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# CSIR NEWS

*Progress, Promise and Prospects*

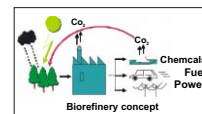
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C O N T E N T S

*Development of Solar Adsorption Cooling system at CMERI, Durgapur*



*Green Process for Converting Hemicellulose into Chemicals*



*The International Conference on Climate Change and Environment (ICCCE) at Cochin University of Science and Technology (CUSAT)*



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*Inauguration of the 9<sup>th</sup> Batch of Advanced Course in Bioinformatics Jointly Organized by IICT, CDAC and JNTU*



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## Development of Solar Adsorption Cooling System at CMERI, Durgapur

Demand for human comfort as well as industrial requirement for air-conditioning, especially in a developing country like India, is increasing at a fast rate. Sixty percent of present air-conditioning market in India is served by small window and split AC systems, rest by central AC systems. Most of this demand is being met by vapour compression based refrigeration system. Recently, though nominal, some vapour absorption based refrigeration systems have come for industrial and office building use.

Conventional vapour compression based air-conditioning systems consume a lot of electrical energy leading to depletion of fossil fuel resources. Moreover, peak electricity demand during summer is being re-enforced by the propagation of air-conditioning appliances. Refrigerants in use pollute the environment through greenhouse gas emission and release of ozone layer depleting substances. Since the Montreal protocol of 1987, international agreements have been signed to reduce the emission of these refrigerants.

Solar energy driven sorption refrigeration systems do not have these problems. The peak requirement for air-conditioning coincides most of the time with the availability of the solar radiation, making solar cooling a much more attractive option. Absorption based systems may take care of large requirements (> 20 TR), while adsorption based systems may serve the office spaces and domestic requirements

### Solar Cooling Technologies

Solar energy can be used for air-conditioning in two ways: electricity through solar photovoltaic cell and then using the same in conventional i.e. vapour compression cycle and the heat driven system. The improvement in solar photovoltaic cell efficiency is slow and so initial cost is very high till now. Among the heat driven systems, vapour absorption systems (water/lithium-bromide, ammonia/water etc.) are already commercially available, but mostly having capacity of more than 20 TR. They have limitations for smaller capacity, whereas domestic cooling requirements are mostly in the range of 1 to 5 TR. Simple, compact, maintenance free (free from problems of corrosion

and crystallization as in water/lithium-bromide absorption chillers) solar adsorption cooling units may fill this gap if properly developed.

Adsorption systems are 100% environmentally benign, having zero Ozone Depletion Potential (ODP) as well as zero Global Warming Potential (GWP). No mechanical power is needed, saving valuable fossil fuel resources. At lower driving temperatures, adsorption systems are more efficient than the absorption systems, making the adsorption chillers more suitable for use with solar thermal collectors (Fig 2). Variation in driving temperature does not affect the performance of adsorption chiller so much as in the case of an absorption chiller (Fig 3).

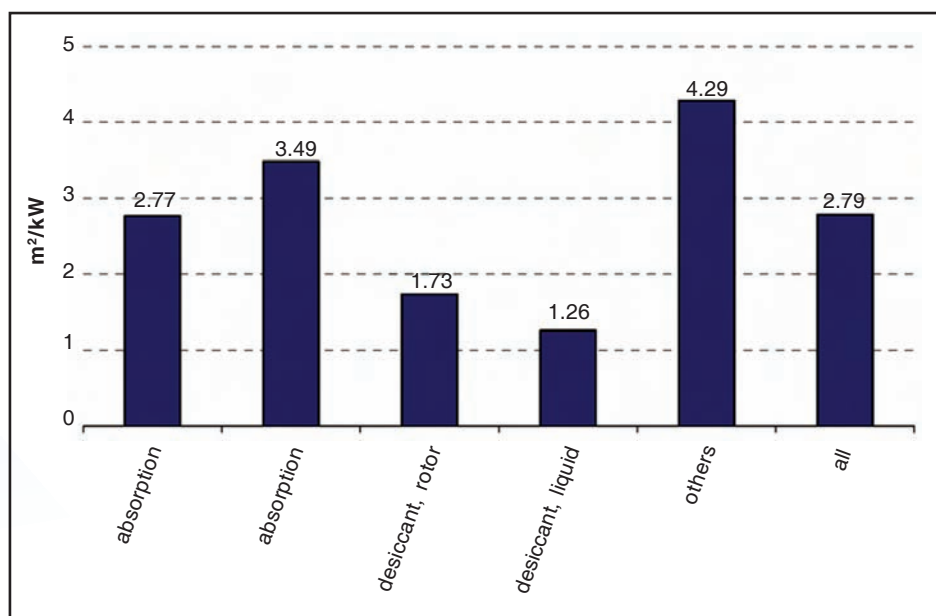


Fig 1. Specific collector area for different solar cooling technologies

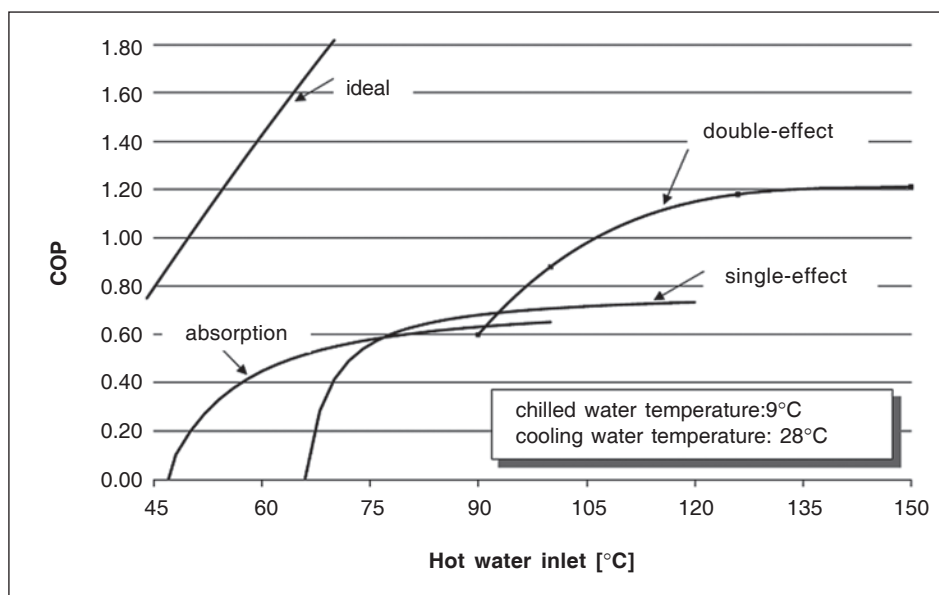


Fig 2. COP-curves of sorption chillers and ideal thermodynamic limit (Carnot)

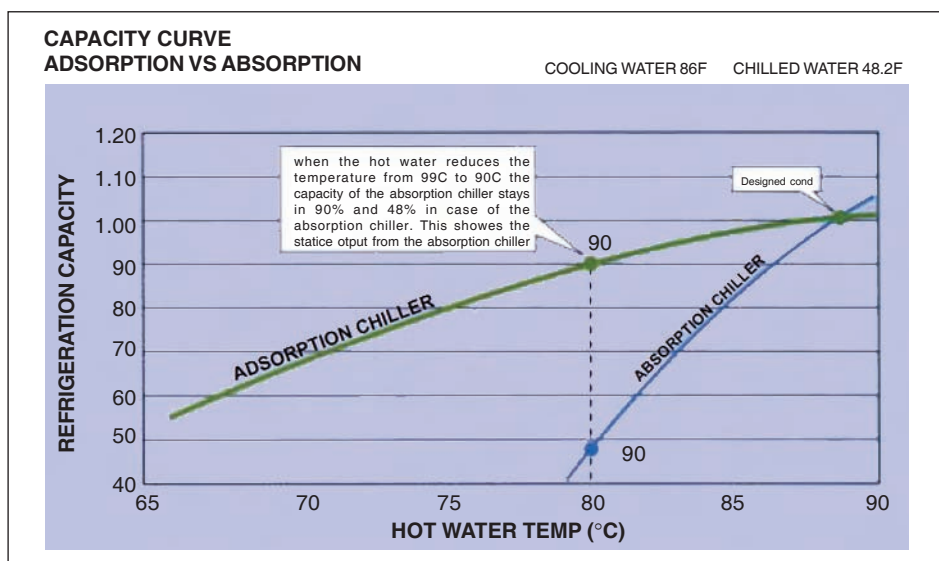


Fig 3. Effect of temperature variation on chiller performance

## Solar Adsorption Technology

Adsorption is a process resulting from the interaction between a solid and a gas, based on a physical or chemical reaction process. The adsorption process

concerns separation of a substance from one phase, accompanied by its accumulation or concentration on the surface of another. An adsorption refrigeration machine utilizes the phenomenon of physical adsorption between a refrigerant and a solid

adsorbent. The adsorbent is heated by the solar radiation, for desorption of refrigerant. Natural refrigerants of the adsorption system such as water, methanol, etc., have zero ODP and zero GWP. It is also attractive for the efficient use of solar energy and low-grade waste heat.

Adsorption systems are compact and noise free, less sensitive to shocks and to the installation position. They do not require frequent replacement of adsorbent. They have very less rotating parts, no refrigerant/adsorbent pump and so very minor maintenance/service issues. Corrosion, crystallization problems are not present as in absorption systems. Flexibility in regeneration temperature for part load operation is much more than that in absorption systems.

Considerable amount of research is being carried out on a number of adsorbent-adsorbate pairs like zeolite-water, activated carbon-ammonia, activated carbon-methanol and silica gel-water etc. Among the pairs, silica gel-water system is ideal for solar energy utilization due to its low regenerating temperature.

