



## NEERI transfers Know-how on Field Kit for Arsenic Detection in Water

**T**HE know-how developed by the National Environmental Engineering Research Institute (NEERI), Nagpur, on 'Field Kit for Arsenic detection in water' was transferred to Dr C.L. Lakhota, LTEK System, 2-B, Rajkamal Complex, Panchsheel Square, Wardha Road, Dhantoli, Nagpur. The terms and conditions for this know-how transfer were: Lumpsum fee: Rs 1.5 lakh; Royalty: Nil; Period of License: Exclusive for a period of two years; Duration of transfer: three months from the date of signing licensing agreement. A cheque of Rs 1.5 lakh was presented to Dr Sukumar Devotta, Director, NEERI by Dr C.L. Lakhota on this occasion. Dr Sunil P. Pande, Scientist and Head, RDPU and Dr Leena Deshpande, Scientist, GEM Division, the inventors of this field kit, were also present during the presentation of lumpsum fee. The meeting for this know-how transfer was organized by Shri P. S. Dutt, Scientist and Head, Business Development Unit (BDU).



Dr Sukumar Devotta, Director, NEERI, inspecting the Field Kit for Arsenic. Also seated with him is Dr C.L. Lakhota



### Beating the Ferro electricity limit in barium titanate nanoparticles

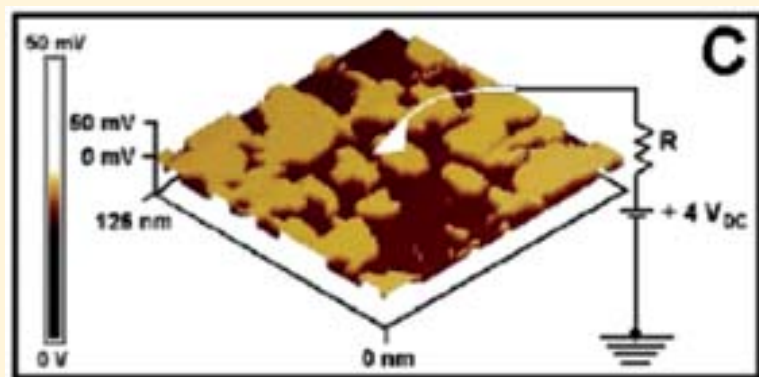
THESE is a recent revival of revisiting several basic issues related to material science following the development of novel chemical and biological techniques to synthesize metals, semiconductor, magnetic and dielectric materials in nanometer size with an excellent control over grain size and shape. However, still it is quite challenging to synthesize several of these materials (especially complex oxide nanomaterials) in size less than 10 nm using conventional wet-chemical methods. Among the ferro-electric oxides, barium titanate has been studied in detail both in bulk as well as in nano-size. However, most of the previous studies on barium titanate show the absence of ferro-electric-tetragonal phase at room temperature when the particle size is reduced below few tens of nanometer. Recently, there is a significant interest among the scientific community in the ferro / piezoelectric nanoparticles to explore various fundamental issues such as (i) the critical size limit for the existence of ferro-electricity / piezoelectricity, and (ii) writing

electrical information on these particles by polarizing them, much similar to what is done in their ferromagnetic counterparts that can be found in computer hard-drives. The information storage in magnetic media has already reached to the roadblock of size-limit due to the unstability of bits owing to “superparamagnetism” where the magnetic information written over each particle may be lost over time due to the relaxation. Additionally, the role of surface capping and crystalline imperfections inside ferro-electric nanoparticles in stabilizing the ferro-electric phase is also important. Investigating these issues is not only important for the fundamental understanding but also to enrich a field which has generated several electronic devices over the years in form of multi-layer capacitors, piezoelectric sensors, actuators, dynamic random access memory (DRAM), etc.

Recently, Dr Absar Ahmad and co-workers of Biochemical Sciences Division, National Chemical Laboratory (NCL), Pune, have successfully synthesized 5 nm

barium titanate particles using a room-temperature fungus-mediated technique in a proper crystalline phase. Dr Pankaj Poddar and co-workers from Physical and Materials Chemistry Division of NCL investigated these particles and their composites in polymethyl methacrylate (PMMA) for the structural and dielectric properties and demonstrated that it was indeed possible to store electrical information in tiny barium titanate particles as small as 5 nm by polarizing them at will (in reverse directions) by using atomic force microscopy probes. The electrical information thus written was directly imaged using Kelvin probe microscopy technique at NCL. This is especially interesting as a direct evidence of a clear ferro-electric to paraelectric (tetragonal to cubic) phase transition across the Curie temperature could be shown at such small size in any ferro-electric material.

These findings generate renewed interest in exploring other ferro-electric and multiferroic oxide materials of various shapes and sizes. This work also paves way towards realization of ultradense ferro-electric based memories, nanosensors and actuators. Scientists are also looking forward to explore the ferro-electric relaxation and piezoelectric properties as a function of sample temperature using techniques such as piezoresponse force microscopy and electrical force microscopy which will generate new information about these materials.

