

CSIR NEWS

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NBRI transfers Bt Cotton Technology to J.K. Agri Genetics Ltd, Hyderabad

THE National Botanical Research Institute (NBRI), Lucknow, signed an agreement with the M/s J.K. Agri Genetics Ltd, Hyderabad, on 26 July 2006, for commercialization of its new Bt cotton technology using Cry 1EC gene, in India. NBRI is well known for its contributions to designing and development of genes and technologies related to transgenic crops for insect resistance. Dr Rakesh Tuli, Director, NBRI, has taken the lead in developing indigenously the first Bt cotton variety and for this, he and his team were presented the CSIR Technology Award in the area of Biological Sciences for the year 2005.

JK Agri Genetics has recently launched the first indigenously developed Bt cotton in the Indian market after obtaining clearance from GEAC during Kharif 2006. The new gene (Cry 1EC) developed by NBRI would be pyramided with the recently released material carrying Cry 1Ac gene. This elite Bt cotton will give broader insect resistance coverage, particularly against *Spodoptera* (tobacco caterpillar) and is expected to provide durable and uniform protection to crop against the target pests. Besides, the new product would also help in delaying the resistance development in cotton Bollworm complex. Currently cotton varieties containing Bt do not offer acceptable control of *Spodoptera*.

JK Agri Genetics is expected to complete the regulatory studies and launch this elite new generation product in three years. Farmers who would plant this new product (Cry1EC + Cry1Ac) would be able to significantly reduce the use of expensive chemical insecticides, including organophosphate and synthetic pyrethroid products for providing protection against pests.



Dr Rakesh Tuli, Director, NBRI and Shri P. S. David, President, J.K. Agri Genetics Ltd, Hyderabad, exchanging the technology transfer documents. Dr R.A. Mashelkar Director General, CSIR (centre) is seen applauding.





CIMAP gets FICCI Award for Rural Development



THE Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has been awarded the prestigious FICCI Award for the year 2004-2005, in the area of Rural Development. The award was presented to the CIMAP Director, Dr S. P. S. Khanuja by Hon'ble Prime Minister of India Dr Manmohan Singh at a function of Federation of Indian Chambers of Commerce & Industry (FICCI) held at Vigyan Bhawan. The award, consisting of a shield and a certificate, has been given to CIMAP for its outstanding work towards catalyzing rural employment and income enhancement through medicinal and aromatic plants based entrepreneurship with special reference to CIMAP's 'Biovillage mission' approach of technological intervention.





SHANTI SWARUP BHATNAGAR PRIZE-WINNERS FOR 2006

THIRTEEN scientists have been selected for 2006 Shanti Swarup Bhatnagar (SSB) Prize for Science and Technology for the year 2006. These will be presented by the Hon'ble Prime Minister of India shortly. The winners along with the citations are:

CITATIONS

Biological Sciences

Dr Vinod Bhakuni
Central Drug Research Institute,
Lucknow

Dr Bhakuni has made outstanding contributions to our understanding the role of noncatalytic structural domains and ionic interactions in regulating the functional activity of the catalytic domains in proteins

Dr Rajesh Sudhir Gokhale
National Institute of Immunology,
New Delhi

Dr Gokhale's work has discovered a new family of long-chain fatty acyl-AMP ligases (FAALs) and has also elegantly elucidated 'biochemical crosstalk' between fatty acid synthases and polyketide synthases, which produce diverse unusual lipids of the complex cell wall of *Mycobacterium tuberculosis*. His studies have significantly expanded our understanding of how pathogens evolve their gene products to generate metabolic diversity.

Chemical Sciences

Dr Srinivasan Sampath
Indian Institute of Science,
Bangalore

Dr Sampath has made outstanding

contributions in developing supercapacitors and nanobimetallics and their novel applications.

Dr K George Thomas
Regional Research Laboratory,
Thiruvananthapuram

Dr Thomas has made significant contributions to photoresponsive nanomaterials and their applications.

Earth, Atmosphere, Ocean & Planetary Sciences

Dr Gufran-ullah Beig
Indian Institute of Tropical
Meteorology, Pune

Dr Beig has made significant contributions related to middle and upper atmospheric response to anthropogenic emissions of green house gases. His prediction of mesospheric cooling by 2 to 4K/decade has serious future implications.