Zeolite-water pair requires a regeneration temperature of above 200°C, activated carbon-ammonia pair also requires more than 150°C for its regeneration. These temperatures are not obtainable by simple flat plate or evacuated tube solar collector systems. Activated carbon-methanol pair also works at low regeneration temperature but it is more suitable for ice production and freezing application. Water, having a higher latent heat of vapourization and suitable for producing a chilled water temperature of 8 to 10°C, is a more



correct choice for air-conditioning purpose.

When fixed adsorbent beds are employed, which is the common practice, these cycles can be operated without any moving parts. On one hand, the use of fixed beds results in silence, mechanical simplicity, high reliability and a very long lifetime. On the other hand, it also leads to intermittent cycle operation, with adsorbent beds changing between adsorption and desorption stages, which decreases the COP of the system. Hence, when constant flow of vapour from the evaporator is required in order to provide continuous cooling, two or more adsorbent beds must be operated out of phase.

Research is being carried out globally in order to improve the solar-powered adsorption system COP and/or extend the operating temperature ranges so that very low-grade heat can be used to operate the system or low temperatures can be obtained using the same low-grade heat input. Advanced cycles using heat recovery and mass recovery are being tried to improve both COP and SCP. Work on multi-stage, compound adsorbent and hybrid systems (to develop commercially viable alternative) have also been started. The area of focus also includes improvement in heat transfer properties and thermal conductivity of the adsorbent bed, and development of composite adsorbents etc.

The technical feasibility of solar thermal driven adsorption cooling system is well established. It is also clear that these systems offer environmentally clean alternative technology. However, since the system performance in terms of initial and running costs plays a major

role for the end-user, it is essential to make these systems economically viable.

## Research at CMERI on Solar Adsorption Chiller

CMERI in collaboration with Solar Energy Centre (SEC), Ministry of New and Renewable Energy (MNRE) is executing a project on solar-powered adsorption based space cooling system with the adsorbent-adsorbate pair of silica gel and water. Silica gel, a well known water adsorber, is used for dehydration purposes in different domestic and industrial applications. Micro-pored silica gel, which has larger adsorption capacity at low humidity, is suitable to be utilized in a closed cycle at sub atmospheric pressure refrigeration system. Compared with other adsorbents, silica gel can be regenerated at a relatively low temperature, below 100°C and typically

about 85°C, making it an ideal choice for solar-powered adsorption system. Water has large latent heat of vaporization and it is suitable for air-conditioning applications, because chilled water temperature required is in the range of 8 to 12°C.

Water, getting heated by solar radiation, desorbs the water vapour from one adsorber bed. The water vapour, thus released, gets cooled in the condenser, and then passed to the evaporator, wherein it again gets evaporated at low pressure, thereby providing cooling. At the same time, the second adsorber adsorbs water vapour from the evaporator (Fig. 4). Thus, the operation of the system follows a periodic succession of cycles. That is, at any time of operation, when one adsorber is in the desorption process (heating period), another adsorber will be in the adsorption process (cooling period). These periods are separated by isosteric heating and cooling of the

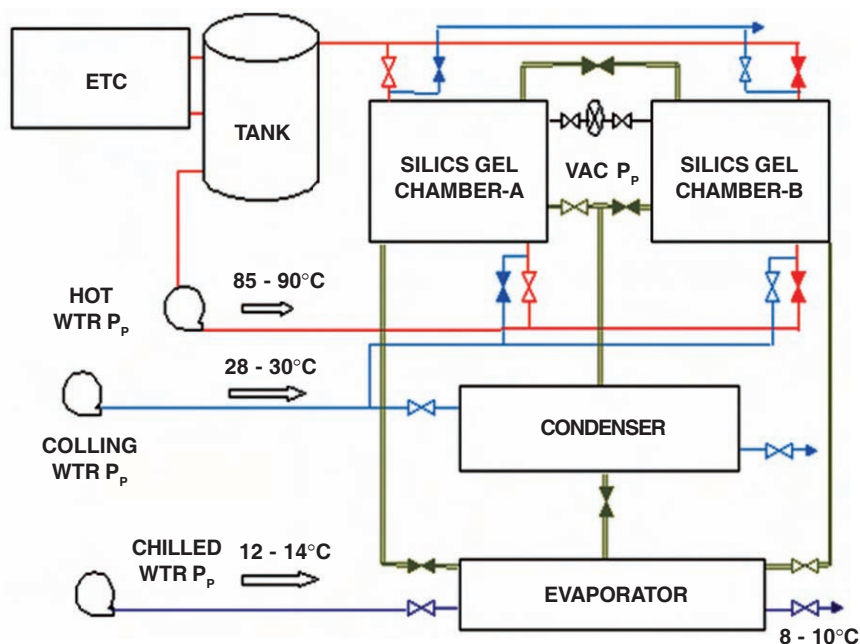


Fig. 4. Flow diagram of silica gel-water adsorption chiller

adsorbers. In this way, a semi-continuous cooling effect may be obtained from the system.

The adsorption systems must have their size and cost reduced to become more commercially attractive. The most promising alternatives to achieve these goals include the enhancement of the internal and external heat transfer of the adsorber to increase the Specific Cooling Power (SCP), and the improvement of the heat management to increase the COP. The main technologies to enhance the external heat transfer in the adsorber are related to the increase of the heat exchange area, the use of coated adsorbers and the utilization of heat pipe technology. To improve the internal heat transfer, the most suitable option is the employment of consolidated adsorbents. An optimum compromise should be achieved between the high porosity necessary for fast vapour diffusion and the high density required for good thermal conductivity.

**Extended Surfaces:** Several types of extended surfaces can be considered, such as finned tubes, plate heat exchangers and plate-fin heat exchangers. The drawback of this

technology is that it increases the thermal capacity of the adsorber. Therefore, extended surfaces heat exchangers require efficient heat management to produce reasonable COPs.

**Coated Adsorbers:** The utilization of coated adsorbers is particularly suited for applications where high COP is not as important as high SCP. This technology consists in the increase of the wall heat transfer coefficient by the effective decrease of the contact thermal resistance between the heat exchange surface and the adsorbent. The main disadvantage of using coated adsorber is the very high ratio between the inert mass and the adsorbent mass.

**Consolidated and Composite Adsorbents:** Consolidated adsorbent with high thermal conductivity can be considered as the most promising alternative to enhance the heat transfer within the adsorber.

**Advanced Cycles Employing Heat Recovery and Mass Recovery:** The aim of the research focused on advanced cycles with heat management is to increase the COP, since in the conventional adsorption cycle, COP is usually smaller than 0.4.

**Heat Pipes:** The use of heat pipes could help to reduce these problems, not only due to the high heat flux density provided by these devices, but also due to the lack of moving parts to drive the heat transfer medium, which makes the whole system cheaper and more reliable. The condensation of the working fluid of the heat pipe can release the necessary heat to regenerate the adsorbent, while the vaporization of the fluid can absorb the sensible heat and the sorption heat of the adsorbent during the adsorption phase.

The principal challenge for adsorption refrigerators powered by solar energy is to overcome several failed attempts to commercialize them. Commercialization of the silica gel/sulphur dioxide refrigerator in the 1930s and the activated carbon-methanol refrigerator in 1960, both of which used a fossil fuel based heat source, were unsuccessful because of the emergence of more efficient vapour compression refrigerators using cheap conventional energy, including electrical energy.

More recently, the commercially tried adsorbent/adsorbate combination of activated carbon-methanol and



Fig. 5. Solar Water Heating System and Sorption Heat Exchangers at CMERI



zeolite-water refrigerators proved to be technically successful but too expensive to penetrate the market. The BLM company of France and Comesse Soudure of South Africa produced the activated carbon-methanol refrigerators. The Zeopower company of the USA manufactured the zeolite-water refrigerators. However, the unit price for the systems was considered too high to get a real market.

### Conclusion

Although investment costs for adsorption chillers are still high, the environmental benefits are impressive, when compared to conventional compressor chillers. The absence of harmful or hazardous products such as CFCs, together with a substantial reduction of CO<sub>2</sub> emissions due to very low consumption of electricity, creates an environmentally safe technology. Low-temperature waste heat or solar energy can be converted into a chilling capacity with minor maintenance costs.

Nevertheless, some crucial points in the development of sorption systems still exist and those are closely connected to the low specific power of the machine and the investment costs. However, it is noted that with improvement in sorbent and reactor technology, there is possibility of adsorption systems offering a viable alternative. Sustained efforts are needed to make these systems efficient and economically viable.

Recently, more close attention was paid to the development of combined systems of solar cooling and heating in order to make use of all types of energies rationally. This work will be of great help to the development of the solar adsorption refrigeration system.

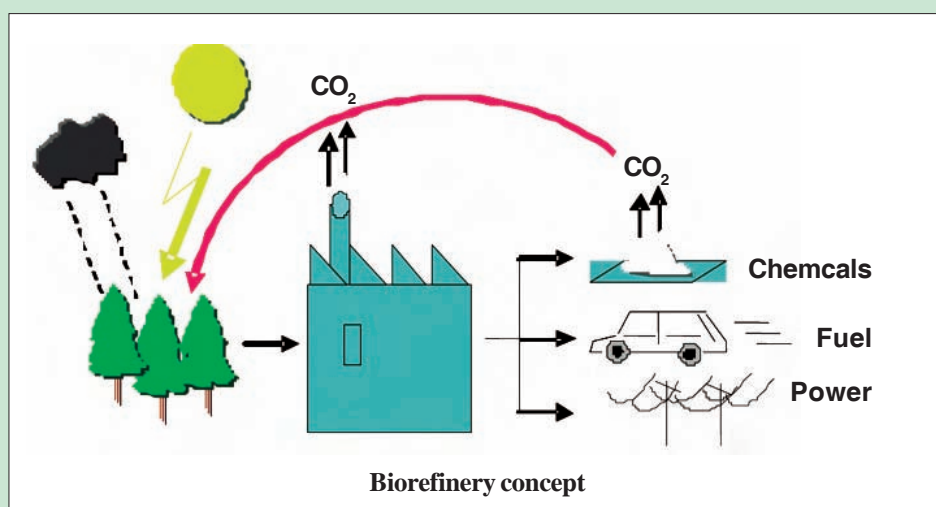
## Green Process for Converting Hemicellulose into Chemicals

NCL scientists have described a one-pot process for the conversion of solid hemicellulose into xylose, arabinose and furfural using solid acid catalysts selectively from lignocellulosic materials. In the recent past, scientists around the world are taking a fresh look at the biomass as a source for a variety of chemicals, besides energy in the form of fuel and power.