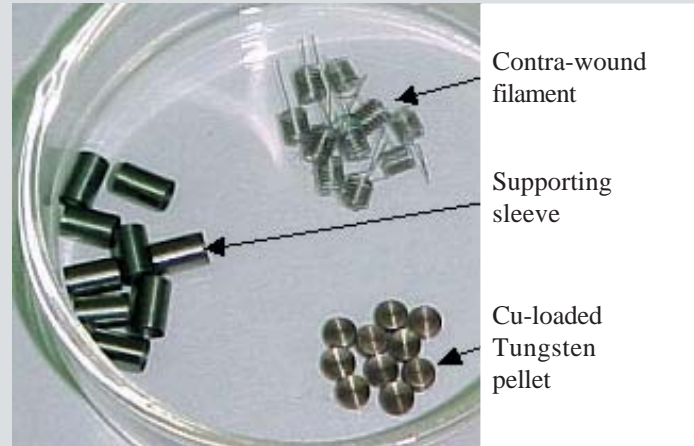


Higher magnification SPM image of barium titanate particles obtained in potential mode after application of +4 V external DC bias voltage

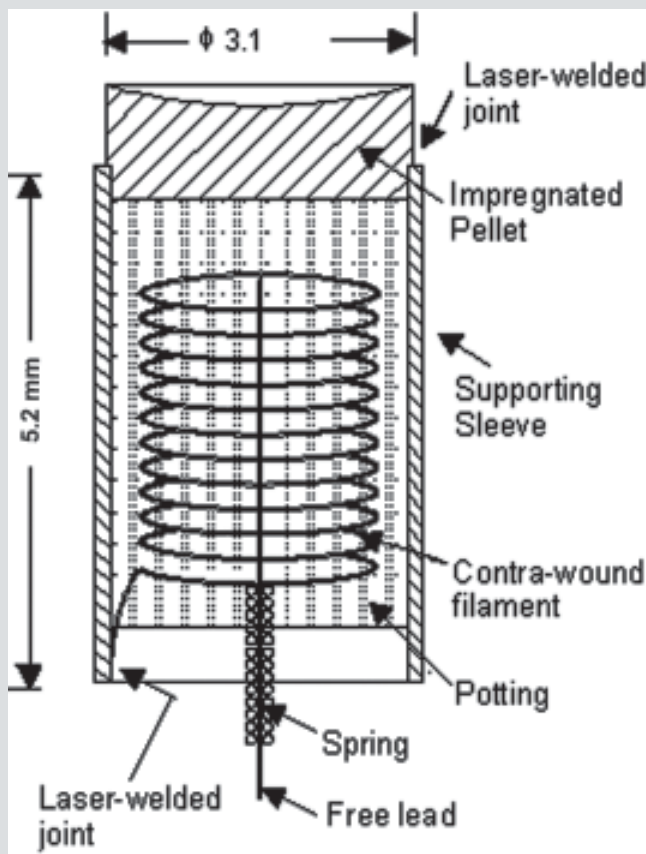
## Technology for Long-life Dispenser Cathodes developed at CEERI

**T**HE technology for long-life and high-emission current density Dispenser Cathodes has been developed under a CSIR network project by the Central Electronics Engineering Research Institute (CEERI), Pilani. The project was aimed at using this technology for ground and space applications.

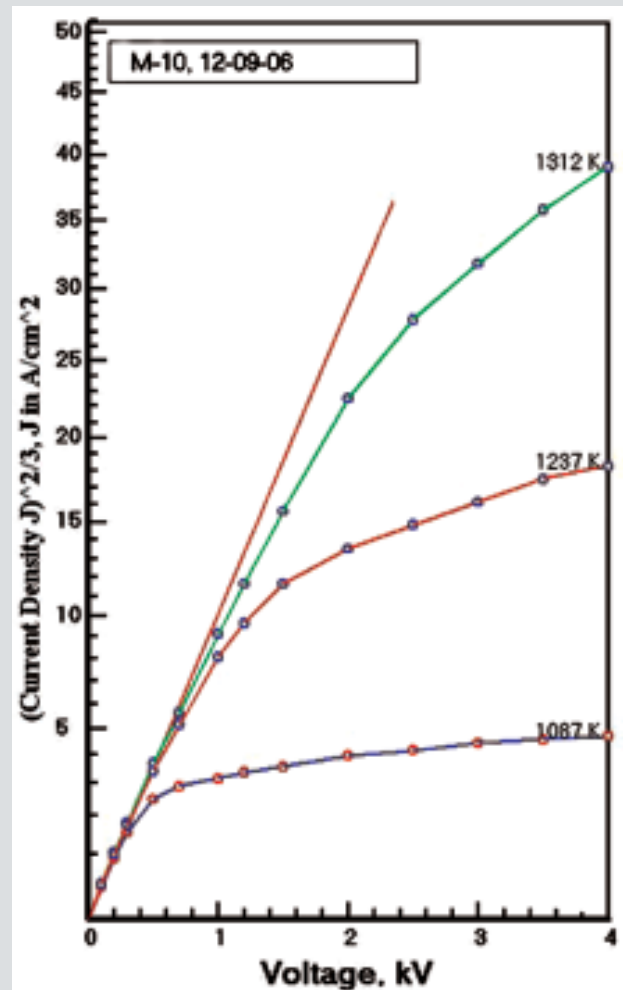
The details of cathode being developed are shown in figure. The main components of the cathode are porous tungsten pellet, supporting sleeve, contra-wound filament. The cathode is impregnated using Ba-Ca-aluminates, which is subsequently coated with a ternary alloy of composition W-2Re-2Os for emission enhancement. The heater is potted with non-shrinkable alumina, which is provided by the Central Glass & Ceramics Research Institute (CGCRI), Kolkata. A micro-helix is introduced into the free end of filament, which is partially buried into the potting zone. This acts as a spring that takes care of thermal and



Parts of Dispenser Cathode



Schematic Diagram of Dispenser Cathode



I-V Characteristics of Diode





Diode Bulb for Life-testing of Cathode



Life-Test Vehicle Cabinet

mechanical stresses. A novel technique has been developed to wind the micro-helix of diameter 0.12 mm out of a 0.05 mm W-3%Re wire. The fabricated parts are shown in figure.

A diode assembly has been made and pulse emission measurements have been carried out at CEERI. The I-V characteristics are plotted as shown in figure. The work function is estimated from these characteristics. The work function is found to be 1.76 eV, which is near to the state-of-art.

