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CSIR NEWS

Progress, Promise and Prospects

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C O N T E N T S

CSIR Offers Technologies
for Inclusive Growth



Micro-Nano Systems Engineering Research



HRDC Training Programme



Dr. S. R. Wate Takes Over
as Director, NEERI



Dr. S. Sivaram Honoured by
Purdue University



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



CSIR Offers Technologies for Inclusive Growth

Shri Prithviraj Chavan, Hon'ble Minister of State (Independent Charge) for Science & Technology and Earth Sciences and Vice President, CSIR announced that CSIR has a plan to come out with end-to-end business solutions built around select excellent technologies, during the “*CSIR Technology - Social Entrepreneur Meet*” organized on 16 August 2010 at CSIR headquarters in New Delhi. The meeting was organized to take forward the *CSIR 800* – an initiative to leverage CSIR’s relevant technological knowledge base for the benefit of 800 million people of the country who are at the bottom of the pyramid of life.

Prof. Samir K. Brahmachari, DG CSIR, informed the participants that CSIR has a bag full of potential technologies which CSIR is willing to

offer, free of cost, to social entrepreneurs and NGOs to reach out to 800 million people, ushering in an era of economic empowerment of rural India. He also shared that many CSIR laboratories are working not just in high science but also generating meaningful technologies that can be translated into relevant products and services for the common man, through partnership with the NGOs/social entrepreneurs.

The proper utilization of such technologies through a network of activists/NGOs surely has the potential to transform rural India and, therefore, must be exploited. The interaction of CSIR officials and other stakeholders in the chain of innovation of technologies for the benefit of the common man will help to establish new linkages and new partnerships to smoothly and quickly

transfer CSIR-800 technologies on the ground.

Social entrepreneurs/NGO representatives from as far as UK and over 60 NGOs, involved in absorption-efforts of technology at grassroots-level developmental work, operating in as many as 16 States of India participated during the deliberations of the meeting. Representatives from financial institutions and banks were also present. During the whole day programme, there were a series of technical discussions, to disseminate information on CSIR technologies. Three thematic sessions, namely, *Affordable Health & Sustainable Energy*, *Waste-to-Wealth* and *Value Added Agriculture* were held in parallel during this one-day programme.



Glimpses of the *CSIR Technology - Social Entrepreneur Meet*





LaCONES

CSIR's Effort to Nurture Nature

Dr. P. Cheena Chawla

What happens when our precious possessions are lost? Invariably, loss of wealth or something dear makes most of us quite upset that triggers us to take measures for protecting our belongings. Well, Nature too belongs to all of us. The bountiful Nature is replete with priceless possessions in the form of myriad varieties of life forms, each one of them being a masterpiece in itself. But alas, some of them like the Caspian tiger, Sea cow, Dodo, Quagga and many more are gone forever and we shall never see them again. With their extinction, the millions of years that these species took to evolve are also lost. Surely, loss of this natural wealth reflected by extinction of several animal species from the face of the Earth is not only very disturbing but also is a fair reason for gearing up our action to conserve the endangered life forms that are on the verge of extinction.

Needless to say, conservation of the existing biodiversity is the need of the hour. Several factors like destruction of forests and indiscriminate killing of animals as a sport and for trade has been the major cause for pushing animals to extinction. It is a matter of pride that CSIR has taken a lead in conservation of wildlife as the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, initiated in 1998 the setting up of the Laboratory for Conservation of Endangered Species (LaCONES) with help of the Department of Biotechnology (DBT), Government of India, New Delhi and the Central Zoo Authority (CZA), New

Delhi. The Department of Forestry, Government of Andhra Pradesh and the Nehru Zoological Park at Hyderabad, are also major partners in this joint venture.

Piloted by Dr. Lalji Singh, former Director, CCMB and Dr. S. Shivaji, Director-grade scientist, CCMB, LaCONES is a unique laboratory set up at Attapur near Nehru Zoological Park, Hyderabad, on land allotted by the Government of Andhra Pradesh. This novel scientific endeavour is a part of a national programme to tackle the challenge of wildlife extinction by employing novel methods of biotechnology and assisted reproductive technologies. The idea is to conserve and prevent the extinction of endangered wildlife by focusing on both conservation as well as propagation of such species by several innovative techniques.

It was on 1 February 2007 that the then President of India Dr A. P. J. Abdul Kalam dedicated the LaCONES to the Nation for the cause of conservation of wildlife (*CSIR News, Vol. 57, No. 4, 28 February 2007*).

The wide range of research activities at the LaCONES includes the resurrection of extinct and endangered species by cloning the frozen genetic material and using oocytes of a closely related species as surrogate mother, monitoring of genetic variations and establishing of gene and cell banks for rare species. A major focus is on the development of assisted reproductive technologies such as intrauterine insemination, *in vitro* fertilization, intracytoplasm sperm injection, embryo transfer, etc., for conservation of rare species.

The state-of-the-art LaCONES has facilities for cryopreservation of semen, eggs and embryos of endangered species. Semen analysis is done to study the semen quality for selecting animals for breeding. Besides, standardization of artificial insemination for wild animals is another major activity at LaCONES. Planned in-house breeding strategies or captive breeding of animals that cannot be saved in the wild are developed. The outcome of such efforts has greatly



The multi-faceted research activities at the LaCONES are all geared to saving our precious wildlife



Protecting the endangered life forms from extinction is the need of the hour

helped in preventing extinction of wild animals like cheetah, non-human primates, and several birds among other rare species.

Protocols have been established for anaesthetizing and electro-ejaculating a wide range of animals such as lions, tigers, leopards, hyenas, jackals, bears, deers and monkeys. A mobile van equipped with facilities like cryopreservation, sonography, computerized sperm motility analyzer, etc., enables the scientists to reach different habitats for collecting samples.

As DNA is the blueprint of life its long-term preservation is a crucial step in storing all information about a particular life form. This has a futuristic possibility of reconstructing an extinct species, while providing a renewable resource for genetic variation in endangered species through captive breeding when loss of variation through inbreeding seriously threatens their survival. On the contrary, if the DNA

and cells of endangered species were not stored, the vital information linked to these life forms would be lost forever. It is a heartening fact that the LaCONES has been honoured as a Member of the International Consortium of the Frozen Ark – an international depository of DNA representing the Indian subcontinent. The Frozen Ark Consortium is a worldwide group of institutions, with its coordinating office located at the School of Biology,



Assisted reproductive technologies have helped to propagate black buck (left) and cheetah (right) species

University of Nottingham, U.K. In these institutions the DNA and the viable cells of endangered species are stored in liquid nitrogen at -196°C.

In yet another achievement, the CCMB scientists have developed primers to decode the molecular signatures of endangered species from their tissue samples by the technique of DNA fingerprinting. A database of molecular signatures of over 2000 animal species has been created.

Scientists at the LaCONES have successfully employed the assisted reproductive technologies to propagate wildlife species such as black buck, cheetah and blue rock pigeon. The birth of 'Spotty', a baby spotted deer/cheetah, using artificial insemination in March 2006 was indeed breathtaking. Such a success story was repeated in August 2007 when 'Blacky', a black buck, was born to one of the three inseminated bucks. The same techniques are being employed on other rare species such as vultures, Nicobar pigeons and the big cats for increasing their dwindling numbers. The LaCONES is indeed a classic example of application of science & technology in protecting thousands of marvelous creations of Nature.



Micro-Nano Systems Engineering Research at CMERI, Durgapur

Micro-nano systems engineering is the science of creating, designing, integrating and manufacturing miniature components, instruments and systems that are having feature dimensions in few nanometers to microns. In recent years, the ability to create structures and patterns in these length scales has triggered a wide range of scientific investigations, leading to the development of novel miniaturized devices.

It has been perceived in many sectors including biomedical, electronics, process control, space and automotives that emerging multi-material micro-nano systems technologies will bring about completely different paradigm shift in the ways the people and systems interact. However, deployment of micro-nano systems in a real industrial viewpoint largely depends on bulk integration and reproducing capabilities. It requires a strong interfacing with advanced miniaturized fabrication protocols to make the devices/systems functional and cost-effective.

CMERI research in micro-nano systems engineering area is continuously striving towards engineering the systems/machines involving electronic, mechanical, chemical elements and functions on the dimensional scale of 10 nm to 500 μm . The broad objectives include:

- Fundamentals in micro-nano systems engineering including, mechanics, heat transfer, fluidics, electronics, chemistry, optics and energy conversion and storage techniques

- Multi-material micro-nano scale manufacturing science
- Development of integrated micro machines, systems and devices
- Training manpower and providing technical support to researchers in related areas.
- Integrated technological solutions for industrial start-ups

Research Facilities

Micro Systems Technology Laboratory established at CMERI in July 2007 is the unique research group, which encompasses several facilities under one roof. It has significant capabilities of generating 3D features in micro-nano scales on multi-materials including metals, polymers, ceramics etc. The current micro-nano fabrication capabilities at CMERI include the following.

Micro milling of 3D features

- Channels: 100 μm , holes: 150 μm diameter in 1 mm thick plate
- Material: Metals, polymers, green ceramics, metallic glass, etc.

Micro EDM-milling of 3D features

- Channels and holes: 20 μm on copper, 50 μm on aluminium

Pulsed Laser Ablation

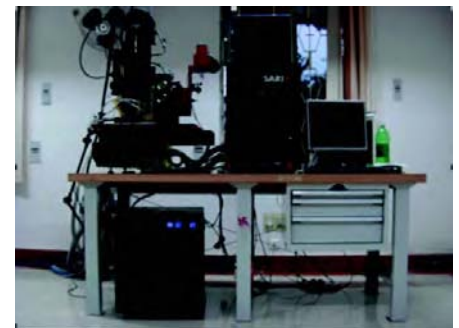
- 50 μm size, 2D features with complex geometry up to the aspect ratio of 200.