Carbohydrates are the product of photosynthesis process and the integral part of fixing of CO<sub>2</sub> makes the utilization of plant-derived biomass a “carbon neutral” process. The net annual yield of biomass is around 1.3 trillion tons, thus, making it the largest renewable resource available. A part of biomass is a non-edible lignocellulosic material, such as wood and agricultural wastes. The cellulose and the hemicellulose are the main components of wood. Hemicelluloses are complex heterogeneous polymers composed of largely pentoses and hexoses.

Efforts are being made worldwide to convert hemicellulose using mineral acids and enzymes. However, these methods generate a lot of wastes and are also corrosive. Catalytic conversion of hemicellulose in a two-step process is also known wherein the first step involves converting hemicellulose into soluble oligomers in the presence of water. Further, in the second step, these soluble oligomers are converted into sugars over ion-exchange resin. The drawbacks of this process are that it requires two different reactors and ion-exchange resins are hydrothermally unstable.

Dr. Paresh Dhepe and his group at National Chemical Laboratory (NCL), Pune studied the conversion of hemicellulose in a one-pot reaction using solid acids as catalysts. The major advantages of using solid acids are the ease of separation of catalyst (solid) and product (water soluble) by simple filtration and working under neutral





conditions without any corrosion in a totally green environment. The catalysts can be re-used up to five runs with almost same activity, which implies that catalysts are hydrothermally stable.

The NCL team achieved 40% xylose + arabinose yield at 170°C with water as a reaction medium and zeolite as a catalyst. Similar reaction conditions, without catalyst, yielded only 6% xylose + arabinose. Further, it was found out that several other solid acid catalysts such as, zeolites HBeta & HMOR and clay were active for this reaction and showed xylose + arabinose yield of 30-40%.

“Hydrolysis of cellulose and hemicellulose is nowadays considered as an entry point in future biorefineries,” says Prof. Dmitry Yu Murzin from Abo Academy University, Finland. “In particular hydrolysis of hemicelluloses to platform sugars in high yields has become an increasingly important issue. Depolymerization of the polysaccharide can be accomplished through chemical, thermal, enzymatic and ultrasonic processes, which are dependent on the structures and conformation of the polymers and the reaction medium. The challenge is to identify the reaction conditions and catalysts to convert the polysaccharide to monomers and at the same time avoid further degradation of sugars. Although acid hydrolysis can be performed in high yields by homogenous acid catalysts, they are difficult to separate, recycle and treatment of waste, and have problems concerning corrosion and decomposition of sugars. Instead, a heterogeneous catalyst could be used which is easy to filter and re-use,” he adds further. According to Prof Murzin, the NCL work is focused on conversion of hemicellulose to sugars using such solid acids as zeolites demonstrating very encouraging results.

#### References:

1. P. L. Dhepe and R. Sahu, Indian patent, 2597/DEL/2009.
2. P. L. Dhepe and R. Sahu, PCT application PCT/IN2010/ 000047.
3. P. L. Dhepe and R. Sahu, A solid-acid-based process for the conversion of hemicelluloses, *Green Chemistry*, 2010, DOI: 10.1039/c004128a

*For further information please contact:*

**Dr. Paresh L. Dhepe, National Chemical Laboratory (NCL), Pune.**

## Development of a Novel Pitch-Based Precursor Material for Special Carbon & Graphite Products

The novel pitch-based precursor is a high quality self-sintering material, which is used for producing special carbon and graphite products without the use of any external binder. The products so obtained possess superior properties i.e. high density, high mechanical strength, low electrical resistivity and low porosity as compared to those produced by the conventional method involving the use of two raw materials i.e., a coke filler and a pitch binder.

These newer products are useful for various analytical, electrical, mechanical, metrological, aerospace and other industrial/strategic applications. Their potential applications include electrical brushes and contacts, heaters for electrical applications, seals and bearings for aerospace and other industries, packings, jigs, hot-pressing dies, collectors for electron tubes and moulds for continuous casting of metals and alloys.

This novel pitch-based precursor is prepared from a suitable coal tar pitch by heat treatment up to 450-550°C under controlled conditions in the presence of suitable additives which is then ball milled to a fine powder (mean size 1-7 microns) in a planetary ball mill. The resulting material is given a coating with a suitable carbonaceous material and/or mixed with a suitable pitch coated carbon powders. This precursor material is then ready for moulding into rectangular or cylindrical blocks and baking at a HTT of 1100°C or higher up to 2600°C to obtain a high quality carbon/graphite product. This novel pitch-based precursor is not presently available in the country. High-density isotropic graphite from such a material is currently being imported that is very expensive.

The special carbon/graphite product from this novel material possesses a bulk density of 1.8-1.9 g cm<sup>-3</sup>, bending strength of 50-100 MPa, electrical resistivity of 1-2 mohm cm and a degree of anisotropy of 0.9-1.1, besides having a homogeneous and fine microstructure. In addition, this carbon has good electrical and thermal conductivities, high mechanical workability and lubricity, and high stability at high temperatures in non-oxidizing atmospheres.

A patent of the process technology has been applied for by the team of scientists led by Dr. G. Bhatia and the know-how of this process has been transferred to M/s. Neotech Consultants & Engineers (Pvt.) Ltd., Gwalior/Varanasi who are already manufacturing carbon brushes for aerospace and defence applications.



### R&D at NIO

#### Analyzing Seafloor Images for Estimating Deep-Sea Minerals

Factors such as non-uniform illumination of seafloor photographs and partial burial of polymetallic nodules and crusts under sediments have prevented the development of a fully automatic system for evaluating the distribution characteristics of these minerals, necessitating the involvement of a user input. A method has been developed whereby spectral signatures of different features are identified using a software 'trained' by a user, and the images are digitized for coverage estimation of nodules and crusts.

Analysis of more than 20,000 seafloor photographs was carried out along five camera transects covering a total distance of 450 km at 5,100-5,300 m water depth in the Central Indian Ocean.

The good positive correlation ( $R_{\text{sup}}(2)$  greater than 0.98) recorded between visual and computed estimates shows that both methods of estimation are highly reliable. The digitally computed estimates were about 10% higher than the visual estimates of the same photographs; the latter have a conservative operator error, implying that computed estimates would more accurately predict a relatively high resource potential.

The fact that nodules were present in grab samples from some locations where photographs had nil nodule coverage emphasizes that nodules may not always be exposed on the seafloor and that buried nodules will also have to be accounted for during resource

evaluation. When coupled with accurate positioning/depth data and grab sampling, photographic estimates can provide detailed information on the spatial distribution of mineral deposits, the associated substrates, and the topographic features that control their occurrences. Such information is critical for resource modelling, the selection of mine sites, the designing of mining systems and the planning of mining operations.

**Authors:** Sharma, R.; Jaisankar, S.; Samanta, S.; Sardar, A.A.; Gracias, D.G.

**Citation:** *Geo-Marine Letters*, Vol. 30 (6); 617-626, 2010

**Copyright:** An edited version of this paper was published by Springer.

**URI:** <http://drs.nio.org/drs/handle/2264/3745>

#### Reconstruction of the Variability of Southwest Monsoon from Continental Margin of Southeastern Arabian Sea

From temporal variation in  $\delta^{18}\text{O}$  in Globigerinoides ruber and G. sacculifer and geochemical indices of weathering/erosion (chemical index of alteration, Al and Ti), a rapid South West Monsoon (SWM) deterioration is inferred with dwindling fluvial and detrital fluxes at ca. 450-650, 1000 and 1800-2200 cal. a BP during the late Holocene.

NIO scientists have evaluated the role of solar influx (reconstructed) and high-latitude climate variability (archived in GRIP and GISP-2 cores) on SWM precipitation. Broadly, the  $\delta^{18}\text{O}$

climate reconstruction is concordant with GRIP and GISP-2, and supports a teleconnection through atmospheric connection between the SWM and the North Atlantic climate, albeit temporal extents of the Little Ice Age and Medieval Warm Period from high latitude are not entirely coeval. Moreover, there is a humid climate and enhanced precipitation during the terminal stages of the Little Ice Age.

The medieval warming (ca. AD 800-1300) is not synchronous either, and is punctuated by an arid event centred at 1000 a BP. Although the delineation of

the specific influence of solar influx on SWM precipitation is elusive, scientists surmise that SWM precipitation is a complex phenomenon and local orography along southwestern India may have a role on the entrapment of moisture from the southwest trade winds, when these hit land.