Some dedicated facilities have been created/ upgraded for development/analysis purposes: namely, (a) DC Triode sputtering for metal/alloy coating, (b) Auger

Electron Spectroscopy (AES) for surface analysis, (c) Low Energy Electron Diffraction (LEED) system for crystalline and secondary emission, (d) pulsar for studying cathode emission studies, and (e) table-top furnace (which can go upto 2000°C in a hydrogen atmosphere) for filament sintering, heater potting and pellet brazing.

For ensuring long-life of these cathodes, testing is carried out by putting them in a life-test vehicle (LTV). One of these LTVs is shown in figure. The cathode is undergoing accelerated life-test, since November 2005. The emission performance is stable till now. The life-tests are expected to continue for the next 5-6 years.

Pulse current density of upto 40 A/cm<sup>2</sup> has been drawn while the requirement for a ground application is <10 A/cm<sup>2</sup>. The other specifications on filament wattage and work function have been met. With an aim to use these cathodes in TWTs, efforts are going on to initially test them in the TWT electron guns. CEERI has plans to use the cathode technology for making cathodes in near future for the on-going projects on Gyrotrons and Klystrons.

For space TWT applications, long-life and reliability are of critical importance. These will be established by continued accelerated life-tests using LTVs for the next 3-4 years.

## Specifications

- Current density : 2 A/cm<sup>2</sup>
- Life (projected) : > 10 yrs
- Filament wattage : < 4 W

## Lab-on-a-chip for Chemical Analysis

The manipulation of liquids and gases in micro-channels has become a viable platform for performing analytical tasks typically done with bench-top instruments. A lab-on-a-chip for chemical analysis was designed and fabricated by the Central Electronics Engineering Research Institute (CEERI), Pilani, with six integrated electrodes for sample injection, separation and electrochemical detection. The device is a ready-to-use system, which does not need any extra mechanical apparatus for electrode insertion. The micro-analytical chip has been successfully tested for measuring hydrogen peroxide, ascorbic acid and uric acid simultaneously.

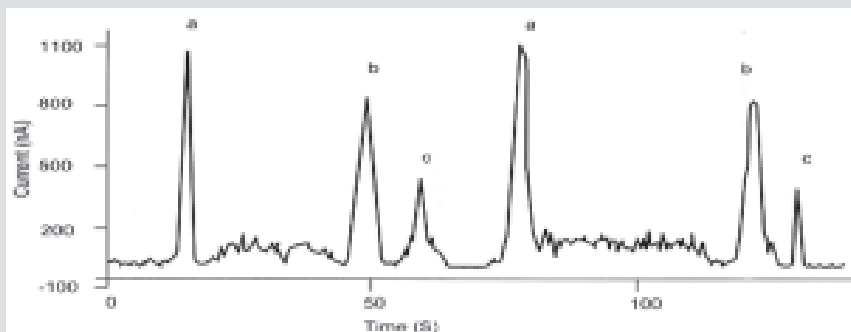
This work was carried out through the collaborative efforts of CEERI, RRL-Bhopal and CECRI-Karaikudi under the CSIR network project on MEMS and Microsensors.

## Specifications

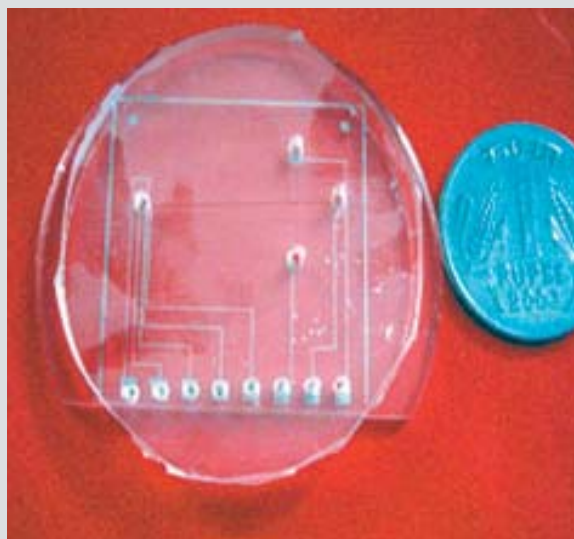
- Total area : 45 mm X 45 mm
- Width of channel : 200 μm
- Ends of injection and separation channels : 1500 μm X 1500 μm
- Injection channel : 10 mm
- Separations channel : 35 mm
- Injected sample volume : 65 nL



Testing jig for Chemical Analysis



Electro-pherogram for Sample Solution Containing 50 mM  
(a) Hydrogen Peroxide (b) Ascorbic Acid (c) Uric Acid



Lab-on-a-Chip



## R&D at NEIST

**T**HE R&D achievements and new programmes of the North - East Institute of Science and Technology (NEIST) (erstwhile Regional Research Laboratory), Jorhat, during the past 3-4 months include:

### Knowhow/Agro-practices developed

- Process know how for production of a bacterial formulation for crop enhancement and yield improvement.
- A new strain BLI-ARUN for cultivation and production of lemongrass.