Dr Pulak Sengupta
Jadavpur University, Kolkata

Dr Sengupta has made fundamental contributions to an understanding of grain-scale reaction mechanism and its application to ultra-high

temperature regional scale metamorphism.

Engineering Sciences

Dr Ashish Lele
National Chemical Laboratory,
Pune

Dr Lele has made pioneering contributions by probing micro and mesostructure of polymeric materials and relating it to the macroscopic dynamical and equilibrium properties using a combination of theory and experiments.

Dr Sanjay Mittal
Indian Institute of Technology,
Kanpur

Dr Mittal has made fundamental contributions to the understanding of flow instabilities in the presence of fluid-structure interactions, specially when structure is flexible and interactions are highly dynamic and unsteady.

Mathematical Sciences

Dr Vikraman Balaji
Chennai Mathematical Institute,
Siruseri

Dr Balaji has made significant contributions to moduli problems of



SSB Prize-winners/MoUs

principal bundles over algebraic varieties, in particular on the Uhlenbeck-Yau compactification of the Moduli Spaces of μ -semistable bundles. Further his work on holonomy groups for stable bundles on surfaces is significant.

Dr Indranil Biswas
Tata Institute of Fundamental Research, Mumbai

Dr Biswas is a very productive mathematician who contributed significantly to algebraic geometry, centering around moduli problems of vector bundles. He is also an acknowledged expert on moduli of parabolic bundles.

Medical Sciences

Dr Virender Singh Sangwan
L V Prasad Eye Institute, Hyderabad

Dr Sangwan has made outstanding contribution to the application of limbal stem cell biology to restore vision to victims of corneal injury.

Physical Sciences

Dr Atish Dabholkar
Tata Institute of Fundamental Research, Mumbai

Dr Dabholkar has established how

quantum theory modifies the entropy of black holes and for his pioneering studies on supersymmetric solitons in string theory.

Dr Sanjay Puri
Jawaharlal Nehru University, New Delhi

Dr Puri has made outstanding contribution to understanding problems in nonequilibrium statistical physics, such as kinetics of phase ordering, including the effects of confined geometries, as well as the role of defects in phase separation dynamics.

The SSB Prizes are given to scientists for their outstanding scientific contributions made primarily in India during the last five years preceding the year of the Prize. Those who are not more than 45 years of age, as reckoned on 31 December of the year preceding the year of the Prize, are eligible. The SSB Prize comprises a citation, a plaque and a cash award of Rs 2,00,000.

CRRI signs MoU with AITS

THE Central Road Research Institute (CRRI), New Delhi and Association for Intelligent Transport System (AITS), New Delhi, have signed a memorandum of understanding (MoU), to collaborate towards the development of a National ITS Centre of Excellence (NITS) and undertake research, consultancy development and knowledge dissemination in the field. While CRRI is a premier institute for road research, AITS is a premier organization for development of Intelligent Transport System (ITS) as well as for undertaking user-oriented research.

The MoU was signed by Dr P. K. Nanda, Director, CRRI and Shri Amitabh Bajpai, President, AITS .



Dr P.K. Nanda, Director, CRRI, and Shri Manoj Kawatra, Director, AITS, exchanging the MoU documents

CSMCRI signs MoU with Archean Chemical Industries for manufacture of potash

THE Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, has signed an MoU worth Rs 1.09 crore on 21 July 2006 with M/s Archean Chemical Industries, owner of Jakhau Salt Works in Kutch, for licensing the know how for production of sulphate of potash

(SOP) fertilizer, refractory grade magnesia and eco-friendly brominating reagent in an integrated manner.

Jakhau Salt Works, which is reputed to produce the finest quality export grade salt in India, now intends to manufacture these products in Greater Rann of Kutch where natural salt bitterns are available in abundance.

