

# CSIR NEWS

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Team CSIR



## Consistent Production of Live Births of an Endangered Black Buck by Artificial Insemination Technology at LaCONES

The city-based Laboratory for Conservation of Endangered Species (LaCONES), an annexe of the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, is involved in research on wildlife conservation. Earlier, LaCONES had delivered successfully a spotted deer by Artificial Insemination as a model for wild ungulates followed by a live birth of an endangered black buck last year in August. They have repeated the same feat with production of two more live births again in black buck on 14 September and 5 October this year consecutively.

The black buck (*Antelope cervicapra*), commonly called as *Kala Hiran* or *Krishna Mrig* in Hindi and *Nalla Jhinka* in Telugu, is a small gracious Indian antelope found all over India.



Live birth of endangered black bucks at LaCONES by artificial insemination technology



However, because of serious threat to its survival owing to over hunting for meat and trade, destruction of habitats, and tourism, it has become seriously endangered and is listed in Schedule-I of the Indian Wildlife Protection Act of 1972. This necessitated developing assisted reproductive strategies as one of the conservation measures.

To improve upon this technology for better success rate and reproducibility, scientists at LaCONES have undertaken ultrasonography to monitor ovarian follicular development and ovulation in the endangered black buck. They characterized the estrus cycle with respect to the length and the number of follicular waves and monitored the size dynamics of the follicle. Two of the inseminated females gave birth to live fawns after 177 days of pregnancy with a success rate of 66%, which is almost double of what was reported earlier. This study formed the basis of a standard protocol for estrus synchronization in the black buck.

Appreciating the sustained efforts of the scientists at LaCONES, Dr Lalji Singh, Director, CCMB, said that the development of assisted reproductive technologies in LaCONES would significantly contribute to the maintenance of genetic diversity and conservation of endangered animals.

## New Products from Central Electronics Engineering Research Institute (CEERI), Pilani

### Multi-Ceramic Rectangular RF Window

A project on the 'Development of Multi-Ceramic RF Window' under sponsorship from IPR, Gandhinagar has been successfully completed. The objective of the project was to develop and establish the technology by brazing of rectangular ceramic blocks, typically two and eight ceramic blocks, to a titanium alloy based metal partner. The windows developed were to be leak-tight as per specifications laid down by Institute of Plasma Research (IPR). CEERI was also to provide necessary advice/guidance in deciding mechanical tolerances, chemical cleaning and vacuum firing procedures for making the job ready for brazing trials.

Titanium alloy based machined metal parts with two and eight slots each and metalized ceramic blocks were received from IPR. After chemical processing, the titanium blocks were fired in vacuum furnace to remove the stresses and get proper surface finishing. After firing of the parts, ceramic pieces were fitted into the rectangular slots of the titanium block. Brazing alloy was put into exact shape of the slot. The assembled window was put in vacuum furnace and brazing was done. The Fig. 1

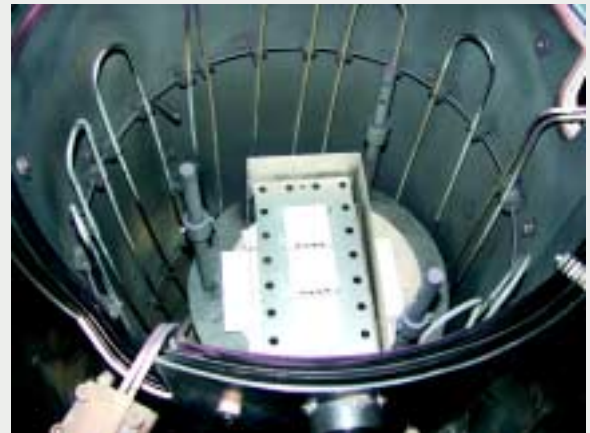


Fig. 1: Window in Vacuum Furnace

shows the window mounted in a brazing furnace. After completion of brazing operation, the window was tested with helium leak detector for vacuum tightness of brazed joints. Typical leak testing operation shown in Fig. 2.

CEERI would provide necessary technical advice in brazing of final window to IPR.

### Major Targets Accomplished

- Planning and optimisation of chemical processing parameters
- Design of jigs & fixtures for brazing and leak testing
- Planning of brazing schedule and optimisation of process parameters
- Fabrication of two-block ceramic window for parameter verification
- Fabrication of two numbers of eight ceramic block windows

meeting the specifications and delivery to IPR

- Documentation of process parameters.

Two prototypes of the window have been developed and both were found leak tight. Both the windows have been handed over to IPR, Gandhinagar. All the details of development process right from chemical cleaning of machined parts to leak testing of brazed window have been worked out and passed on to IPR.



Fig. 2: Leak Testing of Brazed Window

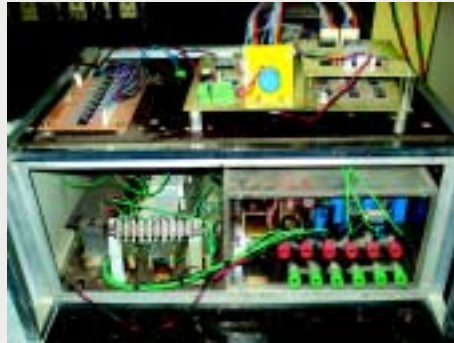
### Specifications

- Frequency : 3.7 GHz
- Power Transmission : 500 kW CW
- Number of Ceramic Blocks : 64
- Cooling : Liquid
- Application : Low hybrid power injection into plasma

## High Efficiency Direct AC-to-AC Converter

A project on 'High Efficiency Direct AC-to-AC Converter' was successfully completed under a sponsored project. Conventionally the three-phase input voltage is converted to variable frequency using two stages. First, the input voltage is rectified and then fed to a three-phase inverter to get variable frequency and variable voltage output. A large filter capacitor is normally used in rectifier for filtering. This two-stage processing reduces overall efficiency and the large filter capacitor makes the system bulky. On the other hand, direct AC/AC converter, known as matrix converter uses no filter, capacitor and due to direct conversion, its efficiency is also high.