### Projects undertaken

#### Grant-in-aid

- Study of fluoride contents in the water system of Jorhat district of Assam and creation of a fluoride database undertaken on behalf of Department of Science & Technology, Government of India, New Delhi. (Total estimated cost Rs 24 lakh for 3 years)
- Setting up of a training-cum-production centre on non leather foot ware centre in Udaipur, South Tripura (Joint project of NEIST and CLRI, Chennai) undertaken on behalf of Ministry of Human Resource Development, Government of India, New Delhi, (Total estimated cost Rs 60 lakh for 1 year)
- Study of diversity and abundance of Eukaryotic Hypomycetes group fungi in the flood prone Alluvial plain soils between the Noa Dihing and Burhi Dihing rivers of the Upper Brahmaputra valley undertaken on behalf of Ministry of Science & Technology, Government of India, New

Delhi (Total estimated cost Rs 12.48 lakh for 3 years, PI: Dr Paran Baruah)

#### Consultancy

- Preparation of Road-map in the medicinal and aromatic plant sector of Assam undertaken on behalf of the State Medicinal Plants Board, Office of the Directorate of Health Services, Hengerabari, Guwahati (Total estimated cost Rs 1.2 lakh for 6 months, PI: Dr P. R. Bhattacharjee)
- Gradation of NECIL coals by determination of heat values of the samples undertaken on behalf of North Eastern Coal Fields, Coal India Ltd, Margherita. (Total estimated cost Rs 0.68 lakh for one month, PI : Shri B. P. Baruah)

### Consultancy Projects completed

- Geotechnical investigation for diesel hydrotreater project of Bongaigaon Refinery and Petrochemicals Ltd, Dhaligaon. (PI: Shri A. K. Biswas)
- Gradation of NECIL coals by determination of heat values of the samples undertaken on behalf of North Eastern Coal Fields, Coal India Ltd, Margherita. (PI: Shri B. P. Baruah)

### Process released

- The strain "BLI Arun" (RRL Branch, Itanagar) released to (i) M/s Nyimi Extracts Pvt. Ltd,

Nyokum Lapang, Itanagar, Arunachal Pradesh and (ii) M/s Shelly Welfare Society, P.O. Doimukh, Dist. Papumpare, Arunachal Pradesh

- The process bacterial formulation for crop enhancement and yield improvement released to (i) M/s Carnation Flora, IID Centre, Assam Industrial Development Corpn.Ltd. Kundargaon, Titabor, Assam and to (ii) Shri Rajib Bora, Dhruva Nagar, Golaghat, Assam.

### Patents

#### Filed in India

- Application No.: 0385NF2005/IN : An improved process for the preparation of 4,5,6-substituted 3, 4-dihydropyrimidin-2-ones and their 2-thioxo analogues, M. J. Bordoloi, D. K. Roy Filing ( 09/03/2007)

#### Granted in USA

- Application No.: 0223NF2001/US: An improved process for isolation of bioplastic polyhydroxybutyrate (PHB) from *Bacillus mycoides* RLJ B-017, M. J. Bordoloi Patent No. 7129068 Grant date : 31/10/2006

### Agreement/MoU signed

- MoU signed with M/s Joram Socio-Cultural & Literary Society, Zero, Arunachal Pradesh by NEIST Branch, Itanagar, for handing over a 600 kg/batch capacity distillation unit under a DBT funded project.

## Centre for Cellular & Molecular Biology (CCMB), Hyderabad

### R&D Highlights: 2005-06

**T**HE highlights of basic research carried out at the Centre for Cellular & Molecular Biology (CCMB), Hyderabad, were covered in *CSIR News* 57 No 12 (2007), pp 192. A brief account of the socially relevant and applied research is presented here:

#### Research Relevant to Societal Needs

##### **Human genome diversity: Unique origin of Andaman islanders—insight from autosomal loci**

The mtDNA and Y chromosome studies of Andaman islanders undertaken by CCMB have led to the conclusion that the Andamanese “Negrito” mtDNA lineages have survived in the Andaman Islands in complete genetic isolation from other South and Southeast Asian populations. The recent investigation pertains to the autosomal microsatellite loci of the Great Andamanese, Onge and Nicobarese to infer about their origin. Interestingly, the Andaman ‘Negrito’ populations do not show genetic affinities either with the African or the Indian populations, confirming their unique origin. In contrast, the Nicobarese show close affinities with the Northeast Asian populations suggesting their more recent entry in the islands.

##### **Molecular diagnosis of common genetic disorders**

CCMB scientists have been seriously involved in attempts to reduce the burden of genetic disorders in the society through

molecular diagnosis, carrier analysis, predictive diagnosis, prenatal diagnosis and genetic counseling for almost a decade. They have added diagnostic tests for five more common genetic disorders, in addition to providing such facility to about 600 families with genetic diseases like haemoglobinopathies, musculopathies, neuro-degenerative disorders, bleeding and clotting disorders and other congenital anomalies. In addition to this endeavour. Several phenotypes, have been identified, which do not fit in the diagnostic criteria of any specific disease and hence provide excellent opportunity to dissect their genetic basis and help these families in avoiding the birth of another affected baby.

##### **Non-invasive detection of hormonal steroids in scat samples of lions**

Steroid hormone analysis plays a crucial role in establishing the fertility status of animals and also the breeding cycle of animals. Therefore, an ability to establish protocols for hormonal analysis of critical endangered animals using non-invasive methods would be very essential with respect to conservation of endangered species. A method has been developed to monitor progesterone and estradiol in scat samples of lions to establish

their reproductive cycle and fertility status. The levels of the steroid have also been correlated with behavioural clues of the animal when in heat. These studies would now help detect lions in heat and thus facilitate appropriate breeding programmes.

##### **Birth of Spotty by artificial insemination**

The technique of Artificial Insemination (AI), although routinely practiced in domestic animals, has not been commonly applied to wild animals. Using an AI technique, CCMB scientists achieved a successful delivery of a live fawn in March 2006. This was first successful artificial insemination in the spotted deer in India; the baby was named Spotty. The only other two countries, which achieved such success in deers using the same procedure, are USA and Australia.

##### **The Toda Buffalo: A unique breed in Nilgiri hills**

The Toda buffalo is an endangered breed reared by the Toda tribes, both are endemic to Nilgiri hills of the south India. These buffaloes occupy a central place in their social, religious and cultural life. There is no knowledge either on the origin or on the arrival of this tribe





or buffaloes in the Nilgiri hills. Microsatellite markers and mitochondrial DNA analyses by CCMB scientists show that this breed is genetically unique and, therefore, needs to be conserved. The time of divergence of Toda breed from the other Indian buffalo breeds has been estimated approximately 900 to 2700 years and it is also possible that the Toda people might have occupied these hills around that time.