Presently, India's annual import of muriate of potash fertilizer (MOP) is around three million tonnes. SOP is a superior fertilizer to MOP and it will be produced at a competitive cost using CSMCRI technology. The magnesia produced will be of more than 95% purity, and with low boron content. The Central Glass & Ceramic Research Institute (CGCRI), Kolkata, has evaluated performance of the magnesia prepared by CSMCRI and found it quite suitable in refractory



Dr Pushpito K Ghosh, Director, CSMCRI, and Shri P B Anandam, CMD, Archean Group of Industries, Chennai, exchanging the agreement documents

applications. CSMCRI has additionally developed a process to produce magnesia of up to 99% purity, which would be of interest for magnesium metal production and other high-end applications. The eco-friendly brominating reagent bypasses the production of liquid bromine and yet is capable of doing many of the commercially important bromination reactions

with high bromine atom efficiency. Aforesaid processes are protected by half a dozen US patents granted recently and related PCT and Indian patent applications have been also filed. Additionally, two more patent applications on the improved magnesia process have been filed.

The total technology licensing fee is Rs 1.09 crore. The license is being given on non-exclusive basis and annual royalty is additionally payable. A foreign consultant from Salt Lake City, USA, with experience in the area of large marine chemicals works, is being appointed by the party to undertake detailed engineering based on CSMCRI process.

Corrigendum 3 MW S-band Magnetron

In the above news item published on p 227 of *CSIR News*, 15 August 2006, please note: A glass version of water-cooled mechanically tunable unpackaged pulse magnetron, with peak power 3 MW in S-band, has been developed by **the Central Electronics Engineering Research Institute (CEERI), Pilani**, [and not *National Institute of Oceanography (NIO), Goa*, as reported] in collaboration with Centre for Advanced Technology, Indore.

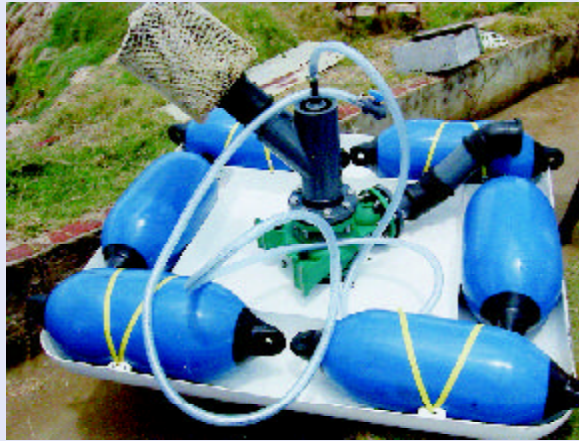
The error is very much regretted.



NIO participates in Indo-Norwegian Programme on Shrimp Aquaculture in Sustainable Manner

POND-based coastal aquaculture, particularly of shrimps, has gained considerable momentum in India due to quick returns from both national and international markets. Today, India occupies fourth position amongst the major shrimp farming countries in the world. The past decade witnessed a remarkable increase in annual shrimp production in the country — from 35,500 to about 113,000 tonnes, with an export value of US \$ 800 million.

Traditionally, aerators are used to increase the oxygen content of the water. Most of the aerators employed in aquaculture today, mix water with air either after the pump (e.g. Ejector base aeration) or with a propeller in open water (e.g. Air O₂, Paddle-wheels, etc). An innovative aeration technology developed in recent past by HOBAS Water Engineering has many improved features. The project was taken up under the aegis of Indo-Norwegian Institutional Co-operation Programme by the National Institute of Oceanography (NIO), Goa, from India and RF-Rogaland Research, Stavanger, Norwegian Institute for Water Research (NIVA) and HOBAS Tropical Aquaculture, Sola from Norway, to develop and demonstrate how the new technology could improve the water quality and in turn result in sustainable production under Indian conditions. The HOBAS



A view of HOBAS Aeration System

aeration technology mechanically mixes air and water in order to replace oxygen deficits, and flushes the excreted, potential toxic, carbon dioxide and ammonia. The pump also creates horizontal physical water current in the pond when sufficient numbers of aerators are employed and implementation is done correctly.