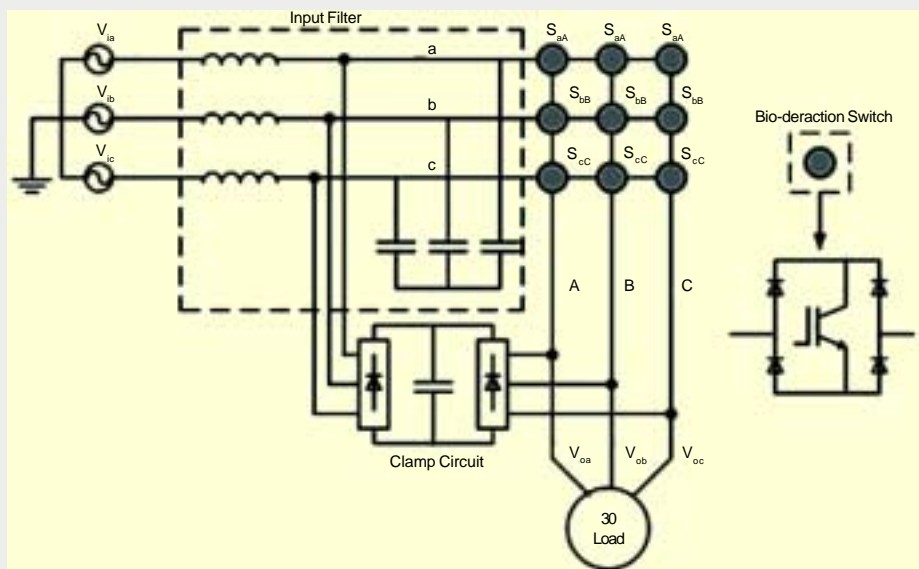
The only disadvantage of the matrix converter is the complex design of PWM generator and controller. But due to easy availability of low-cost microcontroller, it becomes possible to implement the mathematical algorithm economically.



Experimental Prototype of the Matrix Converter

### Specifications

- Input voltage : 380 V 3ph 50Hz
- Output voltage : 120 V 3ph
- Output frequency : 25 Hz, 50 Hz, 100 Hz



Block Diagram of Matrix Converter



The matrix converter is an array of controlled semiconductor switches that connects the three-phase source directly to the three-phase load with variable output frequency and variable output amplitude in the same power block of nine switches. In the last few years, an increase in research

work has been observed, bringing this topology closer to the industrial application.

A new double-sided modulation strategy for matrix converters based upon an indirect conversion scheme, which models the matrix converter as two independent stages performing rectification and

inversion, was made. The new modulation strategy keeps the switching number at a minimum. This space vector modulation for matrix converter is implemented in single PIC18F452 microcontroller and compared with simulation results.

### Carbon Nanotubes Improve Fuel Cell Efficiency

The National Chemical Laboratory (NCL), Pune, has developed a chemical strategy to increase the sulfonic acid content of Nafion membranes by incorporating sulfonic acid functionalized single-walled carbon nanotubes (S-SWCNTs), and demonstrated the remarkable utility of this composite membrane as electrolyte in Polymer Electrolyte Membrane Fuel Cell (PEMFC) applications. Nafion/S-SWCNT composite membranes revealed an almost one order of magnitude higher conductivity than that of Nafion 1135 (available commercially). Nafion, a sulphonic acid containing tetrafluoro ethylene copolymer, is used as membrane in PEMFC and the sulfonic acid group in Nafion facilitates proton conductivity.

Fuel cells are receiving extensive attention as a clean energy source for automotive, stationary, and portable applications. In a fuel cell, electricity is generated by the reaction of hydrogen and oxygen at the electrode-electrolyte interface and

water is the by-product. The proton conductivity of the polymer electrolyte membrane (PEM) is one of the key factors limiting the performance of PEMFC. An improvement in the proton conductivity of the electrolyte membrane even by an order of magnitude could change the performance of fuel cells dramatically. Currently, Nafion-based membranes are widely used as the PEM in fuel cells that operate from 60° to 80°C. Dr Vijayamohan K. Pillai and his research group at NCL modified Nafion membrane to increase its conductivity, chemical stability and mechanical strength. Nafion/S-SWCNT composite membranes were prepared by mixing together dissolved precast Nafion membrane in dimethylacetamide (DMAc) and a solution of S-SWCNT in DMAc.

Dr Vijayamohan, a senior scientist at Materials Chemistry Group of NCL attributes the higher conductivity to sulfonic acid content of the composite membrane, which facilitates more channels for proton transport. Membrane-electrode

assemblies (MEAs) with a Nafion membrane incorporating S-SWCNTs show less electrolyte resistance in comparison with that of Nafion 1135. The conductivity values are 0.0155 and 0.0101 Siemens per cm for composite membrane and Nafion 1135, respectively. It was further found that the Nafion/S-SWCNT membrane gives a maximum power density of 260 mW per sq cm at 0.42 V, whereas the Nafion 1135 membrane gives 210 mW per sq cm at 0.39 V.

The work opens new possibilities of tailoring the properties of composite polymer electrolytes enabling better stability of PEMs to give enhanced fuel cell performance.

#### Publication

Polymer Electrolyte Fuel Cells Using Nafion-Based Composite Membranes with Functionalized Carbon Nanotubes, Ramaiyan Kannan, Bhalchandra A. Kakade, and Vijayamohan K. Pillai, *Angew. Chem. Int. Ed.* 2008, 47, 2653 – 2656.