The major micro-nano fabrication facilities include: Micro-EDM Milling Machine, Multi-purpose Micro Machine and Nano Second Pulsed Nd-YAG Laser System. Characterization and testing instruments include Fluoresce

Microscope, Optical Microscope, Laser Scanning Micrometer, Image Analyzer, Mini Dynamometer and Data Acquisition Systems.



Multi-purpose micro machine



Micro-EDM milling machine



Nd-YAG nano second pulsed laser

Current Research Activities

In the current XI Five Year Plan, CMERI is the nodal agency for executing CSIR network project on “Modular Reconfigurable Multi Material Micro Manufacturing Systems (MRMMS) for Desktop Manufacturing Capabilities”, in collaborations with CEERI, Pilani, CSIO, Chandigarh and NAL, Bangalore. The striving efforts of CMERI scientists participating across multiple research groups including Micro Systems, Tribology, Chemistry and Biomimetic, and Micro Robotics has led to the successful demonstration of four micro machines developed within CSIR laboratories.

1. Micro Electric Discharge Machining (μ -EDM) Machine

The μ -EDM machine prototype developed at CMERI has three axes capabilities with positioning resolution of 0.1 μ m over a travel length of 150 mm. This experimental prototype is integrated with customized RC circuit based pulse generator for low energy (50-200 μ J) discharge. The discharge voltage and currents have been measured using Digital Oscilloscope and the potential drop across cathode and anode during discharge has been monitored dynamically for compensating the electrode wear to maintain constant spark gap in successive discharges.

In the current prototype, the hardware systems are interfaced and

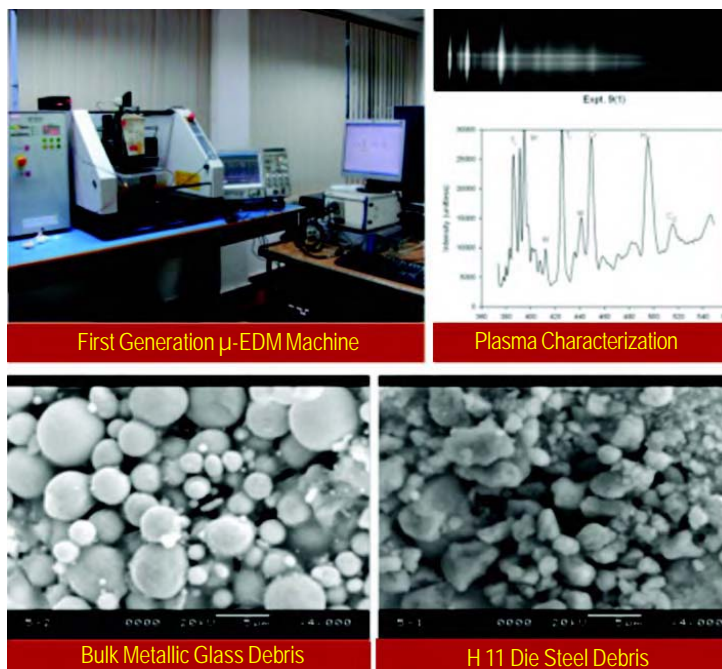


Figure 1: Micro-EDM machine — first prototype

controlled in a synchronized manner through LabView interface, which would be upgraded with CNC controllers in near future. *Figure 1* shows the first generation prototype, which is currently being upgraded with milling features controlled through CNC to realize 3D μ -EDM-milling.

In addition, scientific efforts are in full swing towards enhancing productivity of μ -EDM process to make it batch production process enabled to realize the bulk integration demands in micro-nano scale. Several investigations have been performed on this prototype to characterize the discharge plasma,

debris and influences of electrostatic forces in material removal. Optical emission spectroscopic image of plasma produced at 150 μ J discharge energy and the debris produced during machining ASTM H11 die steel and Zr based bulk metallic glass in the above conditions are shown in *Figure 1*.

2. Micro injection molding System

CMERI is involved in the development of low pressure injection molding system for micro scale plastic and recrystalline wax parts. Scientists have successfully

demonstrated a developed μ -injection molding set-up. This injection system screw barrels have been miniaturized.

Currently, the screw size is 14 mm in diameter and barrel diameter is 20 mm. The combination of cartridge heaters and band heaters controlled through Thirstier controllers are used to

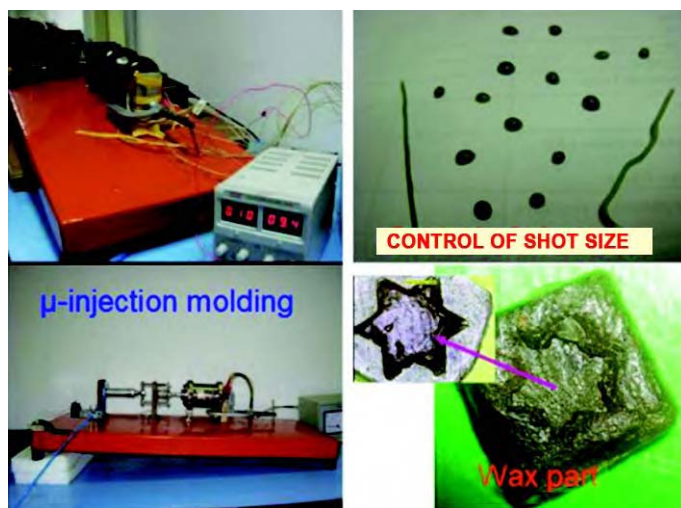


Figure 2: Micro injection molding set-up with sample components



melt the polymer. The screw has 18° helix angle and slow speed imparts shearing action required to have homogeneous polymerization. Like in conventional macro size injection molding machines, screw is used to inject the polymer melt inside the mold cavity with the help of pneumatic actuator. *Figure 2* shows the current micro-injection molding prototype developed at CMERI. The molded sample wax, with a rectangular part of $5\text{ mm} \times 5\text{ mm}$ having star shaped cavity to a depth of $500\text{ }\mu\text{m}$, is also shown.

The injection mold is made in various soft materials including non-metallic materials by micro milling. Currently, the team has successfully demonstrated injection molding of recrystalline wax, where the minimum shot capacity that could be controlled with current prototype was 0.5 mg . However, for the thermoplastics molding, machine needs certain design changes to address few technical issues related to shear rate.

3. Five-axis micro milling machine

Another significant development made by CMERI in micro machines area is the development of five-axis micro milling machine. The machine shown in *Figure 3* is the first generation prototype having 20 mm travel in X- and Y-axes and 30 mm in Z-axis with travel resolution of $20\text{ }\mu\text{m}$. This machine has been controlled through LabView interface which can import tool path CNC data and movement of axes are controlled. Air spindle with 100 K rpm has been mounted vertically. Machining of complex shaped features of $400\text{ }\mu\text{m}$ sizes are successfully demonstrated.

The scientists from Tribology group are currently upgrading this

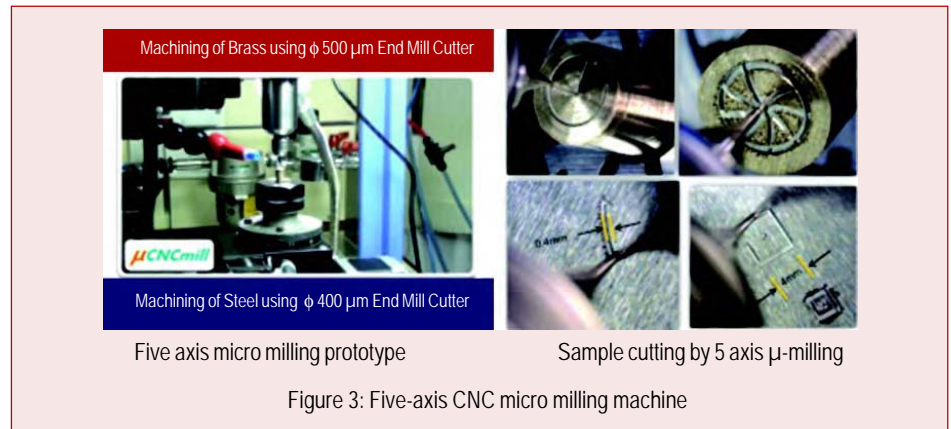


Figure 3: Five-axis CNC micro milling machine

prototype with in-house developed high speed spindle and friction-less linear positioning stages apart from understanding several micro-nano Tribological studies related to lubrication etc. for micro machine tool areas.

4. IPMC based micro actuator

Micro device development is another arm of micro-nano systems engineering research in CMERI. CMERI scientists from Chemistry and Biomimetic group have indigenously developed a new electro-active polymer known as Ionic Polymer Metallic Composites (IPMC).

This includes development of process technology for Platinization of Nafion ionic-polymer using Tetraaquaplatinum (II) complex. A micro-actuation of these IPMC strip (2 cm wide, 5 cm long and 0.2 mm thick) have been successfully demonstrated under operating voltage 3 . *Figure 4* shows the photographs displaying significant deformation under time-

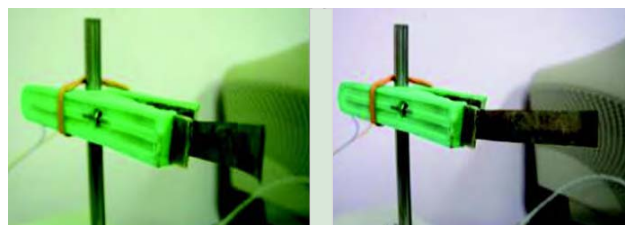


Figure 4: IPMC actuation at $+3\text{V}$ to -3V

varied (0.5 Vs^{-1}) voltage from $+3$ to -3V .