**Authors:** Chauhan, O.S.; Vogelsang, E.; Basavaiah, N.; Kader, U.S.A.

**Citation:** *Journal of Quaternary Science*, Vol.25 (5); 798-807

**Copyright:** An edited version of this paper was published by John Wiley

**URI:** <http://hdl.handle.net/2264/3648>



## Land-Ocean Tectonics (LOTs) and Associated Seismic Hazard Over Eastern Continental Margin of India (ECMI)

The South Indian (Peninsular) shield that includes both the Eastern and Western Continental Margins of India is not as stable as it was originally thought of. The importance of intraplate seismicity within this shield has recently been realized with some devastating earthquakes that occurred during the last few decades. It is also significant to note that most of the Precambrian tectonic lineaments in this shield are oriented in either a NW-SE or W-E direction, joining the eastern offshore. In contrast, the western margin has an elevated coast, associated with a linear coast parallel escarpment,

particularly on the southern side, superimposed by Deccan Trap volcanics on the northern side.

The fault reactivation and the associated seismicity are hence more predominant on the east coast. Recent geophysical studies delineated land-ocean tectonics (LOTs) over the eastern margin, in some cases associated with moderate seismicity as a result of the compressional stress acting on the Indian Plate.

Though the Eastern Continental Margin of India (ECMI) is considered as a passive margin, coastal seismicity

due to the reactivation of the pre-existing tectonic lineaments extending offshore represents a potential natural hazard. In this context, the ECMI appears to be much more vulnerable compared to its counterpart on the west.

**Authors:** Murthy K.S. R.; Subrahmanyam V.; Subrahmanyam A.S.; Murty G.P.S.; Sarma K.V.L.N.S.

**Citation:** *Natural Hazards*, Vol. 55 (2); 167-175, 2010

**Copyright:** An edited version of this paper was published by Springer.

**URI:** <http://drs.nio.org/drs/handle/2264/3750>

## Morphology of Pockmarks Along Western Continental Margin of India: Employing Multi-Beam Bathymetry and Backscatter Data

This study addresses the morphology of pockmarks along the western continental margin of India using multi-beam bathymetry and backscatter data. Scientists have utilized the application of ArcGIS (Geographical Information System) for understanding the morphology of pockmarks from the western continental margin of India. The pockmarks observed in water depths of 145-330 m are circular, elliptical or elongated in plan-view, with an average length and width of 157 (+ or - 72) m and 83 (+ or - 19) m respectively.

The average pockmark relief and perimeter are 1.9 (+ or - 0.9) m and

412 (+ or - 181) m, respectively. The pockmarks have average areas and volumes of 10 759 m<sup>2</sup> and 15 315 m<sup>3</sup> respectively. Spatial separation that coincides with 210 m isobath divides the pockmarks into two groups with differing distributions and morphologies. These pockmarks originated from seepages of biogenic or thermogenic gas or from pore fluids from deeper sources, migrated vertically along the faults. Besides a possible structural control, the pockmark morphologies are also affected by bottom currents and/or by submarine slumping.

The average acoustic backscatter strength from pockmark centre is higher

(+or-35 dB) than the average backscatter of the total area (- 40 dB), which suggests their possible linkage to the precipitation of diagenetic minerals from biodegradation of seepage material.

**Authors:** Dandapath, S.; Chakraborty, B.; Karisiddaiah, S.M.; Menezes, A.A.A.; Ranade, G.; Fernandes, W.A.; Naik, D.K.; PrudhviRaju, K.N.

**Citation:** *Marine and Petroleum Geology*, Vol. 27 (10); 2107-2117, 2010

**Copyright:** An edited version of this paper was published by Elsevier.

**URI:** <http://drs.nio.org/drs/handle/2264/3746>



### Mentor IICB Organized First Annual Convocation of NIPER, Kolkata

The first Annual Convocation of the National Institute of Pharmaceutical Education and Research (NIPER), Kolkata was held on 11 June 2010 at IICB. The Convocation was presided over by Sri Ashok Kumar, IAS, Secretary, Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Govt. of India & Chairman, Steering Committee of NIPER, Kolkata.

Prof. Samir K. Brahmachari, Director General, CSIR was the Guest-in-Chief. Prof. Siddhartha Roy, Director, IICB, the mentor Institute & Chairman, Advisory Committee of NIPER, Kolkata administered the exhortation to the recipients of the degrees. Dr. Pradip Kr. Sengupta, Registrar, NIPER, Kolkata read out the names of the recipients of the Medals and Prizes and Sri Ashok Kumar awarded them to the recipients.

Six students received medals and the five toppers received a prize of books worth Rs.10,000/- each. The meeting was addressed by Prof. Siddhartha Roy, Director IICB; Dr. Asish Kr. Banerjee, Project Director, NIPER, Kolkata; Sri Sabyasachi Sen, Additional Chief Secretary & Commissioner General, Land Reforms, Govt. of West Bengal and Sri Arun Jha, IAS, Joint Secretary, Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Govt. of India & Chairman, Academic Committee, NIPER, Kolkata.

Prof. Brahmachari, the Guest-in-Chief, delivered the Convocation Address entitled, *Positioning for DG, CSIR in Academic Procession Success: Leveraging the Power of Dreams, Commitments and Perseverance*. He highlighted the role of CSIR in the achievements of the Indian Pharma Sector. He opined that the future of Drug-Pharma lies in managing the wellness of the people in all age groups and in all parts of the world through a multi-pronged approach. He concluded his address by exhorting the students to think big and not back down in the face of opposition or if



Advisory Committee members and the honorable guests sitting on the dais



A student receiving Degree scroll from Sri Ashok Kumar in the presence of DG, CSIR

the world says it cannot be done.

Prof. Brahmachari's address was followed by the address by Sri Ashok Kumar. The names of the recipients of the Degrees were read out by Dr. Asish Kr. Banerjee, Project Director, NIPER, Kolkata and 27 students received their M.S.(Pharm.) Degree scrolls. Two students were awarded their degrees in absentia.



## High Level Delegation at NAL From McKinney Aerospace and Defense Experts

On 25 October 2010, a high level delegation from McKinney Aerospace and Defense Experts, led by Mr. Jerry Lundquist, Head of the global aerospace and defense sector with expertise in mergers and acquisitions, corporate strategy, visited NAL. The focus of the visit was to discuss the growing civil aviation opportunities in the country, and their possible engagements.

Director, NAL in his introductory remarks welcomed the visiting delegation and explained in brief the various current programmes of NAL including the civil aviation. Member of the visiting delegation spoke on the globalization of aerospace opportunities, and presented their analysis of four civil aviation growth scenarios of Europe, Brazil, Canada and Japan. They presented the five key

criteria for success that emerged from these case studies: Government Ambition, Access to Capital, Design & Manufacturing Capabilities, Product Quality and Demand. The two teams had fruitful interactions vis-à-vis the National Civil Aircraft Development programme of the country. The delegation had earlier visited Advanced Composites Division.



## The International Conference on Climate Change and Environment (ICCCE) at Cochin University of Science and Technology (CUSAT)

The *International Conference on Climate Change and Environment (ICCCE)*, held at Cochin University of Science and Technology, Kochi, Kerala during 24-26 October 2010 was organized as a part of the project, "Development of a Database for Climate Impact Studies in India – With Special Reference to Lakshadweep." This Project has been initiated by the National Institute of Science Communication And Information

Resources (NISCAIR) in collaboration with Jawaharlal Nehru University, and is partially supported by U.T. of Lakshadweep.

At the outset, this Conference was illuminated by very illustrative talks by Invited Speakers and well supported by contributory papers. The Opening Ceremony made an emphatic call to publish a 'White Paper' on Climate Change and further, on our empowerment to face the perils of

Climate Change. Dr Gangan Prathap, Director, NISCAIR delivered the Inaugural Speech in the absence of the Hon'ble Chief Minister of Kerala.

Many scientists from abroad participated in *ICCCE* that included Dr Fredolin Tangang, Vice-Chairman, Inter Governmental Panel for Climate Change (IPCC), Malaysia; Dr Leonard Sonnenschein, President, World Aquarium and Conservation for the Oceans Foundation (USA); Prof.



# CONFERENCES

Herman A Karl, University of New Hampshire, (USA); Dr Ram Boojh, UNESCO representative to SAARC countries; Dr Clieve, Representative from World Coral Network (Australia) and Dr. Tomonori Matsuura, Toyama University (Japan).

The Scientific Sessions at *ICCCE* were on: Climate Change–Science and

Impacts, Weather Forecasting and Extreme Weather, Environmental Changes–Bio Geo–Chemical aspects, Environmental Changes–Physical Aspects, Climate Change Vulnerability and Adaptation, Database for Climate Impact & Strategies, Climate Change Mitigation and Policy Options and Strategies.

In the presentations emphasis was laid on signals from atmosphere/ocean coupling as well as atmospheric photo-chemical reactions. Abilities/drawbacks in forecasting were highlighted in this context and the main focus was over the Indian sub continent. Each of the PowerPoint presentations made by different authors justified our limited



## Glimpses of the Conference



**Climate change and estuarine biodiversity concerns**  
Sujeeta Lewis and K R Momen

**Introduction**  
Estuarine water bodies are already being affected by climate change. Effects of acidification on aquatic ecosystems are analyzed on the basis of an analytical sampling up of relevant physico-chemical data and occurrence of benthic invertebrates. With growing concern over ocean acidification, the work with bryozoans is gaining importance as they have the potential to act as environmental indicators.

**Objectives**

- Find the major water factors influencing benthic aquatic organisms like the bryozoans in the Cochin Estuary
- Map trends in the composition of benthic communities covered by a collection of water bodies.
- Study impact of global warming on a benthic organism.

**Result**

- Physico-chemical factors play important role in the composition of benthic communities in terms of salinity and pH were fluctuating throughout the period of study for all the water bodies.
- A considerable reduction in biodiversity of the bryozoan communities in their structural elements.
- The disappearance of species sensitive to acidification leading to a reduced and a consequent survival of less acidified opportunistic species was also demonstrated (Table 1).