<http://www.ncl-india.org>

## Single Electron Transfer Behaviour of Nanosized Rhodium Particles

Ultra-small metallic and semi-conducting materials have great utility when their dimensions are of the order of a few nanometers since their fundamental properties can be controlled by both size and shape. However, most of these nanomaterials with sizes less than 10 nm, are not stable for practical applications and, hence, protecting them against aggregation using certain special type of polymers and organic molecules like long chain amines, thiols and carboxylic acid is crucial for many of their applications. Sometimes a single molecule thick layer (monolayer) of organic molecules is enough to impart sufficient long-term stability and such monolayer protected clusters (MPCs) of gold, silver, CdS, CdSe, etc., have found significance

in the design of new molecular electronic devices. For example, many of them possess an uncanny ability to show discrete one electron transfer when subjected to a potential difference at room temperature, a phenomenon known as Coulomb Blockade, which is very promising for the next generation electronic devices.

Recently, Dr Vijayamohanan and colleagues at the National Chemical Laboratory (NCL), Pune, have developed a method to synthesize monodispersed rhodium (Rh) nanoparticles in a size domain of ~ 5 nm, which exhibit variable oxidation states in electrochemical measurements (published in *Adv. Mater.*, 2007, **19**, 272–275).

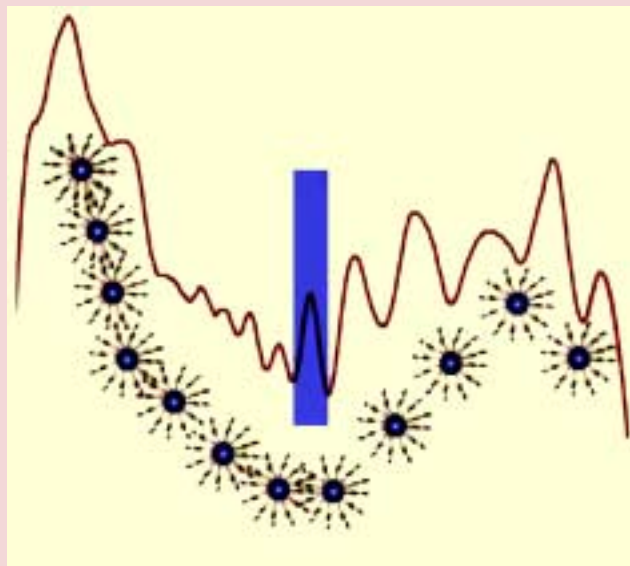
Most of the earlier studies have resulted in the synthesis of smaller metal nanoclusters and their electrochemical properties suggesting a tiny capacitor model, which shows multiple peaks in the voltammetric experiments corresponding to single electron transfer phenomenon in this size regime. During the last decade, many pio-

neering efforts have shown such discrete electron transfer behaviour by several materials including Au, Ag, Pd, Cu, CdSe, CdTe and silicon. However, many of these materials show such behaviour at very low temperature and observing single electron behaviour at room temperature has been an unmet challenge.

The report from NCL of single electron transfer behaviour by Rh nanoparticles stabilized by tridecylamine (TDA) is unique in the sense that the limiting currents are controlled by diffusion of smaller nanoparticles towards electrode surface resulting in a series of evenly spaced redox peaks at room temperature. These consecutive peaks in cyclic voltammetry for single electron transfer observed in solution could be analogous to the peaks observed in the conventional redox reactions. Hence, Rh nanoclusters can be viewed as mixedvalent ensembles of clusters with an intermediate state, where this single electron process can be considered as diffusion controlled.

The unprecedented behaviour of such nanoclusters has the potential to lead to the fabrication of novel single electron transistor devices.

<http://www.ncl-india.org>



Single electron transfer events for a rhodium nanocluster



### Seahorses Born Under Captivity at NIO

Researchers at the National Institute of Oceanography (NIO), Goa, have successfully bred the Indian seahorse species, *Hippocampus kuda*, commonly known as Yellow seahorse or Spotted seahorse, under captivity. Juvenile seahorses collected from the wild were grown to maturity, form pair bonding, mate, complete gestation and spawning under captive

conditions through manipulation of feed and environmental conditions. The project is being funded by the Department of Biotechnology, Government of India.

Two male seahorses delivered 320 new born juveniles on 29 August 2008. Both the parents and the babies are being taken care at the Aquaculture Laboratory — the Fraternity Home. Next 15 days were

very critical for their survival since they were shifted from pelagic phase to the settlement phase.

Seahorses are fascinating and remarkable group of fishes with their unusual body shape and their biology with males incubating the fertilized eggs in a brood pouch. They belong to the family, Syngnathidae. They inhabit many ecologically sensitive aquatic



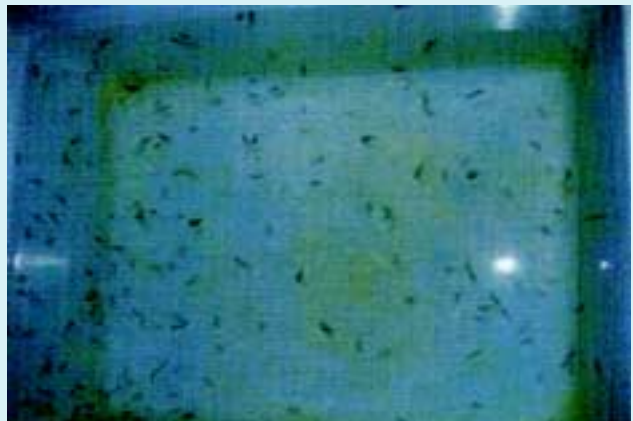
Maintenance of rearing of seahorses in the laboratory



Pair-bonding of seahorses under captivity



Brooding male with embryos (swollen brood pouch)



New born seahorse juveniles

habitats, including coral reefs, seagrasses, mangroves and estuaries, with most species in the Indo-Pacific and western Atlantic region. It is their popularity that places them in danger as they are sought in large numbers for use in traditional medicine, aquarium fish and curios (souvenirs). It has been conservatively estimated that at least 20 million seahorses (~ 56 m tonnes) are being caught annually for the traditional medicine market. In addition, more than one million live sea horses are caught for aquarium trade, mostly destined for sale in North America. India was contributing to about 30% of global seahorse trade until 2001 and now all species of seahorses have been brought under the schedule I of the Wild Life Act, 1972 to prohibit exploitation. As per the Convention of International Trade in Endangered Species (CITES), all species of seahorses have been placed under Appendix II, which states that captive breeding could be undertaken for stock enhancement programme and aquaculture purposes.