The scientists working on this development have been involved in actuation of IPMC using energy released in nerve cells. Once this succeeds, these actuators would be used for many biological applications in future.

Microfluidic Devices

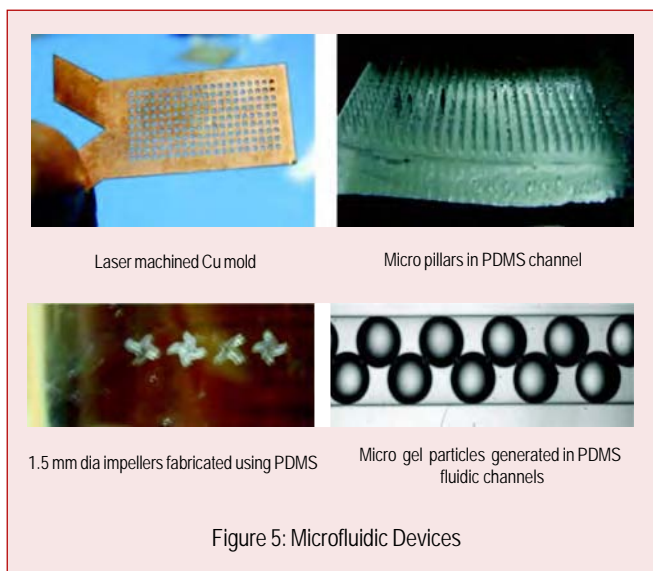
The other key research area of CMERI under micro-nano systems engineering domain is the development of microfluidic devices. A group of scientists have adopted several fabrication approaches to generate micro channels and micro/nano structured surfaces. They have used patterns/molds fabricated by using above micro machining techniques (Laser Ablation, Micro-EDM and Milling) to replicate the desired structures on Polydimethylsiloxane (PDMS), which is bio-compatible. This research is targeted towards development of lab-on-chip kind devices for different chemical and biochemical analysis and microfluidic studies. *Figure 5* shows the sample micro channels structured with micro pillars of $100\text{ }\mu\text{m}$ generated on



PDMS using the copper mold machined by nano-second pulsed Nd-YAG laser.

Currently, research efforts are on to develop microfluidics based systems to perform several investigations which include (1) electrophoresis of DNA nucleotides on these pillar arrays to separate the DNA and other biomolecules, (2) embedding micro impellers inside the fluidic channels for micro mixing applications, (3) generation of spherical and non-spherical micro-gel particles inside these micro channels for drug delivery systems.

The scientists have established demonstrable capabilities in simulation study of micro/nano fluidics. These research teams are working towards combining the multi-domain experts of micro-fluidics, micro systems design and fabrication scientists for developing intelligent sensors, actuators and bio-diagnosis systems in the coming years.



Mobile Essential Oil Distillation Unit Developed at IHBT, Palampur

The Institute of Himalayan Bioresource Technology (IHBT), Palampur has designed and developed a Mobile Essential Oil Distillation Unit (MEDU) under CSIR-RSWNET programme for creating awareness and training the farmers on the production of essential oils from aromatic plants. The unit was successfully demonstrated to the farmers at Pritmas (Tissa) District in Chamba by distilling lavender (*Lavandula angustifolia*) crop, which is cultivated in the region.

Conventionally, the essential oils are distilled in stationary distillation units, which are generally installed away from the cultivation fields. Hence, the farmers have to transport the harvest to the central processing facility to distil their crops. This process, however, incurs cost and also damages the harvest during transportation thereby yielding low quality essential oils. Further, the farmers in the hilly regions possess small land holdings, hence it is not feasible to

invest a large capital for installing distillation unit for processing such small number of crops. The MEDU, on the other hand, can be transported to the remote areas where raw material, water and agro-waste/fuel wood are available to distil the aromatic crops at the site itself.

The MEDU consists of a truck mounted with an essential oil distillation unit having a capacity to distil two-quintal raw material per batch. The system has a built-in furnace, water-head tanks, transfer pumps and a DG set. The distillation unit can be easily loaded and unloaded from the truck by a hydraulic system. Once the distillation unit is unloaded, the truck can be used for other purposes as well. The provision exists to distil the aromatic crops by different types of hydro-distillation techniques



such as water distillation, water-steam distillation and steam distillation. The unit produces good quality oil, which can fetch higher price in the market. The whole system is very light in weight and innovatively designed to suit the requirements of the farmers.

Presently, a majority of farmers in the hilly region are selling their harvest as a raw material and getting low returns. The MEDU would facilitate in processing their crop at the site and result in value addition to their raw material giving higher returns.

New NMR Technique for Estimating Free Fatty Acids

The Free Fatty Acid (FFA) content of feedstocks is an important quality parameter for biodiesel, which is produced by transesterification of vegetable oils or animal fat. Biodiesel fuel standards limit the amount of FFA (by limiting the acid number) in the final product, as their presence can lead to significant operational problems.

Darbha Srinivas and his group at the National Chemical Laboratory (NCL), Pune have been working on producing biodiesel from various feedstocks over solid catalysts. Estimation of FFA content becomes more important especially in the case of low-grade biodiesel feedstocks. A new ^1H NMR method, which is simple, fast and non-destructive, has been developed for the quantification of FFA.

Conventionally, the FFA content is determined by acid-base titration method. This method is dependent on a visual end-point, which is difficult to observe, particularly with dark-colored, non-edible oils. Several instrumental methods including potentiometry, pH metry, chromatography (GC and HPLC), colorimetric ultra-micro method, FTIR and near IR have been reported as alternative to the conventional method of determination of FFA.

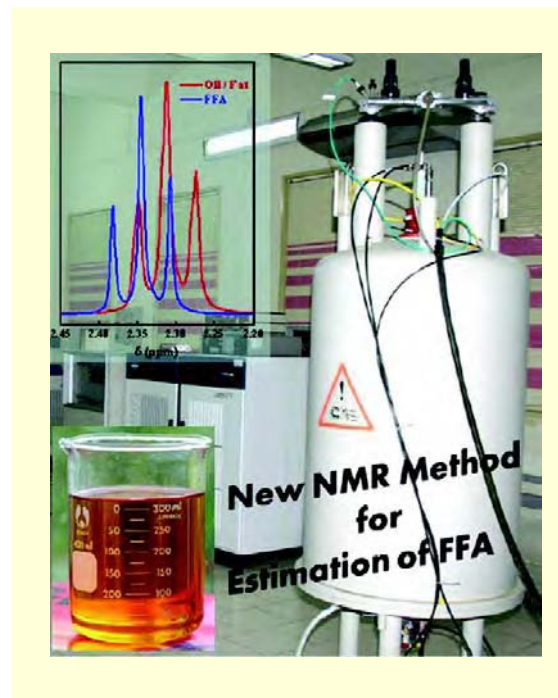
A drawback of some of these methods is that a chemical modification of the sample is often necessary for analysis. The NMR method, on the other hand, is versatile and requires only a small amount of the sample. It can also

be used as an *in-situ* tool to monitor the esterification reaction of FFA to biodiesel.

Although GC and HPLC are more sensitive techniques than NMR, the latter is a rapid and easy method to use than the former. The area of the NMR peak depends mainly on the number of protons and not on their response factor. Each and every component of FFA in the sample has different response factor which needs to be pre-determined and used in the quantitative determination by the chromatographic techniques. Such laborious processes can be eliminated in the case of NMR detection. NMR is, therefore, more suited for quantification as compared to chromatographic methods such as GC and HPLC.

According to Dr Srinivas, this method of quantification is valid irrespective of the type of FFA present in oils and biodiesel. Non-edible oils and fats often contain significant amounts of phospholipids and other acidic impurities along with the FFAs. While the titrimetric method determines the total (gross) acid value in oils and fats, ^1H NMR detects the FFA content exclusively.

^1H NMR determines the FFA in non-edible oils, fats and biodiesel more accurately than the titrimetric method.



Control experiments have revealed that ^1H NMR can detect FFA as low as 0.5 wt%. In the case of refined edible oils (wherein the other acidic impurities are negligible), the results obtained from the ^1H NMR method are comparable with those obtained from the titrimetric analysis.

FFA determination is not only important for biodiesel industry but is a quick and reliable method that is desirable in the food industry as well.

(For further reading: Jitendra K.; Satyarthi, D.; Srinivas, and Paul Ratnasamy, Estimation of Free Fatty Acid Content in Oils, Fats, and Biodiesel by ^1H NMR Spectroscopy, *Energy & Fuels*, 2009, 24, 2273–2277).