**Conclusions**

- Bryozoans are a great bio-assess water quality indicator.
- The group can act as environmental indicators and provide information about the effects of ocean acidification.
- The new research again reveals that Cochin's local pollution system may be the worst though it will make it harder for other organisms to form their shells and skeletons.
- For the quality of the received water of the estuary for benthic.

BRYOZOA	Ctenostomes	Year 2004 - 2006		Year 2008 - 2009	
		2004	2006	2008	2009
Ctenostomes	1. <i>Utriclella</i> sp.	1	1	1	1
	2. <i>Utriclella</i> sp.	1	1	1	1
	3. <i>Utriclella</i> sp.	1	1	1	1
	4. <i>Utriclella</i> sp.	1	1	1	1
Cheilostomes	1. <i>Utriclella</i> sp.	1	1	1	1
	2. <i>Utriclella</i> sp.	1	1	1	1
	3. <i>Utriclella</i> sp.	1	1	1	1
	4. <i>Utriclella</i> sp.	1	1	1	1
Cheilostomes		NIL		NIL	

**Climate Change and Sustainable Development: Analytical Study of Climate Change Policy in India**

**Introduction**

Climate change is a global issue that has gained significant attention in recent years. The Intergovernmental Panel on Climate Change (IPCC) has warned that global warming is causing a range of environmental and social problems. In India, the government has taken several steps to address climate change, including the launch of the National Action Plan on Climate Change (NAPCC) in 2008. This paper analyzes the NAPCC and other climate change policies in India, and discusses the challenges and opportunities for sustainable development in the context of climate change.

**Objectives and Policy Implications**

- Assess the effectiveness of the NAPCC in addressing climate change.
- Identify the key areas for action in the NAPCC.
- Discuss the challenges and opportunities for sustainable development in the context of climate change.

**Methodology**

The study uses a combination of qualitative and quantitative methods. The qualitative methods include interviews with experts in the field of climate change and sustainable development. The quantitative methods include the analysis of data from the NAPCC and other climate change policies in India.

**Results and Discussion**

The results of the study show that the NAPCC has made significant progress in addressing climate change. However, there are still many challenges that need to be addressed. The study discusses the key areas for action in the NAPCC, and identifies the challenges and opportunities for sustainable development in the context of climate change.

**Conclusion**

The study concludes that the NAPCC is a comprehensive and ambitious plan that has the potential to address climate change and promote sustainable development in India. However, it is essential that the government and other stakeholders work together to ensure the successful implementation of the NAPCC.





understanding of atmosphere and its linkages with other sphere(s).

Regional cases on water resources, acidification on pelagic lifeforms and illustrative examples of seagrass and its usefulness figured in the PowerPoint

presentations. There were presentations on Himalayan Glaciology, Decreasing Monsoons and Holocene Sea Level Changes. A good policy paper concluded the Session emphasizing the need to strengthen our knowledgebase, the

concepts of incentives and the fundamental values to address our concerns to climate change with good adaptive measures. The Session ended with a broad call – *It is Time to Awaken.*

### Recommendations of *International Conference on Climate Change and Environment*

- A) Climate change is not alone a scientific problem but it is now universal.
- B) We need good policy directives.
- C) There have to be global interventions too.
- D) There need to be strong political initiatives.
- E) The People's Role – It is critical and should form part of every citizen's agenda.
- F) We now look forward to a Holistic Approach.
- G) Sharing of our Infrastructure is important.
- H) Close cooperation is needed at both the State level and Regional level.
- I) A study at multi-level is contemplated with adequate database development, supported by academic, research and education, with good suggestions on mitigation.
- J) A functioning method in climate change mitigation is applying threshold values controls.
- K) The need for multi-disciplinary approach involving society at large, agriculturists, NGOs/Health authorities are now warranted.
- L) A citizen charter for all interested was yet another suggestion.
- M) MoEF needs to bring out a Global Adaptive Policy and that too may be implemented at State level.
- N) An exclusive Media line has to be developed on Climate Change that could serve as a platform to address our issues and solutions.
- O) UGC should introduce a compulsory program in Climate Change at all levels.
- P) There was a suggestion on having a Central Institute of Climate Studies.
- Q) A change from normal routine methodology of collection of data and building databases has now to address issues on a long-term perspective.
- R) There have to be good protocols on data collection and base development.
- S) Networks are the talk of the day and they need to be integrated too.
- T) Databases and GIS platforms are nowadays a common part of networks.
- U) Emphasis is to be laid on research leading to understand and quantify natural and national resources and develop alternate sources of energy.
- V) Funding by Government – its enhancement and development of a technology hub.
- W) India is not a signatory to Climate Change treaty! We have to decide how to address this issue.
- X) There is a divide on people's lifestyles, health issues, migrations, energy use, and so on. It is important to understand how to address the global community, on Climate Change, in one voice.
- Y) Research outputs to be integrated for improving our understanding on Climate Change.
- Z) As a first step, a research project on developing a climate change database for Kerala needs to be submitted by CUSAT and NISCAIR in collaboration with Kerala State Council for Science, Technology and Environment. Active cooperation from other Institutions & NGO's is welcome with constructive initiatives.



## The International Workshop on *Climate Change and Island Vulnerability* at Kadmat Island of U.T of Lakshadweep

The International Workshop on *Climate Change and Island Vulnerability (IWCCI)* held during 28-31 October 2010 at Kadmat Island, U.T of Lakshadweep was inaugurated by Prof. K. V. Thomas, Hon'ble Minister for Agriculture (State), Govt. of India. Dr Gangan Prathap, Director, NISCAIR; Prof. Fredolin Tangang, Vice Chairman of Intergovernmental Panel for Climate Change from National University of Malaysia; Dr Ram Boojh, Program Specialist, Ecological and Earth Sciences, UNESCO Office for South Asia; Dr Leonard Sonnenschein, President, World Aquarium and Conservation for the Oceans Foundation, USA; Dr Clieve, Representative from World Coral Network (Australia); Dr. K. Vijayakumaran, Director General, Fishery Survey of India; Dr Ranjana U. K. Piyadasa, University of Colombo, Sri Lanka presented papers and participated in the discussions at IWCCI.

Many presentations relating to innovative technologies appropriate to Islands on sanitation and energy were held at IWCCI. The Technical Sessions relating to Marine and Coastal Biodiversity, Sea level Rise Vulnerability, Fisheries, Climate Change Impact on

Livelihood Options, Water and Sanitation in Island Ecosystem and Mitigation, Adaptation and Governance were held.

*Marine and Coastal Biodiversity* Session came across many innovative suggestions based on the recent investigations on marine organisms and climate change. Researchers suggested that biodiversity of the Island is to be protected as a natural mechanism to mitigate climate change.

There are three species of turtles in Lakshadweep Islands that are listed as endangered species in *1986 IUCN red list of threatened animals*. The ecology of these endangered species is to be conserved and the developmental projects are to be modulated with emphasis on the same. This Session was prominent on the biodiversity conservation linked with the development of Lakshadweep Islands.

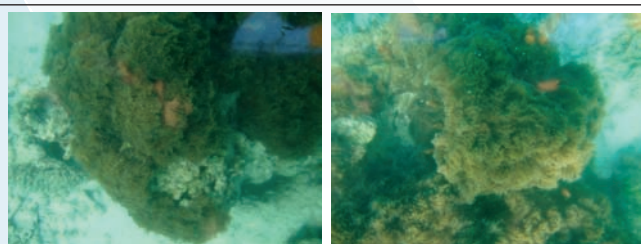
The Session on *Sea Level Rise Vulnerability, Fisheries and Climate Change Impact on Livelihood Options* highlighted the economy and the vital ecosystem of Lakshadweep Islands. The probability recurrence of mass coral bleaching events along Lakshadweep region and the management of coral reefs and their future protection were



Prof. K. V. Thomas, the Hon'ble Minister for Agriculture (State), Govt. of India, inaugurated the International Workshop on *Climate Change & Island Vulnerability* at Kadmat, Union Territory of Lakshadweep

discussed in this Session. Impact of Climate Change on Phytoplankton and the Phytoplankton response to carbon extremity were one of the prominent aspects of the Session. Marine Productivity and the Climate Change for the last 10,000 years were examined with core records.

The Session on *Water and Sanitation in Island Ecosystem* had papers on island aquifer system and decentralized sewage treatment system. It consisted of dry composite latrines and the complete sewage treatment at the household levels. The presentation in the Session *viz. Mitigation, Adaptation and Governance* emphasized the need for coming out of the trap of rhetoric to evolve some pragmatic approaches in addressing the perceived threats of Climate Change. Specific focus needs to be given to livelihood and food security of fishers to combat the SLR and related threats. Integrated coastal management policies supported by management of coastal ecosystem, marine protected areas are a few processes to mitigate island vulnerability due to rise in sea level.



A large variety of corals are a visual treat near Kadmat, Union Territory of Lakshadweep



## Recommendations of the *International Workshop on Climate Change and Island Vulnerability* to be implemented as a part of the project, *Development of Climate Change Database with special reference to Lakshadweep*

**1. Biosphere Reserve:** Biodiversity conservation is being promoted as a means for building natural defence mechanism against climate change. Lakshadweep Islands need a better conservation strategy. There are three species of turtles in Lakshadweep islands that are listed as endangered species in *1986 IUCN red list of threatened animals*. A few Islands of Lakshadweep may be designated as a Biosphere Reserve. Biodiversity zonation may be attempted in all the Islands of Lakshadweep. A detailed study for the same may be convened in the Lakshadweep Island. The support of International agencies like UNESCO may be sought for the same.