With this success, the team of researchers led by Shri R. A. Sreepada is confident that standardization of hatchery rearing and mass culture of seahorses will be helpful in their conservation and reproduction meeting the ever increasing demand in traditional medicine and marine aquarium trade. In addition, development of such technology will provide an alternative livelihood supplementary income to the fisherfolk/self-help groups (SHGs) in the coastal belt of India.

## CECRI: Technology Licensed/ Sponsored Projects and Consultancy/ Technical Assignments Undertaken

The technology licensed, sponsored projects, consultancy and technical assignments undertaken by the Central Electrochemical Research Institute (CECRI), Karaikudi, during May-June 2008 include:

### Technology Licensed

- *In-situ* electro-synthesis of sodium hypochlorite for disinfection and water treatment applications to M/s PPM Technologies, Chennai.
  - Lump sum premium : Rs 56,180+ Demo charges Rs 28,090
  - Nature of license : Non exclusive
  - Period of license : 7 years

### Sponsored Projects

- Studies on the electrolysis of cuprous chloride and recovery of copper, M/s ONGC Ltd, Panvel
- Studies on coating performance in sulphur dioxide environments, M/s International Paint, Bangalore
- Development of conducting polymer rechargeable battery for consumer applications, Department of Science and Technology, New Delhi
- Feasibility study on the preparation of ribityl 3,4-xylydine from D-ribose, M/s Chemapol Industries, Mumbai

### Consultancy Services

- Vetting of cathodic protection design for the BPCL pipeline, M/s Corrosion Control Engineers, Karaikudi
- Testing of gold content in gold electroplating done by Smart Creations, Chennai on copper items, M/s Smart Creations, Chennai

### Technical Services

- Evaluation of "Kirloskar" VRLA batteries as per JIS 8702 - I Specification on the following batteries:
  1. 12 V/45 Ah
  2. 12 V/65 Ah
  3. 12 V/75 Ah, M/s Kirloskar Batteries Pvt Ltd, Bangalore
- Testing of liquid paint samples, M/s Cipy Polyurethane Pvt Ltd, Pune
- Testing of blended organophosphonate samples, NLC Ltd, Neyveli



### IICT: R & D Projects and Patents

The Indian Institute of Chemical Technology (IICT), Hyderabad, has submitted during September 2008 Project Completion Reports on:

- Development of a pilot plant scale process for bio-diesel from high FFA vegetable oils & acid oils to TMOP&M, New Delhi.
- Recovery of nickel as pure nickel carbonate from spent raney nickel catalyst of hydrogenation reaction to M/s Cadila Pharmaceuticals Ltd, Ahmedabad.

#### Consultancy Projects

- Conducting XRPD studies of samples (VIII project), for M/s Cadila Pharmaceuticals Ltd, Ahmedabad. (Contract value Rs 3.37 lakh)
- Providing R&D consultancy services for the specified R&D activity, to M/s Bioplus Life Sciences Pvt Ltd, Bangalore. (Contract value Rs 3.37 lakh)
- Conducting XRD polymorph studies of samples-V project, for M/s Watson Pharma Pvt Ltd, Mumbai. (Contract value Rs 2.24 lakh)

#### Sponsored Projects

- Development of light weight flexible PV foam as a laminated or sandwich to be used for construction and auto applications, sponsored by Tata Steel Ltd, Mumbai (Rs 25.00 lakh)
- Conducting exploratory studies on microbial transformation of fluorobenzene to fluorecatechol on lab scale (Phase-I studies), sponsored by Acoris Research Ltd, Pune (Rs 2.24 lakh)
- Conducting exploratory studies on kinetic enzymatic resolution of a nitrile on lab scale, sponsored by Acoris Research Ltd, Pune (Rs 4.49 lakh)

#### Patent filed (in India)

- Synthesis of hexadecyl cis-9-tetra decenoate and hexadecyl cis-10-tetracenoate and their evaluation for anti arthritis properties in rats, PT-541/2008: Prabhavathi Devi, B.L.A.; Gangadhar, K. N.; Vijaya Lakshmi, K.; Rama Krishna, S.; Madhusudhan, K.; Diwan, P. V.; Prasad, R.B.N.

### Co-Flow Jet Facility at NAL

The subsonic co-flow jet facility developed in the premises of the low speed laboratory of Experimental Aerodynamics Division of the National Aerospace Laboratories (NAL), Bangalore, was formally inaugurated by Dr A. R. Upadhyaya, Director, NAL, on 8 September 2008. This facility has been developed with the support of AR & DB.