### Application-oriented Research

#### Gene silencing and RNA interference

CCMB scientists in collaboration with IICT scientists, have unraveled the mystery of complex processes in animal and human development using RNAi. These path-breaking results were published in 'Cell' and they have presented an intriguing new example of how the RNAi machinery contributes to nuclear organization with a consequence on gene expression. For their studies, they used the genetically well-developed model organism, fruitfly for understanding the role of RNAi. They have further investigated how different developmental genes are regulated through RNAi machinery in executing the specific body plan in a sequence-specific manner. Their findings, for the first time, suggested that the fascinating new mechanism of RNAi machinery not only influences the regulation of a specific gene but also helps in bringing the genes from different chromosomes together promoting

higher-order nuclear organization which is essential for the development and maintenance of the organism.

The understanding of the mechanism of RNAi could be helpful in modern medicine by using the power of RNAi for destroying, for example, the machinery of infectious organisms, and as a powerful therapy against broad spectrum of complex and contagious diseases and for developmental abnormalities.

#### Antibacterial activity by peptides

Investigations on the molecular mechanisms of antibacterial activity by peptides derived from human beta defensins by CCMB scientists indicate that cell death in Gram-negative bacteria such as *E. coli* arises as a result of rapid large-scale destabilization of the bacterial cell surface and membranes. This mode of action is considerably different from the effects shown by therapeutically used antibiotics.

#### DNA macro chip for ophthalmic infections

As a part of the NMITLI project, scientists at the CCMB have designed and developed unique probes for identifying 15 microorganisms that are known to cause ophthalmic infections. These probes are designed for multiplexing. They could successfully multiplex 21 pairs of primers. The prototype of DNA macro chip developed at the CCMB could successfully identify all the

pathogens from the clinical samples at two different hospitals correctly. The primers, probes and the protocol developed at CCMB have been handed over to a commercial company for packaging and product development.

#### Development of Species-specific microsatellite markers/technology for SSR marker development

Microsatellites are the most desired DNA markers for genetic studies, but are limited in their availability (except for relatively few plants/animal species) owing to development cost in terms of work, time and cost. CCMB scientists have developed such markers for many species, including first ever sets for many important plants and animals, namely, Mulberry, beetlevine (plants of economic importance) and Red Panda/olive ridleys (endangered fauna). These markers provide efficient tools for genetic studies and are expected to be very useful in germplasm characterization and population studies on these species.

They have also developed a highly efficient PCR-based pre-cloning enrichment strategy for generating small-insert genomic libraries for development of species-specific microsatellite markers. The new method developed in the lab provides success rate of >80% which is significantly more than the success rates of any other similar method developed/reported till date worldwide.



## Symposium on Aircraft Design

A one-day symposium on Aircraft Design was organized on 14 June 2007 at the National Aerospace Laboratories (NAL), Bangalore, to honour Dr K. Yegna Narayan, Programme Director, Civil Aviation Programme (PGD, CAP). Dr S. Viswanath, Head, Structures Division; and Shri R. Rangarajan, Deputy Head, C-CADD and Project Director HANSA. The symposium concentrated on the various aspects related to aircraft design and development, both civil and other types.

Dr A. R. Upadhyha, Director,

NAL, formally welcomed the distinguished gathering. In his address, Dr Upadhyha mentioned that the civil aviation programme was started in NAL in a very small way in the 80's with LCRA under Prof. R. Narasimha and late Prof. R. B. Damania. "Today NAL has accomplished the mission of having HANSA 3 certified by DGCA, SARAS PT1 and PT2 flying". He expressed his happiness to have seen HANSA 3 participate at the Australian International Air Show 2007." This symposium provides an opportunity to all NAL scientists to interact with those from outside

working on other aircraft development programmes, said Dr Upadhyha. Prof R. Narasimha, FRS, Chairman, EMU, JNCAR and former Director NAL was introduced as the doyen of Aeronautics.

Prof. Narasimha inaugurated the symposium. In his address he mentioned that the seeds of the dream for the civil aviation programme was grown and nurtured at NAL by Dr K. Yegna Narayan and his colleagues. He also mentioned that civil aviation is for the consumer and the civil aeronautics is for R&D. He



### *Glimpses from Symposium on Aircraft Design*





expressed his gratitude to these three scientists Dr K. Yegna Narayan, Dr S. Viswanath and Shri Rangarajan “who are being honoured today, have shown outstanding commitment to the idea that NAL should play a leading role in establishing a civil aircraft design and development capability in the country”. Prof. R. Narasimha released the Proceedings of the Symposium and said “C-CADD will grow to give India an international presence in the world of civil aeronautics”.

The keynote address was delivered by Dr K. Yegna Narayan on Design issues in NAL's Civil Aircraft Programmes. He mentioned that he and Prof Narasimha shared a typical guru-shishya relationship since 1967. He gave an insight into solved and unsolved problems of civil aviation programme at NAL. “The LCRA experience gave NAL enormous confidence in undertaking design and development of composite aircraft”. He recounted the NALLA experiment, which had been abandoned. Later NAL's HANSA got successfully certified by DGCA in 2000. He spoke about salient features of HANSA, SARAS PT1 and PT2 and some major technology design issues like — Effect of propeller slip stream on drag, nacelle design, flap operating mechanics and weight reduction. He further said that NAL has forged first public private partnership in aircraft design and development in India with tie-ups with Mahindra Plexion Technologies Ltd, in the 4-5 seater General Aviation Aircraft development currently underway at C-CADD. He projected NAL's much more ambitious civil aircraft project in development of a state of the art 70 seater Regional transport Aircraft. He finally said “NAL has traveled a long way from LCRA to SARAS and now NAL should have concrete plans for the future”.