**2. Adoption of Green Technology and Declaration of Lakshadweep as Green Islands:** Emission of greenhouse gases from conventional *Chula* may be reduced to one third by utilizing high efficiency *Chula*. The high efficiency *Chula* can reduce two-third of the firewood utilized for cooking through conventional *Chula*. The high efficiency *Chula* may be an important tool for mitigation and adaptation programs of climate change.

The Lakshadweep Islands may be declared as “Green islands” utilizing the technology of high efficiency *Chula* developed by Integrated Rural Technology Centre (IRTC). This may be utilized in all the Islands of Lakshadweep. The Islanders should be trained by IRTC for the construction and maintenance of the High Efficiency *Chula*. This technology has been recognized by many State and Central Government agencies as a feasible model and many government agencies have granted subsidies for implementing the program at household level.

Measures should be taken to develop projects for biomass utilization as an

energy source in all the Islands. Gasifier based bio-energy system may be utilized in all the islands. This may be adopted as a measure to combat the impact of climate change. This will help in declaring Lakshadweep Islands as “Green islands”. The technology developed by IRTC and National Institute for Interdisciplinary Science and Technology (NIIST), a constituent establishment of CSIR, may be utilized for making better quality coir, as a part of the adaptation and mitigation aspect of climate change. The Lakshadweep Islands may be declared as “Green islands” utilizing these technologies.

**3. Fresh Water Contamination, Sanitation and Health:** Improved sanitation packages and models, cost-effective and environment-friendly sanitation devices may be adopted in the island as an adaptive and mitigation measure against the impact of climate change and the microbial contamination of limited fresh water aquifer in Lakshadweep Islands. Household sanitation devices for decentralized sewage treatment developed by NIIST is one of the easily available, adoptable and appropriate technologies for the same. The improved dry composite latrines as eco-sanitation for small Islands developed by IRTC may also be placed on an experimental basis in various islands of Lakshadweep.

Climate Change will have a potential effect on human health. There will be shrinking of fresh water aquifer due to salinity intrusion. The limited fresh water source will be contaminated with human waste and bacteria. Water borne diseases such as cholera and typhoid may come up in future. It is suggested that there should be awareness of water borne diseases among the islanders. There are many gaps in the present system of health survey convened by the concerned department. Steps are to be taken to arrange detailed survey on the present status of health of

the islanders as a part of the present project.

**4. Livelihood Options: Brain-storming Session for Fishery Sector, Mitigation and Adaptation Options:** The present activities in the fishery sector should be diversified. The database developed by Fishery Survey of India (FSI) and the survey on fishery resource convened by FSI around Lakshadweep Islands may be utilized for the purpose. The appropriate technology developed by FSI, Central Institute of Fishery Technology (CIFT), Central Marine Fisheries Research Institute (CMFRI) and National Institute of Oceanography (NIO) may be procured for proper planning. It is suggested to organize a brainstorming session among the experts of above organizations as a part of the livelihood option to mitigate and adapt due to impact of climate change.

Alternative livelihood options like aquaculture and ornamental fish hatcheries may be explored in all the islands of Lakshadweep. This may be developed as one of the measures to adapt and mitigate the impact of climate change.

**5. Bio-markers for Climate Change in Lakshadweep Island:** These are to be identified. Response of seagrass and coral reefs to the rising temperature are to be studied.

**6. Restoration of Seagrass and Corals:** The specific locations for restoration of sea grass and corals in different Islands of Lakshadweep are to be identified.

**7. Coral Study:** The geological past of the Island is to be examined using coral studies. Similar studies have been convened in Kerala.

**8. Controlling Coastal Erosion:** Coastal erosion should be controlled utilizing alternative methods like bio-shields. *Emphis acidula* and *Scaveola taccada* may be utilized for the same.



### Demonstration Programme cum Workshop for Disseminating Rural Technologies Developed by CMERI, Durgapur and IHBT, Palampur

Central Mechanical Engineering Research Institute (CMERI), Durgapur and the Institute of Himalayan Bioresource Technology (IHBT), Palampur in collaboration with Tribal Development Foundation (TDF), Itanagar (who is working towards sustainable development of the tribal community) organized a two-day Demonstration Programme cum Workshop during 18-19 September 2010 at the Doni-Polo Tea Estate, Oyan Village, East Siang District, Arunachal Pradesh.

Through this programme, rural technologies developed by CMERI and IHBT were demonstrated to a large number of farmers, NGO's and entrepreneurs of Arunachal Pradesh who attended the programme. This was followed up by an intensive training cum workshop where the rural people were initiated in the use of the appropriate technologies.

The programme was inaugurated by Ms. Yadap Apang, an eminent social worker of the State. In her Inaugural Address, Ms. Apang stressed on the

development of the rural sector of Arunachal Pradesh through joint efforts between NGOs, CBOs, and CSIR and other stakeholding government agencies. She opined that to eradicate poverty the rural population would have to take meaningful steps in accordance to a carefully developed plan and that the participation of organizations like CSIR would be instrumental in realizing the plans.

Prof. S. N. Shome, Senior Scientist, CMERI, welcomed all the participants and spoke on the activities of CSIR for



Glimpses of the Demonstration Programme cum Workshop for disseminating rural technologies



the rural masses of the country through the flagship *CSIR-800* mission, which aims at providing a better life to 800 million people of the country. During his address, he stressed that the basic needs of the population – namely food, home, health and education – can only be fulfilled if the rural people can fetch sufficient money through appropriate utilization of technologies. He then outlined the major emphasis which CSIR and the Government of India has placed on making available R&D outputs for typical regional and local technology issues and their implementation for the people of the North East India, so that this region emerges as a strong economic entity.

Ginger, turmeric, chilli, cardamom, cinnamon, certain medicinal, aromatic and natural dye plants are typical cash crops of Arunachal Pradesh. Dearth of post harvest processing of these crops in these States, along with the lack of preservation and proper value addition results in loss of revenue for the farmers, as they receive poor prices for the base product. CMERI has been working through the last few years for providing proper technological solutions for preservation and processing of the agro produce and increasing the shelf life of the end products, all of which has translated to significant increase in earnings of the farmers.

Enthused by the response to this effort, CMERI has established in Aizwal, Mizoram and Jengging, Arunachal Pradesh *Centres for Post Harvest Technology* for proper technology diffusion and training. Another such centre is coming up at Pasighat of Arunachal Pradesh. Prof. Shome presented various other

technologies developed by CMERI, which have potential utilization in rural Arunachal Pradesh. He requested the participants, primarily farmers, NGOs and entrepreneurs to come forward and work together with CSIR scientists for economic development of Arunachal Pradesh.

Dr. Virendra Singh, Senior Scientist, IHBT then presented the activities of the laboratory with special emphasis on rural technologies suitable for hilly regions like Arunachal Pradesh. A showcase of IHBT's rural technologies depicted sustainable development of bioresources, floriculture, mechanizing of farm operations in tea plantations, diversified tea products, bamboo species and quality control facilities for value-added products. The potential of the India Himalayan region for producing various aromatic, medicinal and dye plants were discussed in detail by Dr Singh.

In his invited talk, Dr. G.T. Paratkar, Director, Centre for Advanced Research and Training in Biosciences (CARTIB), Mumbai, spoke on the important Medicinal and Aromatic plants grown in various districts of Arunachal Pradesh. He emphasized on grow-together concept, and ensured the support of the CARTIB in basic research and development in herbal formulations.

Dr. P. K. Chatterjee, Senior Scientist, CMERI and leader of the projects of North East India, explained the operation and benefits of the post harvest technologies, especially those pertaining to ginger and turmeric processing units. "The Pasighat centre would have training and display units of various rural technologies," he added. He further informed that based on the

inputs provided by the local farmers, CMERI is now designing improved and more efficient versions of the sub-processing units for faster drying, reduction in the labor cost, maintenance of hygienic conditions of production, uniform quality, etc. Dr. Chatterjee also pointed out that alternative renewable energy sources would be tried in future for electrification and running of the centres in more eco-friendly manner.

The participants showed keen interest and interacted with the scientists. During the interaction programme with farmers, entrepreneurs and NGOs, it was found that proliferation of similar centres is required over the entire State to reduce the time and cost otherwise necessary for transporting the agro-produce to the two dispersed centres.

Shri Imtiaz Asif, a social worker and representative of TDF, clarified all the queries raised during interactive session, with a special stress on product marketing. He mentioned that the process of registering the necessary data related to farmers/entrepreneurs will soon start at the Pasighat Centre once it becomes operational. Efforts are also on, he added, for obtaining necessary international certification for organic farming so that the produce fetches a good value in the market.

The two-day Workshop concluded on an upbeat note that augurs well for the sustainable economic development of tribal communities of Arunachal Pradesh. The efforts of CSIR were lauded by the beneficiaries and other functionaries alike, and active participation of all were promised for furthering the cooperation of the scientific community, farmers, entrepreneurs and NGOs.



### Training Programme on *Blood Pressure Measuring Instruments and Clinical Thermometers* at NPL, New Delhi

Under the banner of “Demand your Rights,” the National Physical Laboratory (NPL), New Delhi, the Directorate of Legal Metrology, Ministry of Consumer Affairs, Krishi Bhavan, New Delhi and the Metrology Society of India, jointly organized a three-day Training Programme for the Legal Metrology Officers of various States, Union Territories, Indian Institute of Legal Metrology (IILM) and Regional Reference Standard Laboratories (RRSL) on *Blood Pressure Measuring Instruments and Clinical Thermometers* during 11-13 August 2010 at the Conference Room, Standard Block A of NPL. The programme was technically coordinated by Dr. A.K. Bandyopadhyay, Head, Apex Level Standards and Industrial Metrology (ALSIM) of NPL.