The salient features of this facility are:

- Large range of area ratio, velocity ratio.
- Inter changeable inner nozzles - circular, elliptic.
- Low speed to high subsonic.
- Top-hat exit profile and low exit turbulence level.
- Provision for active forcing supersonic capability and heterogeneous flows
- Virtual instrumentation based controls and automated data acquisition system for pressure and velocity survey
- Flow diagnostics: laser sheet, PIV, LDV and hot wire techniques

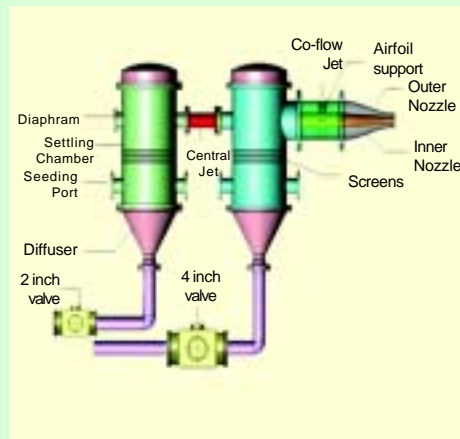
Areas of applications include:

- Basic Research (Mixing, Flow structures, Flow control and Acoustics)
- Combustion Chambers
- High Bypass Engines
- Cooling Systems
- Mixing Tanks
- Premixed Burners
- Jet Pumps

Presently, the investigation planned in this facility aims at obtaining flow in



the near field of low aspect ratio elliptic jet in the presence of external co-flow; 2D and stereo PIV techniques will be used to obtain the instantaneous velocity and vorticity fields in the longitudinal and transverse planes. The phenomenon of axis switching in these non axis-symmetric jets will be studied from the point of view of evolving flow structures in the near field.



- > Air supply
  - 10HP Blower at 3000rpm – flow velocity of 90m/s across 4" diameter pipe
  - Compressed air supply from main receiver at 10 bar
- > Air inlet and control
  - Inner jet – 2" pipe line
  - Outer jet – 4" pipe line
  - Regulation – Two independent Electro Pneumatic valves with PID controls
- > Diffuser – FRP
  - Inlet 100mm diameter
  - Outlet 500mm diameter
  - Conical section – 3815mm length 30° included angle
- > Settling Chamber – FRP
  - 1m x .5 m Cylindrical
  - Three anti-turbulence screens
  - Provisions for PIV seeding, pressure relief, instrumentation
- > Nozzles – Metallic/FRP
  - Inner nozzle
  - $D = 102\text{mm}$ ,  $D_{in} = 36\text{mm}$
  - Outer nozzle
  - $D_{in} = 300\text{mm}$ ,  $D_{out} = 100\text{mm}$
  - Area ratio ( $A_{out}/A_{in}$ ) = 7.716

## Training Programme on Crafting Effective S & T Communication

The Human Resource Development Centre (HRDC), Ghaziabad, organized a programme on “Crafting Effective S&T Communication” at National Aerospace Laboratories (NAL), Bangalore, during 29-31 August 2008. Thirty-four scientists of the level of B and C from various divisions of NAL and C-MMACS attended the programme. Dr Manu Saxena, Scientist, HRDC, Ghaziabad, coordinated the programme. The faculty comprised Dr K. Satyanarayana, Senior Deputy Director-General, Division of Publication and Information and

Editor of *Indian Journal of Medical Research*, New Delhi; Dr B. C. Sharma, former Scientist, NISCAIR; Dr Y. K. Gupta, Head, Department of Pharmacology, Indian Institute of Medical Sciences, New Delhi and Dr I. R. N. Gourdar, Head, ICAST, NAL.

Dr Satyanarayana gave a lecture (in two parts) on various aspects of scientific writing including ways to write and publish papers. The lecture concluded with a brainstorming session with participants on choosing title, abstracts, authorship-issues and sharing of experiences by those who had already published papers. His second lecture dealt with the

importance of IPR in S & T communication.

Dr Goudar spoke on the Impact of Open Access on S & T. Highlighting the importance of this, he also explained how the open access functions at National Aerospace Laboratories.

Dr Sharma gave three interesting lectures on language and style, data presentation and review process in research communication. He also emphasized the importance of effective presentation, apt summarization and frequent grammatical errors observed.

Dr Saxena spoke on Crafting Effective Technical Presentation. He also highlighted the effective use of visual aids in the presentation and dealt with proper planning and organizing information.

Dr Gupta spoke on the relevance of Ethical Issues in S & T Publications and the importance of the impact factor of journals.

The programme was well attended. The group tasks and discussions were lively and benefited a large group of scientists at NAL.



A group photo of the participants



### CSIR Foundation Day Celebrations at Laboratories/Institutes

All the 37 CSIR Laboratories/Institutes celebrated the CSIR Foundation Day on 26 September with great enthusiasm. They took stock of the performance of the past year and planned for the future. Special programmes were arranged on the occasion and the staff members who had completed 25 years of regular service and who had retired since last foundation day, were honoured by presenting mementoes and shawls. Various competitions were organized as a part of the celebrations and winners were awarded. The occasion was also observed as Open Day by many institutes/laboratories and a large number of people, particularly the students, visited and interacted with the scientists. The programmes organized on this occasion at AMPRI, NAL, NEERI, NIO and NISCAIR are highlighted here:

#### Advanced Materials and Processes Research Institute (AMPRI), Bhopal

AMPRI celebrated the CSIR Foundation Day by organizing a national seminar on "Technologies: Opportunities and Challenges". Theme based expert lectures by eminent academicians, scientists and technologists were arranged in consonance with major R&D programmes being implemented at AMPRI. The special lectures broadly covered areas of light weight metallic materials, potential of natural fibres in materials, nano-sciences and sustainable development through waste utilization.

Prof. T.R. Ramachandran, former Director, JN Aluminum Research and Design Centre, Nagpur, delivered a lecture on opportunities and challenges in development of light alloys. Prof. K. Chattopadhyaya, IISc-Bangalore, spoke on challenges in proliferation of nano technologies. Dr A.K. Majumder delivered a lecture on jute based technical textiles. Shri L.Pugazhenty, Chairman, Indian Institute of Metals, Kolkata, highlighted business advantages of

sustainable development, particularly in metallurgical industries. In addition to AMPRI scientists and staff, the seminar attracted participation of representatives from other CSIR labs, local industries, universities and institutes. Prof. K.I. Vasu, former Director, CECRI-Karaikudi, chaired the inaugural session.