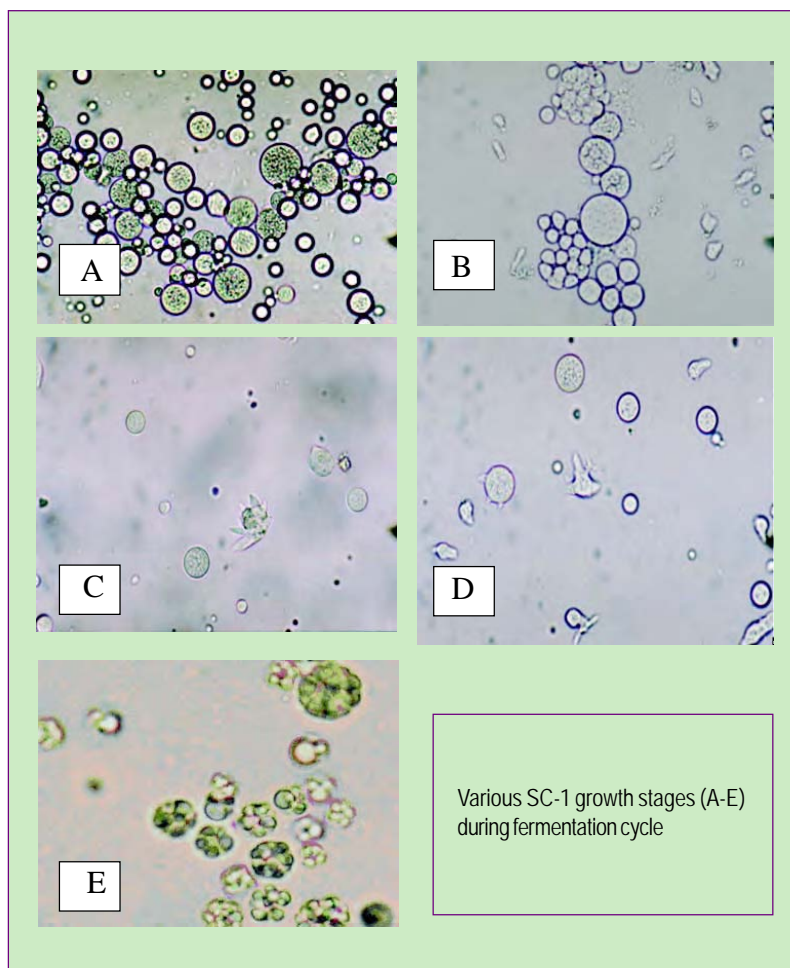
CSIR Team Transfers the DHA Fermentation Technology

CSIR NMITLI team, National Institute of Oceanography (NIO) Goa, Indian Institute of Integrative Medicine (IIIM) Jammu and Indian Institute of Chemical Technology (IICT) Hyderabad developed a fermentation technology for Docosahexaenoic Acid (DHA) production using sea-isolated microbial organism, which acts as an alternative to fish source (*CSIR News*, Vol.60, No.5 & 6, March 2010).

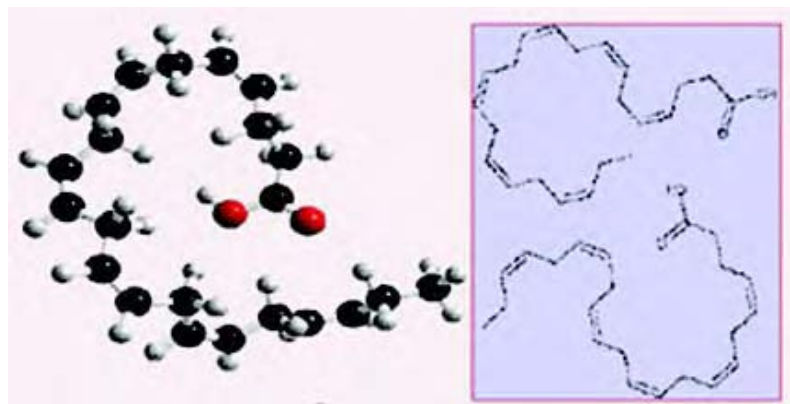
The National Institute of Oceanography (NIO) Goa was responsible for the isolation and identification of single-celled protists, Thraustochytrid named SC-1 from sea, while the qualitative analysis for the presence of lipids and oils samples was done by scientists at the Indian Institute of Chemical Technology (IICT), Hyderabad. Indian Institute of Integrative Medicine (IIIM) Jammu, the nodal Institute of CSIR team, was entrusted with the responsibility for developing the fermentation process in various volume fermentors for mass cultivation of Thraustochytrids (SC-1) under controlled conditions along with its down stream processing.

The fermentation process has been developed in such a manner that this marine organism can now produce DHA up to 45% of its total lipids contents in normal salt conditions. This process for the production of DHA was demonstrated to the industry at IIIM, Jammu in December 2009 using 50L volume fermentors as per the agreement signed between CSIR, New Delhi and M/s Avesthagen Pvt. Ltd, Bangalore.

The industry was provided all technical details as per the agreement: Detailed standard operation protocols (SOP) for culturing the SC-1, fermentation process in detail, down stream processing (total lipids extraction using food grade solvents, and quality analysis details of lipids by GCL method). The M/s Avesthagen Pvt Ltd, Bangalore will pay Rs 150 lacs to CSIR team as technology transfer fee in three instalments.



Docosahexaenoic Acid (DHA): Chemical structure (*right*) and 3D model structure (*left*)



DHA (C₂₂H₃₂O₂)



MNRE Meeting on *National Policy for Geothermal Energy*

A meeting of the Core Group for formulating guidelines for a National Policy on Geothermal Energy in India, constituted by the Ministry of New and Renewable Energy (MNRE), Government of India was held at the National Geophysical Research Institute (NGRI), Hyderabad on 10 May 2010. The meeting was convened by Dr. Sukanta Roy, Coordinator of the Core Group. Representatives from MNRE (Dr R. N. Sawant), NGRI (Dr. Sukanta Roy and Dr T. Harinarayana), GSI (Shri P. B. Sarolkar), Thermax Limited (Shri D.W. Bapat) and Tata Power (Shri Abhishek Kulkarni) participated in the discussions.

Dr Y. J. Bhaskar Rao, Director, NGRI welcomed the members. He stressed the need for undertaking data generation as a national endeavour, to use our own expertise wherever possible, and identify technologies that we need to import from other countries. Dr R. N. Sawant, Director of MNRE explained the objectives of the meeting and the need to have a National Policy on Geothermal Energy in India. He mentioned that this meeting is a subset of a larger initiative of the Ministry to assess the overall status with respect to exploration and exploitation scenario in the country, and to make specific recommendations towards identification of priority areas in exploitation and capacity building. A draft document was compiled during the meeting, which was circulated to all members for further refinement before finalization.

DNA Clubs Inaugurated at NEIST Substation Lamphelpat, Manipur



A view of the meeting in progress

North East Institute of Science and Technology (NEIST)-CSIR, Substation Lamphelpat, Imphal, Manipur organized the Inaugural Function of the DNA club for 37 Schools on 17 July 2010. The event was sponsored by the Department of Biotechnology, Govt. of India. The objective of the Inauguration/Coordinator's Meeting was to create awareness about the DNA Program and its implementation. The Project involves deeper awareness about bioresources, and enthusing students about the role of biotechnology in sustainable utilization, especially in the North-East region.

A total of 57 schools have been selected for this Project, out of which 37 schools were invited to attend the Inaugural Function. Dr. H. B. Singh welcomed the gathering and presented the overall program of the DNA club to be conducted. He gave the profile of the activities to be covered along with their time limits. He stressed on the responsibility of the coordinators in implementing the program.

The Guest of Honour, Dr. N. C. Talukdar, Director-in-Charge, IBSD, Imphal stressed on the importance of the biodiversity in the North-East as a whole and its importance in the DNA club program. Prof. H. Nandakumar Singh, Pro-Vice-Chancellor and the Chief Guest of the Function stressed on the law of Nature to protect the environment and ecosystem as a whole, which is only possible by the conservation of our forest resources. For this, the coordinators of the DNA Club along with the school students need to play an important role.

Dr. B. G. Unni, Scientist G & Area Coordinator (Biotechnology/Biological Sciences) presided over the Function. Dr. Unni informed, in brief, about the various activities undertaken by CSIR-NEIST, Jorhat through the Substation at Imphal, Manipur. The DNA club is one of the activities for the school teachers and students. He said that the main objective of the DNA club is to motivate the students to take up science in their academic career, while making them



aware about the recent developments in Science & Technology. Dr. B. G. Unni, Director's Nominee for the DNA club and Local Advisory Committee member appreciated the efforts made by Dr. H. B. Singh, at NEIST substation Lamphelpat and his team for organizing the Inaugural Function. The vote of thanks was given by Dr. Alka Jain, NEIST, Imphal.

An Interaction Program was also conducted among the Advisory Committee members and the Fellow co-coordinator from TERI Guwahati with the coordinating teachers from different schools. Dr. S. K. Sinha, Fellow and Coordinator of the Project spoke about the program and interacted with all coordinators. The coordinators from different schools actively participated in

the interactive session during which their doubts were cleared by Dr. B. G. Unni, NEIST, Jorhat, Prof. H. Nandiram Sharma, Prof. B. Manihar Sharma, Manipur University, Dr. H. B. Singh, NEIST, substation Lamphelpat, and Th. Surendranath Singh, Executive Director MASTEC, Imphal. This event was held as a part of the Golden Jubilee Celebrations of NEIST, Jorhat.