The Training Programme was focused on the various aspects of accurate measurement, monitoring and control of Blood Pressure Measuring Instruments and Clinical Thermometers. The programme consisted of lectures by NPL scientists of the concerned two fields, Bureau of Indian Standards (BIS) experts and other specialists in the field. The practical demonstrations were organized through four uniquely designed experiments (two for the BP measurements and two for temperature measurements). Comprehensive proceedings



The Training Programme in progress

of the Training Programme giving details of the lectures were distributed to the participants.

The proceedings also contained documents of the International/National regulations, that is, the Organization of the International Legal Metrology (OIML)/ BIS regulatory documents where the regulations regarding the manufacture of the instruments,

industrial measurements and protection, i.e., measurements involved in ensuring public health and human safety were discussed. There were altogether 52 inspectors as participants from the various states/UT’s namely from Kerala, Chhattisgarh, West Bengal, Rajasthan, Mizoram, Maharashtra, Madhya Pradesh, Meghalaya, Assam, Nagaland, Uttar Pradesh, Andhra Pradesh, Uttrakhand, Haryana, Orissa, Bihar, J&K, Delhi etc.

Prof. R. C. Budhani, Director, NPL and President, Metrology Society of India welcomed the delegates and talked about the need of this kind of Training Programme. He briefly discussed the facilities available in NPL and also future plan of NPL. He





mentioned that in the past, NPL has organized many such training courses on Mass, Dimension, Force etc. and also organized several National and International seminars and symposia but this was for the first time that such a programme was being organized exclusively for Legal Metrology Officers.

Dr. P. Banerjee, Senior Scientist talked about the Metrology Society of India and its functioning. Dr. A.K. Bandyopadhyay, Technical co-coordinator talked about the programme and also mentioned the commitment of NPL in the successful implementation of the Legal Metrology Act -2009. Mr. B.N. Dixit, Director, Legal Metrology, Ministry of Consumer Affairs, Food and Public Distribution mentioned about the need of this kind of Training Programme for these inspectors and officers of the department and how it will help the Consumer.

In the Presidential Address, Mr. Rakesh Kacker, IAS, Additional

Secretary, Department of Consumer Affairs (Govt. of India) briefly explained the minimum requirement of the Legal Metrology officers under the Legal Metrology Act, 2009 and their expectations from NPL as the National Metrology Institute of the country. He narrated that although the Legal Metrology Act, 2009 was published in the official Gazette of Government of India on 14 January 2010 and it will replace the Standards of Weights and Measures Act, 1976 and the Standards of Weights and Measures (Enforcement) Act, 1985, but the date of implementation of the Act has not been notified. While delivering the Vote of Thanks, Dr. Pardeep Mohan thanked the Ministry of Consumer Affairs and Director, NPL (CSIR), participants from the States and UT and the Industries who participated in the exhibition.

Based on this theme, various experts delivered talks on the following topics which were broadly covered: (1) Metrology for Medical Devices —

Traceability for Medical Devices with a Measuring Function, (2) Barometric Pressure Measurements: Devices, Methods, Corrections and Measurement Uncertainty, (3) Measurement of Pressures from One Atmosphere to Ultra High Vacuum (4) Temperature Standards: Formulation & Importance of International Temperature Scales, (5) Technical & Metrological Requirements and Test Procedures for Non-invasive Blood Pressure Measuring Instruments Based on OIML Recommendations, (6) Calibration of Industrial and Clinical Thermometers. Two lectures were delivered by medical practitioners: Prof. Dr. Sudesh K Chugh on *Blood pressure Measurements* and Dr. Preeti Bijlani on *Body Temperature Measurements*.

At the end of three-days, an interactive session was organized to get the feedback from the participants. In the Concluding Session, Mr. B.N. Dixit and Dr. A.K. Bandyopadhyay jointly chaired the session and distributed certificates to the participants.



The participants along with organizers of the Training Programme on *Blood Pressure Measuring Instruments and Clinical Thermometers*



## CBRI-IEI Conducted Short-Term Course on Earthquake Resistant Design & Construction Practices

Natural disasters in the form of earthquake have become a global phenomenon, and there is a need to safeguard our building structures against such calamities. The important components highlighted for ensuring safe construction are: Public Awareness, Legal Framework, Technical Competence, Professional Ambience, Enforcement and Research & Development. As a reactive society, a need is felt to inculcate earthquake education to the practicing engineers. In this direction, the Central Building Research Institute (CBRI) in association with the Institution of Engineers (I), Roorkee Centre jointly organized a course on Earthquake Resistant Design & Construction Practices during 21-24 September 2010 at Roorkee.

The Course in all had 28 technical lectures covering a wide spectrum of topics related to earthquake engineering right from engineering seismology; soil and structural dynamics, earthquake resistant design principles & philosophy; performance based design, seismic qualification, geotech-earthquake engineering, seismic up-gradation, sustainable precast construction, quality control in construction and failure analysis with case studies. The Course was attended by 48 participants from various government, public and private sector organizations.



Er. Ajay Chourasia, Scientist, highlighting the brief of the short-term course

While welcoming the Chief Guest, Guest of Honor and participants, Prof. V. K. Agarwal, Chairman, IEI highlighted the importance of the Course. Prof. S. K. Bhattacharyya, Director, CBRI, Roorkee, in his Presidential Address emphasized the need to propagate the awareness and message of seismic resistance to all structural designers/architect so that while conceiving the project they ensure that the measures are adopted during construction so as to save lives and properties in future earthquakes. He also mentioned that it needs whole-hearted support of all stakeholders namely, the owner, the planner, the designers and the builders, which can be achieved by systematic initiatives to change the mindset of professionals and generate awareness regarding earthquake preparedness and mitigation, while highlighting the contribution of CBRI towards the subject.

The Chief Guest of the Inaugural

Function, Shri P. G. Dhar Chakrabarti, Director, NIDM, New Delhi stressed the need on synergizing the theoretical concepts on earthquake engineering with practice by organizing such kind of courses.

The participants of this Course actively interacted with faculty during the entire programme. Faculty members drawn mainly from CBRI, Roorkee and IIT Roorkee included

Prof. S. K. Bhattacharyya, Prof. D. K. Paul, Prof. Swami Saran, Dr. Yogendra Singh, Prof. M. L. Sharma, Prof. A. K. Jain, Dr. B. K. Maheshwri, Dr. Satyendra Mittal, Er. Ajay Chourasia, Er. Sanjeev K. Singh, Dr. Achal Mittal, Dr. Shantanu Sarkar and Dr. A. K. Pandey.

The renowned experts Dr. Shailesh Agarwal, Executive Director, BMTPC, New Delhi and Mr. Yogesh Kajle, Executive (Planning & Design), B. G. Shirke Construction Technology, Pune also shared their experiences. After attending the Course, the engineers expressed their happiness on upgradation of their knowledge on earthquake resistant design and good construction practices, and resolved that after going back to the respective departments they will promote this knowledge among their colleagues.

During the Valedictory Function of the Course, held on 24 September 2010, Prof. S. K. Bhattacharyya, Director,



CBRI, Roorkee and Dr Shailesh Kr Agrawal, Executive Director, Building Materials & Technology Promotion Council (BMTPC), New Delhi addressed the gathering and distributed the certificates to participants. On this occasion, a movie on *Full Scale Testing*

of *Prefabricated RC Frame Structure at CBRI Roorkee for Evaluation of Beam-Column Junctions* was also screened. Prof. S. K. Bhattachryya, Dr Shailesh Agrawal and the participants appreciated the efforts made by the coordinators of the

programme, Er Ajay Chourasia and Er. Sanjeev K. Singh, in organizing the event and hoped that a long-lasting bond is created through such short-term courses between organizers, faculty/speakers and participants, paving a way to make earthquake resilient India.

## Inauguration of the 9<sup>th</sup> Batch of *Advanced Course in Bioinformatics* Jointly Organized by IICT, CDAC and JNTU

The 9th batch of ACB 2010-2011 jointly organized by IICT, CDAC and JNTU was inaugurated on 13 September 2010 at the New Lecture Hall of Indian Institute of Chemical Technology (IICT), Hyderabad. Addressing the students and the gathering present on the occasion, Dr. U. S. N. Murty, Course Coordinator & Head Biology Division, IICT Hyderabad, stressed the importance and need for taking up such a challenging course wherein the students would be exposed to new frontiers in the area of science. He also emphasized that the challenges faced by mankind in the areas of health, pharmaceuticals and other allied areas can be overcome to a great extent by pursuing research in the area of “Bioinformatics”. Dr. Murty also brought it to the notice of the students and the parents present that in the near future many scientific innovations would be accredited to this virgin branch of science called “Bioinformatics”.

Speaking on the occasion Dr. Ahmed Kamal, Director In-charge, IICT Hyderabad said that he has closely watched the Course grow from strength to strength. He also said that the Course syllabus is very challenging and has been

designed to provide the students much needed information. He was of the opinion that the future belongs to these students who can integrate the subjects of Biology and computers to provide much needed succour to the challenges faced by the human race as most of the research carried out would be *in silico*.

Delivering his address Dr. Jain, Director, CDAC Hyderabad highlighted how the stream of Biological sciences was moulding itself into the arena of information technology and in the process getting out the best from the IT industry. He also said that in the near future all the leading players of the pharma industries around the world

would rely upon this area of science to find solutions for the existing problems.

Dr. Lakshmi Narasu, Director, Department of Biotechnology, JNTU, Hyderabad said that this is a challenging course with lot of potential for the students who have opted for it. She also said that the course syllabus has been drafted according to the present day scientific needs. She brought it to the notice of the students and the audience that the three institutes engaged in offering this Course were giants in their respective fields. Dr. Narasu wished all the enrolled students a very bright future. The Inaugural Function ended with a Vote of Thanks by Mr K. Sriram Biology Division, IICT, Hyderabad.