Earlier, at the main CSIR Foundation Day function Shri L. Pughazenty, Executive Director, India Lead Zinc Development Association and Chairman, Indian Institute of Metals (IIM) was the Chief Guest and Prof. K.I. Vasu, former Director, CECRI, Karaikudi and former Vice-Chancellor Madurai Kamraj University and Founder, Swadeshi Science Movement presided over the function.

In his address, Shri Pughazenty, while highlighting the Indian R&D scenario, said that scientific community should now go near to the industry and consumers. A tremendous amount of marketing sense is the need of the hour, he said.

He underlined India's industrial and economic growth. He mentioned that India is going to be a very economically aggressive country and that is where the role of scientists becomes important. He highlighted the crucial role of the two visionaries: Pt. Jawaharlal Nehru and Dr Shanti Swarup Bhatnagar, at whose initiative the large network of research centers came into being across the country.

Prof. K.I. Vasu dwelt upon India's traditional wisdom and the wonderful history of technology, development, particularly in the domain of metallurgy. He expressed confidence that Indian scientific community would respond to the challenges in the new global settings. Dr Navin Chandra, Acting Director, AMPRI, welcomed the guests and other dignitaries and highlighted the achievements of CSIR and AMPRI, Bhopal.

On this occasion inhouse awards of excellence were given away. Dr K. Basu, Dr R.N. Yadav and Shri K.K.S. Gautam were felicitated for retiring on



superannuation. CSIR studentship was given to Master Shubhranshu Barnwal and Master Argha Mondal for securing admission in IITs. Prizes for IIM Quiz were also given to school children. Mementoes were given to staff members on completion of 25 years of service in CSIR.

As part of the celebrations, an exhibition on the activities of AMPRI was also put on display on 25 September 2008. It was inaugurated by Dr P.K. Verma, Director General, M.P. Council of Science and Technology, Bhopal.



CSIR Foundation Day function in progress

Speaking on the occasion, Dr Verma exhorted the scientific community to work on projects and schemes aimed at regional development. Emphasizing the need for research cooperation

among various institutes, he said that high science can provide solutions to problems of masses. He lauded the contributions of CSIR and AMPRI.

A large number of students from various schools and colleges, entrepreneurs and general public visited the exhibition and took keen interest in the displayed technologies relating to natural

fibre, Light weight metals, MEMS, Minerals Processing, Environment and Nano Materials, Metal Matrix Composites, Industrial Waste Utilization for various applications and Modeling based studies.

## National Aerospace Laboratories (NAL), Bangalore

At NAL, Dr P. S. Subramanyam, DS & Director, ADA, was the chief guest. He released the *Suvarana Sadhana*, a booklet on NAL's 50 achievements and spoke on "50 years of DRDO and its partners and 25 years of ADA." He gave a broad outline of the major systems that have been inducted and those in the pipeline, infrastructure and facilities, DRDO industry partnership and technology roadmap. He spoke at great length about 25 years of LCA. "Don't think that Rs 5000 crores were spent to build 15 birds, it is the money invested in the aeronautical technology and infrastructure

upgradation in the country," he said.

Earlier, in his welcome address, Dr A.R. Upadhyya, Director, NAL, described Dr Subramanyam as a distinguished scientist and a DRDO system specialist.

Dr G. K. Suryanarayan delivered the eleventh CSIR Foundation Day Business Lecture on *Augmentation of National Trisonic Aerodynamic Facilities*. His lecture covered the benefits gained from the programmes completed thus far and future enhancements.

The chief guest distributed prizes to children of NAL's employees for excellent achievements in the field of

academics and sports. NAL honoured scientists for their patents and copyrights by presenting them with IPR certificates. The function concluded with a vote of thanks proposed by Dr M. R. Nayak, Adv (M&A). Dr M. N. Sathyanaraya compered the programme.

As a part of its on going Golden Jubilee Programme, NAL also organized Open Days on 26 and 27 September 2008. The exhibits from various divisions from Kodihalli were displayed at ACD bay. The video shows on SARAS, HANSA and NAL facilities were shown and museum was kept open for the



## CSIR Foundation Day Celebrations

visitors. At Belur, the exhibits from various divisions were displayed at SARAS and HANSA hangar. The Micro Air Vehicle display was held at the cricket ground and the mini helicopter at Belur hangar. A visit to Wind Energy Division was also

arranged. There was also an exhibition by Agasthya Foundation at ACD bay. All these programmes were scheduled for both the days.

An aerial display of HANSA by AVM (Retd.) A. S. Lamba was

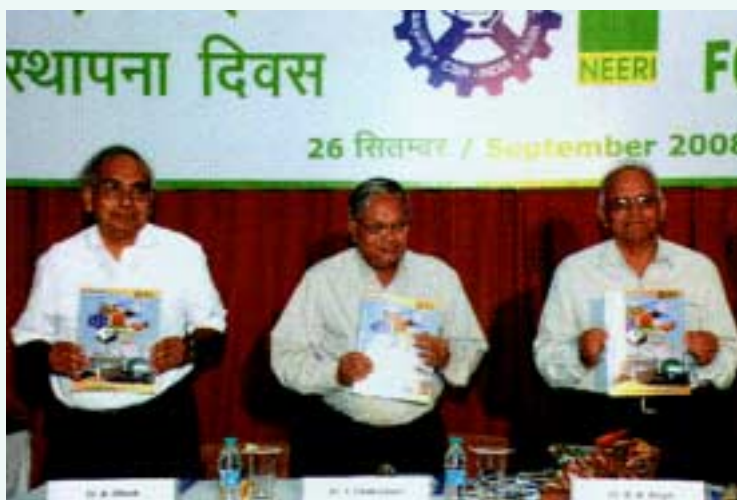
arranged at Belur. A science model exhibition was arranged for school children. School children exhibited their models in ACD. The children enjoyed the experience, especially the HANSA flight and the Micro Air Vehicle shows.