Workshop on *Recent Progress in Heat and Fluid Flow Research at NAL*

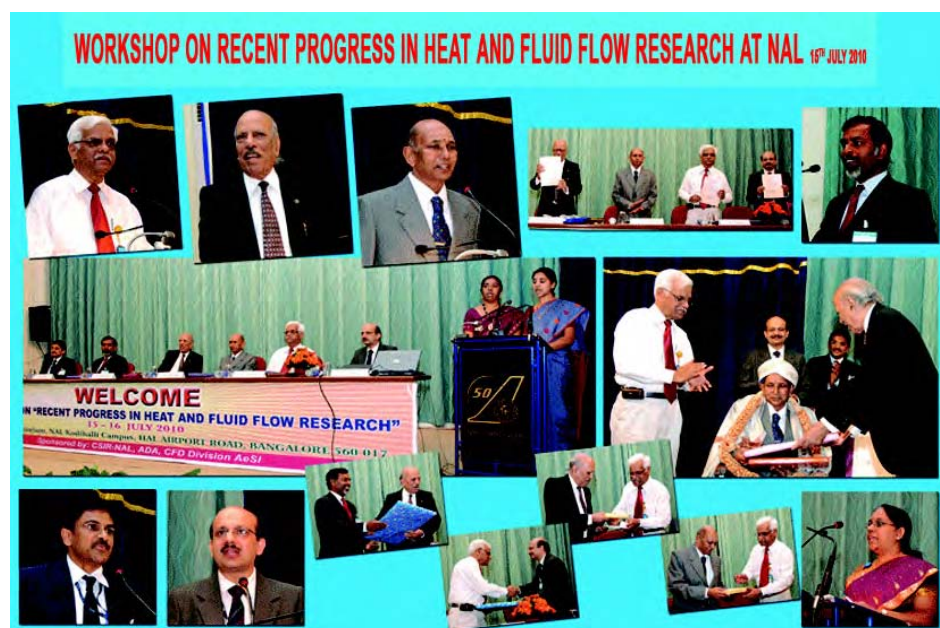
A Workshop on *Recent Progress in Heat and Fluid Flow Research* was organized at NAL, Bangalore during 15-16 July 2010. This Workshop was organized to celebrate the 70th Birthday of Prof. K. N. Seetharamu by his former students and colleagues, and was partly sponsored by CSIR-NAL, ADA, and the CFD Division of the Aeronautical Society of India.

Prof. Seetharamu is a world renowned expert in the finite element method applied to heat transfer problems. He was a Professor in the Department of Mechanical Engineering, Indian Institute of Technology, Chennai, and subsequently taught in Universiti Sains Malaysia. Presently, he is a Professor in the PES Institute of Technology, Bangalore.

The Inaugural Session of the Workshop was Chaired by Dr. A. R. Upadhy, Director NAL. The Chief Guest for the function was Prof. A. Ramachandran, a pioneer in heat transfer research in India. Prof. Ramachandran has held many important positions during his career including

Under-Secretary General and Executive Director of the United Nations Centre for Human Settlements, Director General of CSIR, Secretary Department of Science & Technology, and Director of IIT Chennai. Prof. Seetharamu was felicitated by Prof. Ramachandran and Dr. Upadhy. Prof. Nithiarasu made a brief presentation on the achievements of Prof. Seetharamu during his long career.

In his remarks, Dr. Upadhy discussed the importance of heat transfer in all areas of engineering, with special emphasis on applications in aerospace engineering. Subsequently, he also described NAL's research activities on heat transfer. Prof. Ramachandran, in his excellent address to the delegates, first outlined the history of heat transfer research activities in the country and then eloquently discussed some of the





major challenges facing the country in the future in providing affordable food, shelter and energy to all. These are national challenges where extensive efforts in science & technology development are required.

The Workshop consisted of invited presentations in the area of heat transfer and fluid flow and covered a very wide range of research areas, emphasizing the wide-ranging importance and applications of this area. Prof. N. Siva Prasad, IIT Chennai, described the finite element modelling of arc welding, while Prof. Pradip Dutta, IISc Bangalore, discussed the modelling of binary alloy dendritic growth. Prof. C. C. B. Sobhan, NIT Calicut, delivered an interesting talk on heat transfer in micro- and nano-channels, and Prof. Anantha Suresh of

IISc Bangalore talked about electro-thermal micro-actuators.

Atmospheric applications were covered by Prof. C. Balaji, IIT Chennai, who talked about rainfall modelling. Applications to aerospace were described by Dr. K. P. Singh, ADA, who gave examples from the Tejas programme, and Dr. V. Krishnamoorthy, NAL (Retd.), who described the work done at NAL on heat transfer in cooling passages of turbomachinery.

The second day of the Workshop saw presentations on control of bluff body flows by Prof. B. S. V. Prasad Patnaik, IIT Chennai. The extremely complex area of bio-medical simulations and its challenges were described by Prof. P. Nithiarasu, Swansea University,

UK. Mr. S. L. Beh, a faculty member in the Multimedia University Malaysia, delivered a talk on his Doctoral research programme in the simulation of micro-channel heat sinks. The final invited talk in the Workshop, by Dr. C. Ranganayakulu, ADA, described the development of heat transfer coefficient and friction factor correlations for offset fins using simulation techniques.

The Workshop was attended by a large number of former students and colleagues of Prof. Seetharamu, including a few from Malaysia, and gave them a unique opportunity to interact and discuss their research activities. There were also some participants from NAL and ADA, who took advantage of this unique opportunity to listen to the distinguished speakers.

Workshop on *Diversifying Floriculture at NBRI, Lucknow*

Developing new varieties, standardization of propagation protocols and agro-technologies for commercial cultivation, providing authentic planting materials, popularization of floricultural crops by setting up demonstration plots and organization of training courses are some of the NBRI priorities in the field of floriculture. Commercial cultivation of *Gladiolus* for the production of cut-flowers in the North Indian plains is an outcome of well articulated lab-to-land programme on rural development taken up by NBRI.



Shri R. K. Tomer, Nodal Officer, DASP addressing to the UPDASP officials, farmers and entrepreneurs. Sitting on the dais from left are: Dr. S. K. Tewari and Dr. P. Nath

Keeping line with the above contributions to floriculture and widening the arena of floriculture crops for their commercial exploitation, the Institute has taken a new initiative for cut-flower

production of *Gerbera* in Poly-House. *Gerbera* is one of the ten most popular commercial cut flowers in the world. The blooms are attractive, suitable for any type of floral arrangement and are available in different shades and hues. The cut flowers have a long vase-life, which fetches premium market prices.

For introducing *Gerbera* in Uttar Pradesh for diversification of floriculture and uplifting economic conditions of the farmers, NBRI organized a one-day Workshop on *Diversifying Floriculture in U.P.* on 29 June 2010 at NBRI, Lucknow. The



Workshop was sponsored by the Horticulture Component of World Bank funded Diversified Agriculture Support Project (DASP). The main objective of the Workshop was identifying beneficiaries from potentially favourable districts and drawing a roadmap for commercialization of diversified floricultural activities in U.P., specially protected cultivation of *Gerbera* in poly-houses under NBRI's technical guidance/collaboration.

The Workshop was inaugurated by Dr. P. Nath, Scientist G in presence of Dr. S. K. Tewari, scientist and PI of the project, Dr. R. K. Tomer, Nodal Officer of DASP (Horticulture Component) and Dr. Hari Singh of National Horticulture Board. Dr. S. K. Tewari, spoke on the genesis and objectives of the Workshop and possible areas of S&T collaboration between NBRI, farmers, entrepreneurs and financial institutions. Dr. Parvendra Nath, senior-most Scientist, NBRI in his Welcome Address spoke on the global importance of floriculture industry. He highlighted the current progress of work being carried out by NBRI in the diversification of floriculture activities.

Dr. B. K. Banerji, Dr. R. K. Roy, Dr. Pratibha Misra, and scientists of NBRI along with other experts from financing institutions and poly-house/floriculture industry delivered lectures on various aspects of *Gerbera* farming and also participated in the open house discussion. The Workshop was attended by UPDASP officials, farmers and entrepreneurs from various districts of U.P. On this occasion, a poster exhibition of NBRI's rural development activities was also arranged for the participants.

Motivational Programme for Talented School Students at NEIST, Jorhat

With an objective to attract and motivate students for taking up science as a career, NEIST, Jorhat conducted a week-long motivational programme for talented school students of NE region during 26-31 July 2010. A total of 41 enthusiastic science students of higher secondary level along with their escorting teachers from different schools of NE states (except Manipur, Arunachal Pradesh and Sikkim) participated in the Programme. The Inaugural Function of the Programme was held at the Auditorium where, apart from NEIST fraternity and the participating students, Dr. K. K. Dwivedi, Head, NCSTC, DST, Govt. of India and Ms. Indu B. Puri, Senior Scientist, NCSTC were also present.



Dr. K. K. Dwivedi, Head, NCSTC addressing the students at the Inaugural Function

Presiding over the Inaugural function, Dr. P. G. Rao, Director, NEIST, gave a warm welcome to the students and the invited guests from NCSTC. He cited the various opportunities and benefits that the students can obtain from the programme for which he encouraged them to take the full advantage.

In his speech, the Chief Guest, Dr Dwivedi, expressed his happiness for being in the midst of such brilliant students who have been specially selected for the Programme. He spoke about the wonders that science can do to human life and urged upon them to take up research in science as a career. As a special invitee, Dr. B. G. Unni gave



NEIST scientists demonstrating scientific experiments and interacting with participating students



a brief insight about the idea behind organizing such a Programme and advised the students to imbibe the spirit of science.

Dr. P. C. Neog, Principal Coordinator, detailed about the scope of this type of Programme and its impact among the students of NE region. He informed that three more of such Programmes are being planned to be executed soon. Dr Dwivedi also released a brochure on the Motivation Programme. Later, the students were taken round the laboratory where NEIST scientists demonstrated many scientific experiments. The students were divided into various groups and allotted project work under different disciplines with separate scientist guides.

As a part of the Programme, Ms. Indu B. Puri, Senior Scientist, NCSTC delivered a lecture on *Career Development* where she spoke about the various schemes of NCSTC for school students and the many scholarships awarded by the Govt. of India for meritorious students. She also gave an overview of the premier/best Institutes in India where students can opt for their higher studies.

Dr. Kishore Kr. Barua, Technical Officer from the Dept. of Physics, Tezpur University and Dr. D. K. Dutta, Scientist, NEIST also delivered popular science talks. Besides, the students also visited Tocklai Experimental Station, Jorhat, Assam Agricultural University, Jorhat and various biosphere spots and ancient engineering heritage sites at Sivasagar. Some special highlights of the Programme included an elocution competition and a cultural evening programme held at Megha Resort, Jorhat.