Prof. Narasimha while presenting a memento to Dr K. Yegna Narayan proudly proclaimed that he is very proud to have a shishya like Dr K. Yegna Narayan.

Shri M. S. Chidananda, Joint Head, C-CADD proposed a vote of thanks.

## AMPRI participates in the Exhibition on ‘Materials and Processes for Sustainable Development’

**T**HE Advanced Materials and Processes Research Institute (erstwhile Regional Research Laboratory) (AMPRI), Bhopal, participated in the ‘National Convention on S & T Communication for Growth and Empowerment’ organized by the Madhya Pradesh Council of Science and Technology (MPCST), Bhopal. On this occasion, AMPRI also displayed its ‘Materials and Processes for Sustainable Development’, showcasing the Building Materials using the industrial wastes like fly ash and red mud; Bulk Utilization of Fly Ash in Agriculture; Sisal Fibre Technologies, Environmental and Disaster Modeling and Environmental Chemistry aspects.

The AMPRI display was visited by a large number of dignitaries including Dr Balram Jakhar, Governor and Shri Shivraj Singh Chouhan, Chief Minister of Madhya Pradesh, scientists, technocrats, entrepreneurs, students and the general public and lauded the contribution of the institute to the development of the rural sector.

The AMPRI stall was adjudged as the second best stall in the exhibition.



Dr Balram Jakhar, Governor of M.P. visiting AMPRI stall in the exhibition.

Dr N. Ramakrishnan, Director, AMPRI is also seen

## CSIR-Industry Meet 2007

**T**HE Council of Scientific & Industrial Research (CSIR) (TNBD Division) organized the second CSIR-Industry meet at the Indian Institute of Chemical Technology (IICT), Hyderabad, with the theme 'CSIR: A partner for Innovation Driven R&D'. This two-days (17 and 18 May 2007) event had special focus on biotechnology and

drugs and pharmaceuticals. It received a tremendous response. About 135 industry representatives actively participated in the meet. From CSIR, Directors of 12 of constituent Laboratories made specific presentations to highlight core strengths in the focused areas and elaborated exploitable leads available. Focused brainstorming on

Technology Partnership in Biotechnology and Drugs and Pharmaceuticals respectively followed at the end of day's technical sessions. Dr T. Ramasami, Director General, CSIR put forth in the meet a broad framework for initiating well focused R&D activities in public-private partnership mode. He said that CSIR, has been engaged in the technology transactions model for long. A relationship model based on partnerships which promise co-generation of values to each other, for industry as well as CSIR, is the essential next step forward. He suggested sector specific in depth discussions to arrive at a common understanding so that roadmap for initiating well defined R&D activities be developed. Dr Ramasami further said that such partnership models can be an independent entity with industry and CSIR co-owning it. Following the meet several industries have initiated discussion with the laboratories to identify the possible collaborative/contract research projects.



Glimpses from CSIR-Industry Meet 2007





### National Technology Day Celebrations at CGCRI, NAL, and NBRI

**T**HE National Technology Day (NTD) is celebrated every year by the whole nation to commemorate the three major events that marked the resurgence of technology in the country: (i) the nuclear tests at Pokharan, announcing India's entry into the exclusive Nuclear Club; (ii) successful launch of *Trishul* missile showing the country's capability to defend itself and (iii) flight of *HANSA-3* heralding the dawn of civil aircraft industry in the country on 11 May 1998. As in the past, this year also CSIR laboratories/institutes joined the whole nation to celebrate the occasion.

Presented here is a brief account of NTD celebrations at the Central Glass & Ceramic Research Institute (CGCRI), Kolkata; National Aerospace Laboratories (NAL), Bangalore; and National Botanical Research Institute (NBRI), Lucknow, to cite a few examples of NTD programmes at the CSIR labs/institts.

#### Celebrations at CGCRI: *Role of Technology in Energy Security*

The theme of celebrations at CGCRI was 'The Role of Technology in Energy Security'. The Chief Guest on the occasion was Dr Sujan Chakraborty, Member of Parliament. Two thematic lectures were delivered: (i) '*Solar lighting Mission for India*', by Dr S.P.Gon Chaudhuri, Special Secretary to Government of West Bengal and Director, West Bengal Renewable Energy Development Authority (WBREDA), (ii) '*Can India reduce the foreign exchange outgo on oil to about a third of the current value*' by Prof. H. S. Mukunda, Indian Institute of Science, Bangalore. Participation to the function was from various institutes and industry in and around Kolkata.

Welcoming the guests and colleagues, Dr H. S. Maiti, Director, CGCRI, explained the significance of the day as well as the theme of the two lectures.

Dr Gon Chaudhuri in his lecture explained the link between the spread of solar power in the rural areas and the uplift of the rural

masses through the possibility of better education and higher standards of living. He explained how the use of solar power could avoid the use of fossil fuels such as kerosene. He said that the immediate target users for the use of solar power should be those who reside in the remote desert, hill areas, islands, and forest areas. He said providing light to 10 million families within the shortest possible time would require action on a Mission mode. The savings in subsidy on kerosene oil could be one of the incentives for funding the mission mode activities, he pointed out.



Dr H.S. Maiti, Director, CGCRI, felicitating Dr S.P. Gon Chaudhuri, Director, West Bengal Renewable Energy Development Authority. Prof. H. S. Mukunda, Indian Institute of Science, Bangalore, is seated on the right.