### National Environmental Engineering Research Institute (NEERI), Nagpur

The institute organized several programmes and observed Open Day on this occasion.

As a part of science motivation programme, about 500 students of local and Vidarbha region visited the institute and interacted with the scientists. Documentaries prepared by CSIR were also screened in the NEERI auditorium.

Dr R.N. Singh, an eminent Geophysicist, Bhatnagar Laureate and former Director (1999-2003), NEERI, was the Chief Guest on this occasion and delivered the CSIR Foundation Day Lecture on "Joseph Fourier (1768-1830): The Modern Environmental Engineer". Dr Singh expressed that Joseph Fourier's many contributions to modern engineering science are so critically important and so pervasive that he is rightly regarded as the father of modern engineering. He explained that in 1798, Napoleon made his Egyptian campaign into a scientific mission as much as a military one. Napoleon made



NEERI Annual Report 2007-08 being released on the occasion of CSIR Foundation Day

Fourier secretary of the newly formed Institute of Egypt and Fourier did high-level administration during the Egypt campaign. When Napoleon returned as the leader of France, he sent Fourier to serve as the Prefect of Isère, something like the Governor of an American State. Fourier brought astonishing energy to the task; he built roads and engineered land drainage and wrote papers on mechanics and a book on Egypt.

Dr Singh said that modern environmental engineering began in London in the mid-nineteenth

century when Joseph Bazalgette designed the first major sewerage system that reduced the incidence of waterborne diseases such as cholera. He also mentioned about various scientific activities carried out by Joseph Fourier, such as heat transport in space: heat conductivity, heat storage within solid: specific heat, linearity: principle of superposition, etc. Dr Singh said that Joseph

Fourier actually provided us with the strategies that would be basic to the entire field of continuum mechanics, of which heat conduction and convection are a major part. These are the identification of field differential equations and boundary conditions, the technique of separation of variables, and the idea of representing solutions in the form of series of arbitrary functions, he added. Dr Singh stated that many contributions of Joseph Fourier are still being globally used in pure and applied mathematics in modern engineering.



Fourier's view of homogeneity required the creation of contrived parameters, such as electrical resistance, heat transfer coefficient, and material modulus, Dr Singh said. These parameters, and the myriad others like them, are the engineering tools now used to describe and to analyze natural phenomena which exist only because of Fourier's pioneering view of homogeneity, he added. Dr Singh also briefed about various uses of Fourier theory in environmental engineering, such as fate and transport of pollutants, diffusion, air, water and soil media and environmental technologies: reaction-diffusion theory. Describing the Fourier's three heat sources affecting terrestrial temperature, Dr Singh said that the concept of green house effect was also given by Joseph Fourier in 1824. Also, Fourier's work helped in conceptualization of other branches of science, such as electricity and chemical diffusion. Comparing Indian mathematics with western mathematics, Dr Singh said that the

roots of Indian mathematics lie in linguistics, whereas the roots of western mathematics lie in philosophy. Both cultures developed remarkable formal systems, but western formal developments focused on axiomatic proof, whereas Indian attention focused on the development of constructive approaches to grammar, he added.

Dr Singh said that CSIR has played a major role in modernizing science in the country, in the sense that natural laws are used to construct knowledge. Fourier also played a great role in developing 'modern environmental engineering' and his framework is used to employ diffusion laws to understand natural systems and also designing engineered systems of pollution control, which are used extensively in NEERI.

Earlier, Dr Tapan Chakrabarti, Acting Director, NEERI, delivered the welcome address and gave details about the recent significant achievements of the institute. He assured that NEERI will continue to work according to its mandate of

innovations in environmental science and engineering for sustainable development. He specifically mentioned about climate change and CO<sub>2</sub> emissions in the country, and the related technological solutions. Dr Chakrabarti also informed about the establishment of Center for Research on Climate Change at the institute.

Dr R.N. Singh released the NEERI Annual Report 2007-08. On this occasion, mementoes were presented to NEERI employees who had completed 25 years of service in CSIR, and those who had retired during the past one year. The children of NEERI employees, who were the winners of Essay and Quiz Competitions on General Science, organized on the occasion of CSIR Foundation Day were given prizes.

Er. Arindam Ghosh, Scientist and Head, Research & Development Planning Unit (RDPU), introduced the Chief Guest. Dr G.V. Mulmuley, Scientist, RDPU, proposed a vote of thanks.



Students being explained the R&D activities of NEERI



## CSIR Foundation Day Celebrations

### National Institute of Oceanography (NIO), Goa

This year, NIO celebrated the CSIR Foundation Day with a difference. It invited over one thousand high school children and over two hundred science teachers from all parts of Goa to witness an innovative science popularization programme nick-named “Toys from Trash” conducted by the ‘Green Guru’ Shri Arvind Gupta of Inter University Center for Astronomy and Astrophysics, Pune. Shri Gupta is a recipient of several honours including Indira Gandhi Prize for Science Popularization. He has authored and translated several popular science books for kids and teachers. Through his 30 years of service to science popularization, he has made both learning and teaching science enjoyable. He uses day-to-day household trash to build science and math models and demonstrates an easy way to understand the scientific principles behind their working.