HRDC Training Programme on *Research Methodology and Communication Skills*



Dr. Samir K. Brahmachari, DG, CSIR, interacting with the participating engineers. Seated on the dais (*on right*) is Dr. Gangan Prathap, Director, NISCAIR, and (*on left*), Dr. Nagin Chand, and Dr. Manu Saxena, scientists at HRDC

Human Resource Development Centre (HRDC), Ghaziabad, the central training establishment of CSIR, organized from 6-13 June 2010 an intensive Training Programme on “*Research Methodology and Communication skills*” for the Quick Hire Scientist trainees recruited in various CSIR institutions under its ambitious and futuristic scheme — the Post-Graduate Research Programme in Engineering (PGRPE).

This PGRPE Programme launched in August 2009 has been conceptualized and planned as a follow-up of the strong-felt need for inducting engineers into the research stream of various engineering laboratories of CSIR. The Programme is open to the engineering students graduating from various engineering colleges across India. Out of several thousand applicants, only a handful was selected by rigorous selection criteria by eight CSIR institutions, namely, CEERI, CMERI, CSIO, IIP, IMMT, NAL,

NEERI, and SERC in niche engineering domains. Of the various training modules to be studied by these scientist trainees, HRDC was chosen to plan and deliver the module on *Research Methodology and Communication skills* using a judicious mix of pedagogy and case studies.

The Training Programme exposed 51 participants/young recruits to the vision, mission, goals and work culture in CSIR; and S&T Scenario and Planning in India to align participants with CSIR and to see the S&T developments in a wider perspective. The exposure to creativity and out-of-box thinking made them pause and look at problems with completely new and crazy angles to come out with innovative solutions.

The session on Project Planning and PERT/CPM gave them a sound basis of the importance and advantages of time management in a systematic and scientific manner to realize project goals.



TRAINING PROGRAMMES/FOUNDATION DAY CELEBRATIONS

The sessions on IPR and ‘Searching’ scientific information gave them a clear understanding of private goods, their importance, and how to utilize this information in project formulation and planning for innovations and the role of searching the existing databases and literature for a desired output or outcome.

These sessions were in addition to the main Research Methodology and Communication modules. In the former, the relationship between empirical research and statistics was discussed followed by exploratory data analysis, planning of experiments, correlation and regression, inferencing, ANOVA, factorial experiments, categorical data analysis and response surface methodology.

The participants showed keen interest in the topics discussed. In the domain of communication, they were exposed to popular science writing,



Dr Samir K. Brahmachari, DG CSIR, responding to a point raised by a scientist trainee. The concerned coordinator is standing in the active follow-up

effective S&T presentation, language and style in scientific writing, and then how to write and publish a research paper. There was a key presentation on “*Methods of Science*” by Dr. Gangan Prathap, Director, NISCAIR, who was described as ‘role model’ by the DG for the participating engineers.

On the concluding day, the Director General, CSIR Dr. Samir K. Brahmachari interacted with the participants and obtained feedback first-hand. The DG expressed his satisfaction the way PGRPE was shaping up and

he provided on-the-spot solutions to the problems faced and as raised by the participants requiring immediate attention. The DG delivered a highly inspiring and motivating talk with personal touch and dwelt on the genesis of this particular initiative. He shared the secrets of mastery in creating world-class research and leadership in cutting-edge research domains.

The participating scientist trainee engineers and the PGRPE coordinators appreciated HRDC’s organizational acumen, so deeply reflected in the planning and selection of course contents, selection and organizing the faculty and delivery. It was felt that this module should not only be offered at the end of first semester but should be of longer duration and have greater emphasis on statistical methods in research and more of practice sessions in written communication. This programme has now been institutionalized in HRDC’s annual training calendar.

IICB Celebrated its 54th Foundation Day

The Indian Institute of Chemical Biology (IICB), Kolkata, celebrated the 54th Foundation Day on 23 April 2010 at its premises. Prof. Indranil Manna, Director, Central Glass & Ceramic Research Institute, (CGCRI), Kolkata, was present on the occasion as the Chief Guest. Prof. Kanury V. S. Rao, Senior Scientist & Head, Immunology Group, International Centre for Genetic Engineering & Biotechnology, (ICGEB), New Delhi delivered the 22nd Dr. J. C. Ray Memorial Oration. Prof. Siddhartha

Roy, Director, IICB presided over the function.

After the traditional lighting of the lamp, Prof. Roy, in his Welcome Address described the occasion as a very special one. He apprised the audience that IICB is going to start many new projects. The Synthetic



Foundation Day Celebration at IICB. Seated on dais (from left) are: Dr. T. K. Dhar, Prof. K. V. S. Rao, Prof. I. Manna, Prof. S. Roy, and Mr. S. Dey



Biology Project has just been approved and is going to be a major Flagship programme. He stressed that IICB Infrastructure continues to be upgraded. The construction of Salt Lake campus had been started and hopefully it would be ready by April 2011.

Dr. Roy also mentioned that IICB has received the approval of DG, CSIR for expansion of space in IICB campus including a modern animal house, isolated from the main building. Besides, DG, CSIR has also approved the construction of a ten-storied modern building as students' hostel with international standard of amenities. He added that the West Bengal Govt. has also recently allotted 22 acres of land for CSIR at Baruipur, near Kolkata and IICB is planning to have a Translational Research Centre there as part of Knowledge Hub. In the end, Dr. Roy extended his thanks to all his colleagues and students in IICB for their efforts and contributions to make the Institute a better place for all.

Dr. T. K. Dhar, Scientist and Chairman, Organizing Committee presented a brief history of IICB, its

development and contributions towards mankind. He mentioned that IICB is engaged in almost every aspect of health science and different studies are in progress. Prof. Manna, the Chief Guest, in his Inaugural Address mentioned that IICB has a very illustrious history in biomedical research. In the early days it was a leading Institute for tropical diseases with a mandate to serve the common people of India. During the years, IICB has undergone a tremendous evolution in its research activities and is now poised for a major breakthrough with the immense talents that it has. He further added that CSIR itself today is poised for a change and the mandate it holds is a New CSIR.

CSIR is committed to lead the nation in healthcare, engineering, energy, defence and space exploration "In addition to serving the nation through different sectors, CSIR also needs to provide solutions in strategic areas", he added. "The ultimate goal is always to provide a better service to the nation". Prof. Manna emphasized on stronger correlation and co-ordination among the CSIR labs to achieve the goal faster.

Prof. K. V. S. Rao presented his Dr. J. C. Ray Memorial Oration entitled "*Defining Host-Pathogen Interactions Through Genome Wide-Screen and Alternate Approach to Drug Target Discovery*". The lecture was very informative and interesting. The focus of the topic was *Mycobacterium tuberculosis* (MTb). He discussed about the problems associated with developing new therapeutic strategies for MTb. His valuable work was to overcome these problems by disabling the successful integration of the pathogen with the



Prof. K. V. S. Rao delivering the Dr. J. C. Ray Memorial Lecture

intracellular machinery of the host cell. The objective of Prof Rao's work has been to identify the components of host intracellular machinery that regulate survival of the pathogen and the approach was to deplete individual host-specific molecules from an infected cell and then monitor the consequences on pathogen survival.

The employees of IICB who had completed 35 years of service in IICB/CSIR were honoured by presenting memento to them. Scientists of IICB were also honoured with mementos for their national recognition in the period 2009-10, for their achievements or contributions in science. Students, who were awarded their Ph.D. degrees during 2009-10, were felicitated by the Chief Guest with mementos. The best three Ph.D. theses submitted during 2009-10 and best three Ph.D. course work performers in the previous year were also awarded. The Function was graced by invited guests, distinguished scientists, employees, ex-colleagues and students. The Function ended with the vote of thanks followed by a cultural programme.



Prof. Indranil Manna delivering the Inaugural Lecture



Foundation Day Celebrations at IHBT, Palampur

On June 7, the Institute of Himalayan Bioresource Technology, (IHBT), Palampur, celebrated its 28th Foundation Day. In the forenoon session a lecture was delivered by Dr. Bal Ram Singh, Director, Botulinum Research Centre, University of Massachusetts, Dartmouth on the topic entitled, *Botulinum Neurotoxin vs Neuromedicine – Basic and Applied Research*.

The main function was organized in the afternoon at IHBT auditorium. Dr P. S. Ahuja, Director, IHBT extended a warm welcome to the guests and presented a brief account of the R&D achievements during the bygone year. He revealed that with strategic vision, IHBT has established ecological experimental plots in the Himalayan zone for better understanding on the chronology of major plant phenological events. In a major initiative, an arboretum, botanical garden and a conservatory on Pteridophytes was launched.

Dr Ahuja informed that environmentally benign methodologies have been developed at the Institute in the areas of fertilizers, pesticides etc. In green chemistry, new methodologies were developed for bioactive molecule synthesis. Dr. Ahuja also apprised the audience that with focus on the cold deserts of western Himalayan regions, carrier based plant growth promoting microbial inoculants have been licensed for commercial production to



A dais view of the Foundation Day Function

M/s Multiplex Biotech Ltd, Bangalore.

In another venture, a 10 TPA production unit was established with M/s Jallan Trini-Tea Processing (P) Ltd., Gurgaon for the production of steviosides on a turn-key basis. Breeding for improvement of steviol glycoside content was launched both by conventional and non-conventional methods.

A CSIR-NIF collaborative programme was initiated for scientific validation and value addition of rural innovations in order to encourage local traditions. Also, in a network mode with 17 institutes under the CSIR 800-RSWNET programme, activities have been now strengthened for dissemination of rural-based CSIR technologies in rural areas. He highlighted that IHBT scientists also visited Ethiopia to train the

workers of Ethio-Agriceft on cultivation of medicinal and aromatic plants and tea husbandry.