Prof. Dr H. S. Mukunda discussed the far reaching role that the use of biogas generated power could play in energy management in the country, reducing the extent of dependence on the conventional fossil fuels. He said there was enough technological capability in India in this regard. In fact, some of the Indian designed plants were being exported. He discussed how



the biomass could be derived from various sources and the various technology options, which were available. He presented an analysis of waste assets and ascribed agriculture, plantation, waste lands and urban activities as the waste sources. He also discussed strategies for waste land uses and the techno-economic issues. Gasification technologies are more efficient at smaller energy scales of 10kWe to 3 MWe. He reported a not too well known feature of the gasification systems, that is, the system requires one-fourth of the water required for operating a steam power generation system.

Dr H.S. Maiti then presented the current activities of the institute. His presentation focused on the achievements in three broad sectors, namely the National Security/Strategic, Industrial Growth and Societal Activities. He explained that CGCRI was a participant in the six out of sixteen technology sectors identified by CSIR in the Eleventh Five Year Plan. These are (i) Materials, Minerals and Manufacturing, (ii) Communication & Instrumentation (iii) Health Care, (iv) Energy & Environment, (v) Water Technology

and (vi) Rural Development.

Explaining the significant achievements of the institute during the Tenth Five Year plan, which ended on 31 March, Dr Maiti touched upon the achievements in specialty glasses, engineering ceramics, optical amplifiers and fibre Bragg grating sensors, bioceramics prosthesis and implants, nanostructured materials, solid oxide fuel cell, traditional ceramics, arsenic and iron removal

plants using ceramic membrane technology. He said that the plan for the use of a biogas power generation plant in CCRD, Bankura heralded an innovative approach for the energy management in energy intensive ceramic industry.

Dr Sujan Chakraborty in his address as the Chief Guest spoke of the need for a clear and supportive policy of the planners so that appropriate technology could be developed and the fruits of the development could be spread throughout all sections of the society. He pointed out as to why the Indian



Dr Sujan Chakraborty, Member of the Parliament and the Chief Guest on the occasion of the NTD celebration at CGCRI, delivering his address

scientists and the technologists should be on the alert to be able to maintain the leading edge, and did not lose out to other countries. He gave his opinion on the role that technology could play in controlling the environmental damage that were taking place in the energy sector. In this context, he appreciated the choice of the two topics for the day.

At the end of the function, Dr Chakraborty inaugurated the renovated and modernized auditorium named after the renowned Scientist Dr Meghnad Saha.

## Celebrations at NAL : National Power and Vedas

NAL arranged two lectures:  
(i) Air Commodore Dr M. Matheswaran VM, PhD, Commandant, ASTE, Bangalore delivered the Technology Day keynote address on *Technology Dimension and National Power*: and  
(ii) Shri Ramakrishnanda

Saraswathy Swamiji of Sri Vidya Peetam, Rishikesh, who is also the Founder of Vedic and Scientific Research Foundation, Pune, spoke on '*Scientific Applications of Vedas*'.

The celebration commenced with Dr A. R. Upadhyaya, Director, NAL, formally welcoming the

gathering. In his address he brought forth the significance of the event and highlighted the Technology Development programme undertaken and successes achieved by the laboratory. He also brought about the paradox of having achieved the highest technological



achievements on one side and stark poverty on the other and emphasized that only through technology can we narrow this gap.

Dr A. R. Upadhyia introduced the chief guest. Air Commodore Matheswaran was commissioned in the flying branch as a fighter pilot in 1975. During his career spanning over three decades, he has had the distinction of having flown various types of fighter, transport aircraft and helicopters, having logged 3100h of flying hours. He was awarded Vayu Sena Medal (VM) by the President of India in 1997.

### ***Technology Dimension and National Power***

Air Commodore Matheswaran in his illuminating exposition on 'Technology Dimension and National Power', brought about clear linkages between technology and power of a nation. He went on to elucidate how in the eyes of international community India is being taken seriously post Pokharan. The core of his address was his comparison of Toffler's theory of the era of Agriculture, Industrial and Knowledge based economies. He also made it clear that in the hegemony cycle in the life of nations it is very important to strategize on the military, economic, technological and political strength as well as weaknesses. He stressed that for the

### ***Celebrations at NBRI***

At the NBRI function Prof. G.K. Garg, Director (R&D), Krishi Dhan Seeds, Jalna, Maharashtra was the chief guest. Prof. Sushil Kumar,



A dais view of NTD Celebrations at NAL

nation to sustain its strategic and political dominance, it should identify its core technological strength and be focused to master the evolving technologies. It was his surmise that by the year 2020 India will be scientifically proficient. He aptly concluded his speech by quoting from Dr Manmohan Singh, IDSA 40th Anniversary Speech, 2005. 'Our security policy in the emerging global order must be based on three pillars. First, strengthen India economically and technologically. Second, to develop adequate defence capability making optimal use of modern science and technology. Finally, develop partnerships in the strategic, economic and technological spheres, to enlarge our policy choices and developmental options.'

Dr M. N. Sathyanarayan, Jt. Head, KTMD, compered the

IIM, Lucknow and Dr S.K. Gupta, Chief Gamete Antigen Laboratory, National Institute of Immunology, New Delhi, were the other

function and Dr M. R. Nayak, Advisor, M&A, proposed a vote of thanks

### ***Scientific Applications of Vedas***

Shri Ramakrishnanda Saraswathy Swamiji in his speech explained how Vedic rituals and mantras can be scientifically used to solve the problems of mankind. He mentioned about the experimental methods used by Vedic and Scientific Research Foundation to study the Vedic 'manthras' and 'yagnas'. He chanted two mantras identified for the cure of heart disease and hypertension. According to him the base of the various Yagnas and Homas was totally in tune with reason and logic of science.

Dr M. N. Sathyanarayan, Joint Head, KTMD proposed a vote of thanks.

dignitaries who graced the occasion. Scientists from the institute and research scholars of other sister laboratories, besides students of





various schools and colleges also attended the function. The day was observed as open day. Members of general public and students from various local colleges visited the different laboratories of the institute.