This two hours programme was a memorable feast of science for the participants. The interactive programme was relayed from auditorium to other places in campus through multimedia network to accommodate the huge number of kids. Building three-dimensional geometric models with

matchsticks and pieces of bicycle valve tubes; building dynamo with safety-pins, rubber bands, copper wire junk; effect of vibrations creating fan to rotate using a pencil and ball-pen refill

tube; constructing different types of water pumps; demonstrating working of magnetic trains with cheap magnets and pencil, etc. are a few amongst the several models he demonstrated. There was an inspiring interaction between the children and Shri Gupta after the end of programme. Several teachers and students have expressed that it was a first of its kind great experience for them to witness such an innovative programme and to be on the campus of NIO. They wanted that NIO to conduct similar programmes for kids more often. In fact, NIO has been conducting programmes for school children such as arranging meetings with Nobel Laureates, outstanding



Shri Arvind Gupta demonstrating his models

scientists, etc. since the last few years. NIO strongly feels that the science needs to be taken to the doorsteps of stakeholders as well as young talents as the science and technology is going to be the driver of future economy. Elaborate arrangements were made to ensure the safety and comfort of kids while on campus.

NIO Director Dr S. R. Shetye welcomed the participants and the guests and thanked all those schools responding to his invitation to be part of the CSIR Foundation Day.

Dr V. K. Banakar coordinated the programme that was attended by nearly two hundred schools. Invitations were sent to over 350 high schools of Goa.

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

Prof. V.N. Rajasekharan Pillai, Vice-Chancellor, Indira Gandhi National Open University, New

Delhi, was the Chief Guest and delivered the CSIR Foundation Day Lecture at NISCAIR. Prof Pillai

began his lecture by lauding the contribution of NISCAIR: “ I, being a scientist, know the importance of



this institute at national and global level. This institute is a conglomeration of the earlier premier institutes (NISCOM and INSDOC) of CSIR in the area and is providing important services to scientific communities, thereby promoting research, in addition to taking science to the common man.”

Citing a few examples, Prof Pillai said that the *Indian Journal of Traditional Knowledge* published by NISCAIR is an important journal and the impact such a contribution would create will become more visible, may be after 10-15 years, when the traditional knowledge of this country is disseminated in a big way. Lauding *Wealth of India*, he said it is a contribution which “You and your predecessors have been doing. This is a remarkable contribution.”

Stating that “Science Communication is a real challenge, Prof Pillai stressed that it is very important that print as well as electronic media and the modern Information and Communication Technology play a greater role in education at all levels, specifically for promoting science. “Science, all of us know is nothing but knowledge and bringing the importance of knowledge to each and every person of the country is a real challenge for all of us,” opined Prof. Pillai. And NISCAIR has been functioning as a facilitator for furthering economic,



Seen on dais during the CSIR Foundation Day Function at NISCAIR (from left) are: Dr K.K. Kakkar, Shri S.K. Rastogi, Prof. V.N. Rajasekharan Pillai and Shri Pradip Banerjee

social, industrial and scientific and commercial development by providing timely access to relevant and accurate information.

He pointed out that it is very important to develop human resource in Science Communication and Information Resources Management. In this context he suggested that the NISCAIR programmes such as Associateship in Information Science (AIS) should be made more popular. More people should be able to attend such programmes.

He informed that IGNOU is offering full-fledge Certificate/ Diploma/Degree courses in science communication and a large number of students have shown interest in these courses. IGNOU invites institutes such as NISCAIR in offering such courses. It is important for every person to actually understand science to be able to communicate science to common man in a more effective way, he added. .

Prof Pillai further said, “Emphasis should be laid on providing access to scientific and technological information to the rural areas for application of science in everyday life. We have to make use of all technological capabilities for dissemination of S&T information to the common people, to have maximum impact of S&T on the national development.”

Earlier, Shri S.K. Rastogi, Acting Director, NISCAIR, apprising Prof Pillai of major programmes of NISCAIR, said that the institute has been providing a platform for scholarly research communication of international standards for the country’s scientists through its 17 research journals. In addition, NISCAIR has also been bringing out two abstracting journals – *Indian Science Abstracts* and *Medicinal and Aromatic Plants Abstracts*. It has been popularizing science among the masses through its three popular science magazines – *Science Reporter*, *Vigyan Pragati*, and *Science Ki Duniya*.

NISCAIR’s *Indian Journal of Traditional Knowledge* and *Medicinal and Aromatic Plants Abstracts* are the only journals from a developing country that have been included in the coveted list of the ‘prior art journals’ used for prior art search before grant of patents by the International Search Authorities. NISCAIR is also implementing a



## H onours & A wards

network project, the CSIR e-Journals Consortium, which has successfully provided electronic access to 4200 plus international S&T journals and various databases and standards, such as Web of Science, Derwent Innovations Index, Delphion, and ASTM and Indian Standards to CSIR scientists. *Nature* was added to the list of the Consortium's journals in October 2007.

Shri Pradip Banerjee, Scientist, NISCAIR, delivered the welcome address and introduced the Chief Guest. Dr K.K. Kakkar, Scientist, NISCAIR, proposed the vote of thanks.

The event concluded with a colourful cultural programme in which members of the NISCAIR staff families participated. Prizes were distributed to the winners of the contests organized to mark the CSIR Foundation Day.



Prof. V.N. Rajasekharan Pillai delivering the CSIR Foundation Day Lecture (*above left*) and releasing the NISCAIR Annual Report 2007-08 (*above right*). Students visiting the NISCAIR Research and Specimen Cell (*left*)

## Prof. S. K. Brahmachari to receive ISCA's S.S. Bhatnagar Memorial Award



The Indian Science Congress Association would be honouring Prof. S.K. Brahmachari, Director General, CSIR, with the S.S. Bhatnagar Memorial Award during the inaugural session of the 96th Indian Science Congress on 3 January 2009. The Award will be given to Prof. Brahmachari for his significant and lifetime contribution to the development of Science and Technology in the country. The Award seeks to honour his key contributions in the development of Science and Technology – specifically in the area of Structural Biology, Disease Genomics and Genome Analysis and also for the role he has played as an institution builder in this area; shaping the way this emerging field should develop in the future.

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