Dr. Ahmed Kamal, Director In-charge IICT seated along with other dignitaries. Dr U. S. N Murty, Course Coordinator seated to his right; Dr. Jain, Director CDAC Hyderabad and Dr. Lakshmi Narasu, Director Biotechnology Department, JNTU, Hyderabad are seated to his left during the inauguration of the 9<sup>th</sup> batch of *Advanced Course in Bioinformatics*



### Dr. J. N. Baruah Memorial Lecture at NEIST, Jorhat

Commemorating the death anniversary of the former Director of NEIST, Jorhat and also a renowned Scientist, Dr. J. N. Baruah, the Assam Science Society, Jorhat Branch and Dr. J. N. Baruah Memorial Trust, Jorhat, jointly with North East Institute of Science & Technology, (NEIST), Jorhat organized the 16<sup>th</sup> Dr. J. N. Baruah Memorial Lecture at NEIST on 2 September 2010. Besides NEIST fraternity, the lecture was attended by distinguished guests, eminent scientists, special invitees, family members of Lt. Dr. J. N. Baruah, members of press and media and others.

Prof Asis Datta, Professor of Eminence, National Institute of Plant Genome Research (NIPGR), New Delhi, delivered this year's Dr. J. N. Baruah Memorial Lecture on the topic, *'In search of a dream....'* Dr. Mridul Hazarika, Director, TRA, Tocklai, attended as the Guest of Honour. Notable among others present were Prof. (Dr) Kasturi Datta, Dean, School of Environmental Sciences, JNU, New Delhi, Prof. Samir Bhattacharyya, INSA Fellow and Dr. P. G. Rao, Director, NEIST, Jorhat. The Function was presided over by Dr. J. C. S. Katakya, Scientist G, NEIST & President, Jorhat Branch of Assam Science Society.

Delivering the Welcome Address on the occasion, Dr. P. G. Rao, Director, NEIST, spoke briefly about the remarkable contributions of Lt Dr. J. N. Baruah during his tenure at NEIST (then RRL) and his pioneering works. He said that more than 60% of NEIST technologies were commercialized as well as NEIST made a record by

securing the maximum number of patents filed and granted during time which was the highest in the history of patent filed/granted by a CSIR laboratory. "NEIST is proud to have been guided by such an able leader and organizing the memorial lecture at NEIST this year was a value addition to the Golden Jubilee celebration year of NEIST," he opined.

The lecture was formally inaugurated by Prof. Samir Bhattacharyya, INSA Fellow, by lighting the lamp after which the dignitaries as well the members present paid homage to the portrait of Lt Dr. J. N. Baruah. The Inaugural Address was delivered by Prof. Samir Bhattacharyya, INSA Fellow, where he expressed his appreciation for the warmth and ambience created by the presence of such a galaxy of scientists present for such an occasion. Prof. Bhattacharyya also shared few words about Lt Dr .J. N. Baruah who he said that his contributions to make 'science' a potential area in the region was a matter of high praise and the same efforts should be made by all to show prosperity of not only self but also 'science' as a subject.

Delivering the Memorial Lecture on *"In search of a dream...."* Prof Asis Datta said that progress is a constant journey where many variables keep coming up at odd hours and turns. "Science should not be taken as a destination but as a journey and every person should excel in whatever they do and excellence should be achieved for the benefit of human kind," he said. "Nobody achieves anything without

taking risks and every human should have passion which is the only key to success," he added. Prof Datta further urged on by saying that science for providing food security is another big concern because world peace cannot be achieved when people are living in empty stomach and misery. He also spoke briefly about his work in the area of microbiology especially in the treatment of human diseases, in agriculture and genetically modified foods. Concluding his speech, Prof. Datta said that the road to success is always the road to strive for excellence and that one should do science with a purpose, a purpose that should contribute to the society.

Dr. Mridul Hazarika, Director, TRA, in his speech touched upon the safety issues of genetically modified foods and further expressed his appreciation to Prof. Asis Datta for his meaningful lecture. In the Function, the website of the Memorial Trust was officially launched by Dr. P. G. Rao, Director, NEIST, for its wider popularization and easy accessibility by the public about the Trust.

Since its 5<sup>th</sup> Memorial Lecture, every year, the Memorial Trust give away awards to deserving candidates in two categories, one in the form of scholarship for the meritorious and economically weak HSLC passed out student from Higher Secondary Board of Assam for two consecutive years annually and another for outstanding research in science. This year the scholarship was awarded to Miss Padmini Saikia of Titabor who secured 81.3% in her HSLC exam of Higher



Secondary Board of Assam and Dr Ashish K Mukherjee, Tezpur University, Tezpur for his research activity. Dr Ashish K Mukherjee, recipient of the Award, presented a brief overview of

his work in the areas of environmental biotechnology, industrial microbiology, biochemistry and biotechnology of snake venom.

Later, as a token of love and

appreciation, mementoes were presented to the dignitaries present. The Function came to an end with Vote of Thanks offered by Dr. I. C. Baruah, Secretary, Assam Science Society, Jorhat Branch

## Distinguished Lecture by Nobel Laureate Prof. Y. T. Lee

NGRI had the honour of hosting Prof. Y. T. Lee, a Nobel Laureate in Chemistry and organizing a distinguished lecture for the benefit of scientists and school children from the twin cities on 9 July 2010. Prof. Lee, in his talk shared his experiences as a child who wanted to become a good chemist and as a scientist during his journey to achieve excellence. He stressed the importance of “thinking” rather than mechanically accumulating knowledge and opined that scientists should be creative and imaginative to excel in research. To begin with, one has to think himself/herself to be different and to take up things differently.

Prof. Lee opined that creativity is not innate; rather it is related to ones cultural upbringing. Creativity could be developed at an early age through education and it feeds on success. Any person tends to be more creative when he/she becomes increasingly more accomplished and productive.

In his awe-inspiring talk, Prof. Lee aspired for an environment where intellectual curiosity is promoted and ample opportunity exists to probe and



(From Left): Dr. Harsh K. Gupta, Panikkar Professor & former Director, NGRI, presenting memento to Noble Laureate Prof. Y.T. Lee. Dr. Y. J. Bhaskara Rao, Acting Director, NGRI is also seen in the centre

explore the unknown, to synthesize and communicate ideas and to define and formulate problems. Prof. Lee's beliefs lie strongly in the fact, “Learn to learn yourself”. The fundamental things are the most important to pursue research and the fundamentals should not be limited to ones' subject. The young scientists today have tremendous pressure of writing research proposal and papers, which according to Prof. Lee is improper.

Creativity is stifled where intellectual superficiality and dogmatism persists while there is high penalty for

failure. By growing up in a supportive environment, qualities such as independence, self-reliance and willingness to take task develops in an individual. Training the students to solve problems is of prime importance, which helps them to proceed step by step into a mature scientist. Children should be taught to become good students; rather than being test takers, following the footprints of others. Elementary school should be the place to make a child learn the laws of Nature and to build confidence in oneself.

Prof. Lee's remembrances about himself were those of a hardworking child, always challenged by his mother and teachers to do new things and find different ways to solve problems. He had two goals in life; firstly to be an excellent scientist, not limited by the environment of family, school and society and secondly, to work idealistically to make the world a better place to live in and serve humanity. An admirer of Einstein, Prof. Lee concluded with Einstein's quote '*I do not know everything but if I want to know, I can find it*'.



### NGRI Scientist Chosen for the N. N. Chatterjee Award-2010



Dr. Kalachand Sain, Scientist & Head of Gas-Hydrate Group at National Geophysical Research Institute (NGRI), Hyderabad, has been chosen for the N. N. Chatterjee Award-2010 of the Geological Society of India in recognition of his outstanding contribution in the field of Energy Resources of India.

Dr. Sain has proposed several innovative approaches that are being used for the delineation and assessment of gas-hydrates along the margins of India. He has played a vital role in identifying the presence of gas-hydrates in the Krishna-Godavari, Mahanadi and Andaman regions in the Bay of Bengal from surface seismic measurements, which has been established by the drilling and coring of National Gas Hydrate Program. He has also contributed significantly in imaging hydrocarbon-prospective Mesozoic sediments below the flood-basalts in the Saurashtra peninsula and central India.

Dr. Sain has made a remarkable contribution in understanding the earthquake processes and evolution of various geological/tectonic provinces. His research area of interest includes seismic travelttime tomography, AVO

### Nominations Invited for Shanti Swarup Bhatnagar Prizes in Science and Technology - 2011

The Council of Scientific and Industrial Research (CSIR) invites nominations for the Shanti Swarup Bhatnagar (SSB) Prizes in Science and Technology for the year 2011. 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 2011 SSB Prize **should not be more than 45 years as on 31.12.2010**.

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 **Scientist I/C - SSB YSA Unit, Human Resource Development Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110012** should be sent as per the prescribed pro-forma (Original + 14 copies) along with one set of reprints of significant publications of the last 5 years period on or before **31 March 2011**.

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>.

modeling, full-waveform inversion, attenuation and attributes studies, prestack depth migration, and rock physics modeling. He has so far published 57 research articles in peer reviewed journals with citations in 200 research papers. He has guided two students for their Ph.D. and five students are pursuing Ph.D. under his supervision.

Dr Sain is a highly motivated and well-recognized scientist. He has earlier

won many Awards and notable among them are *Krishnan Gold Medal* (1996) by IGU, *Young Scientist Award* (1998) by CSIR; *Raman Research Fellowship* (2003) by CSIR and *National Mineral Award* (2005) by the Ministry of Mines. He is *Bureau Member of International Lithosphere Program* (2007 till date), and has delivered *Prem Bahadur Memorial Lecture* (2009) of the Indian Geological Congress.



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