Dr. Rajesh S. Gokhale, Director, IGIB, New Delhi delivered the Foundation Day Lecture on “*Synthetic Genomics Harnessing the Power of Genomics to Solve Global Challenges*”. Presiding over the function, Prof. K. L. Chopra, former Director, IIT Kharagpur, emphasized on the ethical issues in Science and Technology at national and international levels and ways to handle it. The Vote of Thanks was delivered by Dr. Anil Sood and the Function was coordinated by Dr. Aparna Maitra Pati.

The Function was attended by faculty and students of CSK HPKV, Palampur, and also the dignitaries from the regional stations of IVRI and IGFRI.



Golden Jubilee Celebrations at NEIST, Jorhat

Completing 49 years of dedicated service to Nation building, the North East Institute of Science & Technology (NEIST), formerly known as Regional Research Laboratory (RRL), Jorhat inaugurated the Golden Jubilee year celebration of the laboratory on 5 April 2010 at a grand function organized at its premises. The Function started with CSIR song presented by NEIST Research Scholars. Prof. Samir K. Brahmachari, Director General CSIR graced the occasion as the Chief Guest while others present on this momentous day included Directors of other CSIR laboratories, Directors of many research organizations, dignitaries from in and around Jorhat town, Vice Chancellors of NE universities, Principals of colleges, Press and media besides NEIST fraternity.

Welcoming the gathering, Dr. P. G. Rao, Director, NEIST extended a warm welcome to all. A slide presentation was presented by Dr. Rao, which depicted a brief journey of the five decades of NEIST. The celebration was then formally inaugurated by lighting of lamps by the Chief Guest and Directors of CSIR laboratories.

Prof. Brahmachari in his Inaugural Address expressed his happiness to be present at such a historical moment. He also further encouraged all the other CSIR Directors to study the possibilities and impossibilities of the region, and strive to bring the benefits of science & technology to the people at large.

To mark the momentous occasion the logo of the Golden Jubilee year celebration was launched as well as a Brochure on year-long programme,



Prof. Samir K. Brahmachari, Director General CSIR delivering the Inaugural Address

'Golden Jubilee Calendar of Events' (both in Hindi and English) was released by the Chief Guest.

Significantly enough, a few selected entrepreneurs who had ventured into setting up sustained business establishments based on NEIST technologies and services were honoured by the Chief Guest. They were namely, Mr S. K. Jain, Aroma India Pvt.

Ltd. and Boko, Kamrup and Mr Pranjal Baruah, Mushroom Development Foundation, Guwahati. Besides, herbal products of NEIST viz., anti-arthritis and anti-fungal products were also launched at the Function by the Chief Guest. Prof Samir Bhattacharyya, INSA Fellow, gave a brief insight about the significance and few success stories of these products during their trial process. Expressing pleasure to be a part of the Function, Dr. V. Prakash, Director, Central Food Technological Research Institute (CFTRI), Mysore and Dr. S. Sivaram, Director, National Chemical Laboratory (NCL), Pune, delivered few words of felicitation to the laboratory for the selfless service to the NE region and the country as a whole. As a token of love and appreciation, a Memento was presented to the Chief Guest after which the Function concluded with the Vote of Thanks by Dr. B. G. Unni, Scientist, NEIST.

Workshop on "Management of Intellectual Property Through Patents with Hands-on-Training on Patent Search and Analysis" organized at NEIST, Jorhat

As a part of the Golden Jubilee Celebration of NEIST, Jorhat and World Intellectual Property Day for the year 2010, a one-day Workshop on "Management of Intellectual Property Through Patents with Special Emphasis on Hands-on-Training on Patent Search and Analysis" was organized jointly with M/s Merit India Consultants Private Ltd., New Delhi at NEIST on 10 May 2010.

Dr. Rajendra Prasad, Chairman of M/s Merit India Consultants Private Ltd., New Delhi was the resource person to conduct the Workshop and provided the hands-on-training. Nearly 28 scientists of NEIST participated in this interactive Workshop-cum-Training Programme. The Programme was followed by a special lecture on "Global Trends in Patenting".



Commemoration of NCL Diamond Jubilee



The Hon'ble Prime Minister, Dr. Manmohan Singh inaugurating the Diamond Jubilee celebrations of the National Chemical Laboratory (*left*) and unveiling the NCL Diamond Jubilee Plaque (*right*)

National Chemical Laboratory (NCL), Pune, commemorated its Diamond Jubilee on 1 April 2010 by Dr. Manmohan Singh, the Hon'able Prime Minister of India and the President, CSIR unveiling the NCL Diamond Jubilee Plaque and by inaugurating and dedicating to the Nation Diamond Jubilee Polymers and Advanced Materials Research Laboratory. Dr Manmohan Singh also unveiled the Foundation Stone of Indian Institute of Science Education and Research (IISER), Pune. Shri K. Sankaranarayanan, Governor of Maharashtra presided over the Function.

Addressing the galaxy of distinguished personalities including CSIR-NCL scientists and students, Dr. Manmohan Singh highlighted the tradition of excellence in scientific research at NCL. He emphasized that NCL has had a lineage of distinguished leaders who have guided its destiny with great distinction. "NCL made seminal contribution to the emergence of Indian

pesticides industry which was critical to the success of the Green Revolution in our country," said the Hon'ble Prime Minister. "Post-1970, the research conducted at the National Chemical Laboratory gave birth to the Indian generic drug industry, a forerunner to the vibrant Indian pharmaceutical industry of today," he added. "More recently, this Laboratory has contributed to the growth of the petrochemicals, polymers and fine chemicals industry. With its world class facilities, it is my hope that the National Chemical Laboratory will sustain this culture of excellence and continue to explore the boundaries of frontier science," complemented the Hon'ble Prime Minister.

The Hon'able Prime Minister further said that it is our scientific capabilities that will determine our ability to overcome challenges which lie ahead in areas such as climate change, clean energy, environment friendly technologies, sound water management, affordable healthcare, food security, and biotechnology.

"Our Government has declared 2010-2020 as the *Decade of Innovations*. We need to instil the spirit of innovation in our young minds so that they can find solutions in a variety of areas to achieve the goal of inclusive and sustainable development. Innovators must be challenged to produce solutions our society needs" mentioned Dr. Singh.

Shri Prithviraj Chavan, Minister of State for S&T (IC) underlining the contributions of CSIR-NCL said that the laboratory has been a pioneer in India's scientific march. "It has a proven record of leadership in terms of all indicators, namely, quality of science, number of publications, number of Ph.D. students, industry interactions, and technologies successfully transferred to industry," said the Hon'able Minister.

Applauding the NCL scientists, the Hon'able Minister said that as many as six NCL scientists have been honoured with Padma Awards, 25 scientists have been elected to the prestigious Indian National Science Academy and 14 scientists have won the Bhatnagar



Prize. Shri Prithviraj Chavan, emphasized that NCL has an excellent record of close cooperation with industry, and it has been responsible for birth of several industries such as pesticides, generic drugs, catalytic processes, plant tissue culture and biotechnology.

Prof. Samir K. Brahmachari, Director General, CSIR while giving introductory remarks applauded the vision of Pandit Jawaharlal Nehru, who, even in the early days of India's Independence, put his faith in national development using science and technology. It was this faith that led to the inauguration of NCL in 1950. While celebrating 60 glorious years of NCL, Prof. Brahmachari reminded the audience the words of Pandit Nehru, "*Time is not measured by passing of years but by what one does, what one feels, and what one achieves*". "Sixty years down the road, I feel proud, as DG-CSIR, to say that CSIR-NCL has more than fulfilled our nation's expectations," said Prof. Samir K. Brahmachari.

Dr. S. Sivaram, Director, CSIR-NCL in his welcome remarks said that the history and growth of NCL has been inextricably linked to the growth and progress of our nation. "We are proud of our legacy, the culture of scientific excellence that pervades every corner of this Laboratory. As we rejoice in our past, we are conscious of the great expectations that this country has from us. On this solemn occasion we rededicate ourselves to the task of building India of the future," said Dr. Sivaram.

Coinciding with the commemoration of Diamond Jubilee of NCL, a CSIR exhibition on '*Touching Lives in a Million Forms*' was organized on 2-3 April 2010. The exhibition which was open to the general public was inaugurated by Prof. Samir Brahmachari, DG CSIR on 1 April 2010. About one hundred exhibits from NCL, NCL-Innovations, URDIP as well as other CSIR labs, including CSIR HQ were displayed at NCL Innovation Park.

The exhibits covered historic perspectives and the journey of 60 years of NCL, its current activities as well as major contributions to basic science, industry and society by CSIR labs, in general, and NCL, in particular. Posters, models, and products were displayed depicting the CSIR achievements in the area of affordable health, affordable housing, provisioning potable water, sustainable energy, empowering farmers, empowering industry, waste to wealth, lead programmes such as CSIR-OSDD, CSIR 800, TKDL, Soleckshaw tricycle, human resource, intellectual property rights, etc. About 3000 visitors including students, teachers, and faculties from various colleges and Universities visited the exhibition.

Dr. S. R. Wate Takes Over as Director, NEERI

Dr. S. R. Wate has taken over as Director of National Environmental Engineering Research Institute (NEERI), Nagpur with effect from 6 August 2010. Prior to his becoming Director, NEERI, Dr. Wate was working as Scientist 'G' and Head, Environmental Impact and Risk Assessment Division, NEERI, Nagpur.