Dr Rakesh Tuli, Director, NBRI, while welcoming the chief guest and other dignitaries present on the occasion, said that it was imperative that good scientific leads were converted into technologies for the benefit of nation and common man. Referring to the products developed by NBRI, Dr Tuli informed that nearly 12 products have been sent for biosafety value assessment. Systematic studies would ultimately develop pharmacopoeia for plant based drugs. Citing the example of herbal gulal developed by NBRI, he said that we need to enlighten the common man and utilize the knowledge in various ways to reach the common man and industry. He also called upon the students who had gathered on the occasion to take up science as a career to contribute towards the industry and nation.

Speaking on the occasion, Prof. G.K. Garg mentioned about the various challenges faced during

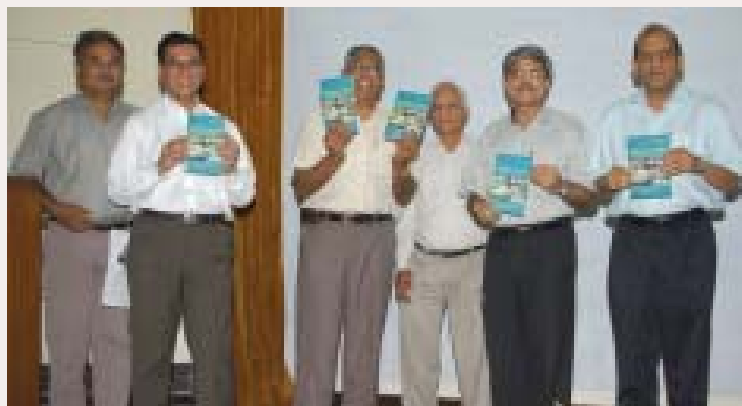
process of technology transfer. In his opinion, for an effective transfer of technology, it was necessary to survey the market, be updated about the latest in technology and develop the ability to do anything in large-scale. If the institutes lacked anywhere, it was at the product designing and development stage, he added. While outlining the development of biotech industry in India and abroad, he emphasized the need for enhancing public private partnership in biotech industries through innovations, gene discovery and technology development. Although there were millions of avenues but the need of the hour was dialogue, trust and commitment among the partners for successful public private partnership, he commented. If we succeed in this, India will have the projected growth in agriculture



A dais view of NTD Celebrations at NBRI

to sustain its overall economic growth. He also dwelt in detail the growth, demand and SWOT analysis of the bio-based Indian agri-industries.

Prof. Sushil Kumar in his lecture, entitled 'Agribusiness & Food Market: An overview', spoke on the global and national opportunities in agri-business and food market. Indian agriculture has always served as a means for subsistence, while today's demand is to make it a successful venture in terms of contribution towards the economy of the nation. Agri-business involves production and successful marketing of value added products. Without value addition to





## Appointments/NTD Celebrations

the agri-products, the income of the farmer is not going to increase, he stated. Presenting comparative data of yield of selected agri-commodities of many countries, he pointed out that India was far behind in terms of per hectare production. He stressed the need to focus on the technological changes in agriculture and turn these into agri-business, as India is the largest producer of tea, jute and other such products. India has the highest share of milk production and is the largest producer of pulses, and second largest producer of wheat and rice, he said. He emphasized the need to find our core competency and develop a synergistic relationship for better results. He called upon the scientists of NBRI to develop eco-friendly sustainable technologies.

Dr S.K. Gupta delivered a lecture, entitled: '*Innovation in Biotechnology: Opportunities for Scientists*' with special reference to various application of plant antibodies.

Dr R.K. Srivastava, Scientist, NBRI, presented the various green technologies developed by the institute which are available for commercial exploitation. An exhibition of the technologies and products developed by NBRI was also organized for the benefit of visitors. A book entitled '*Plants for decoration of House*' was also released.

A significant event of the day was the signing of R&D agreements with Reliance Energy Limited; Dabur Research Foundation, Ghaziabad and SB Limited, Ghaziabad. Dr R.K. Gupta, Scientist, NBRI, proposed a vote of thanks.

## Dr Ashwani Kumar takes over as Acting Director, ITRC

**D**R Ashwani Kumar, Scientist F and Head, Environmental Biotechnology Division of Industrial Toxicology Research Centre (ITRC), Lucknow, has taken over the charge of Acting Director, ITRC on 13 June 2007. Earlier, Dr C.M. Gupta, Director, CDRI was having additional charge of Director, ITRC.

Dr Ashwani Kumar did his M.Sc. in Biochemistry from Lucknow University in 1976 and Ph.D (Biochemistry) from Indian Institute of Science (IISc), Bangalore, under the supervision of Prof. G.Padmanaban. The areas of specialization of Dr Ashwani Kumar are Environmental Biotechnology — cloning and characterization of degradative genes, bioremediation of soils that are contaminated with chlorinated pesticides and Toxicogenomics — Microarray based transcription profiling, 2D-PAGE based proteomics, and determination of genetic predisposition in Indian population by discovery of SNPs using RFLP, dHPLC, and capillary sequencing.

Dr Ashwani Kumar visited NYU School of Medicine, NY, USA during 1980-84 as Post doctoral Fellow and again during 1988-99 as visiting scientist. He also visited University of Iowa, USA (January-December 1994); University of Stuttgart, Germany 14-18 June 2000); Melbourne, Australia (20-21 November 2003) and Tohoku University, Japan (15 April to 14 June 2006). Dr Ashwani Kumar has many national and international publications and one patent to his credit. He is life member of various national and international academic societies and professional bodies.



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Phone: 25846301 Fax: 25847062 E-mail: bck@niscair.res.in; meenakshi@niscair.res.in; vineeta@niscair.res.in; Website: <http://www.niscair.res.in>

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