site: An Epidemiological and Biochemical Studies*' presented at the Fourth International Congress of Chemistry and Environment 2009 (ICCE-2009), in association with Ubonrathchathani University and PACCON (The Pure and Applied Chemical International Conference) organized by the Chemical Society of Thailand held at Convention Centre, Sunne Grand Hotel Ubonrathchathani, Thailand, during 21-23 January 2010. Dr. B. G. Unni also Chaired the Life Sciences section and was also one of the judges of the Evaluation Committee from India to evaluate the posters presented at the ICCE 2009.





Prof. Abdur Rahman

The well known science policy scientist, Professor A. Rahman, expired on 5th November 2009, after a prolonged illness in Okhla, New Delhi. Before 1947, during his student days, he was a freedom fighter. He graduated in science from Aligarh Muslim University, Aligarh and completed his postgraduate studies in science from Indian Institute of Science, Bangaluru. He was selected for Tata Memorial Award for studies abroad. During his two years stay in England he came in contact with great scientists like G. D. Bernal.

After coming back to India, Professor Abdur Rahman joined as an information scientist in Council of Scientific & Industrial Research (CSIR) and worked in its various laboratories, namely, Indian Institute of Chemical Technology, Hyderabad, Central Food Technology Research Institute, Mysore and Central Building Research Institute, Roorkee. He then became the Chief of the Planning Division in CSIR HQ and developed capabilities for resource survey and planning. He took a number of initiatives for planning of scientific and technological research in the CSIR



system. Prof. Rahman also acted as Chief Editor, at then PID during 1963-64.

He was a member of Indian Commission of History of Science and Technology set up by Indian National Science Academy. He was elected Chairman of the International Commission on Science Policy. He was also the Chairman of a Committee on Science Popularization appointed by Anjuman Urdu Traqqi Board, New Delhi. Through his efforts, CSIR started publishing a popular Urdu science magazine, namely, '*Science ki Duniya*,' He continued to be its supervisor (*nigran*) till he retired from CSIR service in 1985.

He was the founder Director of the National Institute of Science Technology and Development Studies

(NISTADS), CSIR. NISTADS was the first Institute of its kind (and remains the only of its kind till date) in India. Prof. Rahman fashioned its programmes in the true tradition of science policy studies emerging at that time internationally, including in UN bodies. He led the team of scientists working in this Institute in establishing a developing country perspective to science-technology-society (STS) studies and public policy and planning for S&T. Through his visionary approach, untiring efforts and unique knack for networking, he placed this Institute on the world map.

As a social activist he involved young scientists to create a social movement in favour of scientific temper. Because of his contributions to the understanding of the social implications and interface of Science and Technology, he was awarded *Padma Shri* by the Government of India.

Prof. Rahman wrote more than two dozen books and about 200 articles on history of science and on issues related to science and technology policy and their interaction with society. He is survived by his wife and two sons.



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