Dr. Wate (born 22 December 1955) did his M.Sc. Ph.D. in Biochemistry from Nagpur University. His R&D activities related to environmental biotechnology were largely devoted to the application of metabolic activities of microorganisms to solve various environmental problems in the country. He was involved in various significant R&D activities such as biogas production from renewable resource, biodegradation of oil sludge and recovery of hydrocarbons, development and application of a biosensor for environmental monitoring, development of biochemical processes for treatment of wastewaters from petroleum industry, decolourization of azo dyes using microbial consortium, development of molecular imprinting polymers for detection of polynuclear aromatic hydrocarbons and development of novel organo-lanthanide materials for environmental applications.

Dr. Wate has significantly contributed in designing and developing water safety plans with recourse to quantitative chemical and microbial risk assessment, grey water recycle plants in rural areas, wastewater treatment-cum-recycle systems for oil containing wastewaters and assimilative capacity based standards for discharge of treated wastewaters in Amlakhadi.

Dr. Wate has pioneered various projects related to environmental impact and risk assessment studies in India and abroad. These studies involved various industries such as petroleum, mining, fertilizer, sugar



and distilleries, leather, pulp and paper, thermal power plants, oil refineries, iron and steel, aluminum, copper, zinc, pharmaceutical, etc. He has also been involved in the major projects such as *Sethusamudram Ship Channel Project* and *Kalpasar Project*.

By providing coastal and marine environment management plans and carrying capacity based development planning to the environmental regulatory authorities, Dr. Wate has consequently helped in formulation of new environmental policies in India for such regions. He has coordinated several R&D and consultancy projects funded by The World Bank, UNDP, ADB, UNEP, WHO, Ministry of Environment and Forests, Department of Biotechnology, Department of Science and Technology, Pollution Control Boards, Public Sector Industries and Multi-National Private Sector Industries. He has been World Bank Consultant on EIA to Philippines Government.

Dr. Wate has published 51 research papers in international SCI journals, 31 in National peer reviewed journals and presented 121 papers in International/National conferences. He has two patents to his credit. He has authored more than 590 technical reports of major developmental projects in industry and infrastructure sector, and basic and applied R&D. He has also contributed to the contents of nine books.

Dr. Wate has been a WHO Fellow for assessment of water supply and sewage treatment practices in developing countries. He has many such honours and academic distinctions to his credit. He has also visited many countries in connection with various R&D and consultancy projects.

CSIR Scientists Honoured with National Mineral Awards

Three scientists of NGRI, Dr. Ajay Manglik, Dr. Sukanta Roy and Dr. V. Chakravarthi; and Dr. Sridevi Jade, scientist, C-MMACS received the National Mineral Awards, which were presented in the recent past, by . Shri B. K. Handique, Hon'ble Minister for Mines & DoNER, Government of India. The Award carries a cash prize, trophy, certificate and citation.

Dr. Ajay Manglik received the Award for his contributions in the field of applied geophysics towards understanding the tectonics of the Indian plate and underlying mantle dynamics and for development of tools for multi-parametric joint inversion of geophysical data. His studies on quantification of heat and mass transport processes in continental lithosphere through integration of crustal seismic velocity, electrical resistivity and density structure, heat flow and seismicity have provided useful insights into the thermo-mechanical state and tectonics of the Indian shield. His work on the development of joint inversion tools integrating seismic and electromagnetic methods has a significant impact on exploration geophysics.



Dr. Sukanta Roy received the Award for his contributions in the area of geothermal studies. Dr. Roy, who leads the Geothermal group of NGRI made significant contributions that led to advancements in understanding the thermal state of the Indian lithosphere and characterization of its geothermal energy potential. Through acquisition of extensive geothermal datasets and adoption of innovative interpretation strategies, he has characterized the deep thermal regimes in Deccan Trap, Aravalli, Dharwar and Southern Granulite terrains, generated new models for the source of heat of geothermal springs in the Indian shield leading to re-assessment of their geothermal energy potential. He has also built a record of past climate changes in India by exploiting the potential of geothermal observations. Geothermal investigations initiated by him for assessing the temperature regime along proposed tunnel segments in the Himalayas have opened up a new engineering application in India, having immense potential for upcoming hydro-power plants.





Dr. V. Chakravarthi received the Award for his many outstanding contributions in both theoretical and experimental geophysical research. He applied geophysical modeling techniques for mineral and hydrocarbon explorations, and also in identifying subsurface geological structures in both on-shore and off-shore regions in India. His algorithms were recognized in the form of high impact International Journals and International Patent. His US Patent entitled, “*Digitally Implemented Method for Automatic Optimization of Gravity Fields Obtained From Three-Dimensional Density Interfaces Using Depth Dependent Density*” in the year 2003, is the first US patent granted to NGRI.



Dr. Sridevi Jade, Scientist, Centre for Mathematical Modelling and Computer Simulation (C-MMACS), Bangalore was awarded National Mineral Award 2008 by the Ministry of Mines in recognition of her significant contribution in the field of Disaster Management, which included GPS based research studies in Indian subcontinent related to the understanding of earthquake Hazard under the Applied Geosciences discipline.



Dr. Jade has made extraordinary contributions in hazard mitigation projects for the past 21 years at CSIR. She has been extensively involved in the development of GPS (Global Positioning System) geodesy in India, leading to several firsts in quantifying the kinematics of the Indian Plate. She had extensively worked in the GPS related research activities to determine the displacement and strain rate fields in some significant tectonic provinces of the Indian continent to determine their seismogenic potential.

Dr. Jade is also a recipient of Sir C. V. Raman Young Scientist Award 2002 in appreciation and recognition of her exceptional contribution to Earth Science.

Dr. S. Sivaram Honoured by Purdue University

Dr. Swaminathan Sivaram, Director, National Chemical Laboratory (NCL), Pune received a D.Sc. (h.c.) Degree from Purdue University, West Lafayette, Indiana, USA on 16 May 2010 in the Commencement Ceremonies held at the University Campus. The Honorary Degree is the highest Award Purdue can offer and recognizes distinguished service to the profession and great achievements in career and life.

Selected after intense scrutiny and approved by the Board of Trustees, Purdue Honorary Degree recipients constitute one of the most eminent groups in the world. The Award of the D.Sc. Degree to Dr. Sivaram was in recognition of his extraordinary achievements in polymer chemistry and bringing global recognition to India for its pre-eminence in polymer science and technology development. Dr. Sivaram is the 23rd recipient of the Honorary Degree from the Department of Chemistry, Purdue University and the second Indian to have received this coveted honor.

Dr. Sivaram received his Bachelor's Degree in Chemistry, Mathematics, and Physics from Madras University in 1965 and his Master's Degree from the Indian Institute of Technology, Kanpur. He received his Ph.D. degree in Chemistry from Purdue University in 1972. He was mentored by Professor Herbert C. Brown, Nobel Laureate in Chemistry, 1979. Following completion of his studies at Purdue, Dr. Sivaram spent two years at the University of Akron before returning to India and joining Indian Petrochemicals Corporation Limited for a 15-year tenure.

Dr Sivaram's contributions have many dimensions: Basic research in polymer chemistry, industrial R&D, technology development, commercialization of technology, imparting education and research training to a large number of young people in polymer chemistry, institution building, providing policy advice to Government in critical areas of science and technology and advising industry on research and development strategies. He is also an articulate spokesman for Indian science and technology competencies to global



HONOURS & AWARDS

companies and, thus, helping India gain its rightful place as the knowledge hub of the world. He has championed and facilitated the creation of global R&D Centers of companies such as, GE, Dow Chemicals, Solvay and Battelle in India.

His contributions to science in India have been widely recognized by several Awards. He is an elected Fellow of all the learned Academies of Sciences and Engineering in India. He is also an elected Fellow of The World Academy of Sciences (TWAS), Trieste, Italy, a body that recognizes excellence



Dr. Sivaram receiving the degree from the President of the Purdue University

of scientists working in the developing world. The President of India acknowledged his contributions to society by conferring on him the coveted civilian honour, *Padma Shri*.

Dr. S. Sivaram has made significant and notable contributions to chemical technology and polymer science, which has found wide spread applications in industry. He has distinguished himself as a globally recognized scholar, educator, and scientist. The Indian Chemistry Council (ICC) recognized his contributions to the chemical industry by bestowing on him the *Life Time Achievement Award* in 2009.

Dr. Sivaram is cited as an inventor in 51 issued U.S. Patents. He has mentored 36 Ph.D. students and several post-doctoral fellows and authored over 200 peer-reviewed publications.

Dr. Biren Roy Trust Award 2009



The winners of the Dr. Biren Roy Trust Award from NAL are : Left to right (*front row*) Dr. G.N. Dayananda, Mr. J. Ramaswamy Setty and Mr. G.M. Kamalakannan. Dr. Prahlada, CC (R&D), DRDO; Dr. Kota Harinarayana, Rajaramanna Fellow; Mr. Ashok Bhushan, Honorary Secretary General, AeSI are also seen

The Aeronautical Society of India confers Awards annually to professionals in various aeronautical fields. Dr. Biren Roy Trust Award is one such award instituted by Dr. Biren Roy Trust, Kolkata in the year 1983. It is to recognize outstanding contributions in the field of design, development, maintenance, operation, training, manufacturing and allied areas of aviation and space technologies.

The Award for the year 2009, has been given to a team of NAL scientists consisting of Dr. G. N. Dayananda, Mr. G. M. Kamalakannan and Mr. J. Ramaswamy Setty in recognition of their contribution to the design, development and indigenization of the state-of- the art autoclave process control equipments required for the manufacturing of advanced composites for major National Aircraft Programmes such as the Light Combat Aircraft (LCA) and SARAS.

The Awards were given at 61st AGM held on 10 April 2010 in Bangalore. His Excellency H.R. Bhardwaj, Governor of Karnataka(Chief Guest)and Dr. Vijay Mallya, President, graced the occasion.



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