A team of NIO scientists conducted various experiments for water quality, environment, bacteriology and production in commercial shrimp ponds along the Coastal Karnataka with the HOBAS aeration technology and noticed that it is capable of maintaining optimum water quality conditions, particularly the dissolved oxygen, healthy bacterial counts and maintain sustainable shrimp growth and resulting in lower Food Conversion Ratio (FCR). This technology, along with other Best Management Practices (BMPs), seeks to help improve conditions in the pond

for better utilization of nutrients. Adoption of these technologies will result in increasing the yields by about 20-25% for two reasons: Due to the optimal environmental conditions in the pond during the production cycle and the increased phytoplankton production due to re-suspension of available nutrients. The HOBAS aerator also showed a strong ability and high capacity in flushing the possible toxic gases such as Ammonia and Hydrogen

sulphide. This technology may be replaced or could be used in conjunction with the existing aeration technology for improvement in environmental conditions in the pond.

Few more trials of HOBAS technology, particularly along the east coast of India to generate data under different environmental conditions with the active involvement of stakeholders so that farmers gain confidence in this new technology has been proposed. NIO would be providing R & D support to commercialize the HOBAS technology in India

Scientists from NIO - Dr D. Chandramohan, Shri. R.A. Sreepada, Drs P.A. Lokabharathi, S.G. Dalal, X.N. Verlecar, B.S. Ingole and a group of young project assistants were involved in evaluating this technology and developing other Best Management Practices (BMPs) for sustainable aquaculture for last three years.



National Chemical Laboratory (NCL), Pune

R&D Highlights

THE National Chemical Laboratory (NCL), Pune, continues to maintain its lead in research in cutting edge science as reflected by its publications. A few indicators:

Research Publications

During 2005, NCL published 443 scientific papers in leading journals of the world. The average Impact Factor (IF) per paper from NCL has been steadily increasing over the past three years, and during 2005, it was 2.067. NCL's basic research is supported by over 420 research fellows and post doctoral research associates. The laboratory produces the largest number of Ph.Ds in chemical sciences.

Patents

During 2005-06, NCL was granted 31 Indian patents and 29 US patents. It filed 45 patents in India and 28 patents abroad during the above period. Two of NCL's US patents, one in the area of process safety control (U.S. Pat. 6,826,513) and the other in the area of separation of complex signals into components (U.S. Pat. 6,208,951) have been licensed to a US company.

Technology Development and Transfer

The laboratory introduced a new product, a porous PE for ocular reconstruction after trauma causing injuries. A new company, named Biopore (www.biopore.in) has been incorporated to introduce the

product commercially in the market.

A catalytic process to produce Epichlorohydrin was licensed to Aditya Birla Group (ABG). The laboratory met the challenge to develop and demonstrate a commercially viable process (reaction + separation) to ABG. This contract with ABG is one of the largest in the history of process licensing at NCL. It is envisaged that the plant for the production of Epichlorohydrin will come up in Thailand in a few years.

An improved process was developed for the manufacture of Silicon Chloride using an innovative reactor design and operations. The process was demonstrated to the customer on 1 kg/h scale using a continuous fluid bed reactor.

A pilot plant has been set up for the production of a family of alkylphosphine oxide and the process demonstrated to the customer. The products are of strategic relevance to the country. Innovations in performing Grignard reactions on a large scale were addressed to in the course of developing this process on a manufacturing scale. Also, several processes developed by NCL for API moved closer to the market.

Service Rendered

The laboratory rendered knowledge-based services to 110 customers, including 18 from outside India.

Budget and Revenue

NCL closed the financial year with an external cash flow (ECF) of Rs 21.5 crore, as compared to Rs 14.8 crore in 2004-05. More importantly, the contribution from industry to ECF was Rs 11 crore, up from Rs 9.0 crore in 2004-05. NCL ranked fifth in ECF, after NAL, NGRI, IICT and CEERI, amongst the CSIR laboratories. However, the laboratory ranked first in ECF from industry.

Over and above, the ECF of Rs 21.5 crore, NCL received, as grants, an additional sum of Rs 8.72 crore under various Network and NMITLI programmes. The laboratory received from CSIR a sum of Rs 45.1 crore as budgetary support for the year 2005-06. This takes the total value of NCL's operating budget to Rs 75 crore. NCL transacted funds to the extent of Rs 100 crore in 2005-06, a substantial increase over the last year. This increase in transactions has come from productivity increase per employee, not the number of employees in these functions.

New Facilities

NCL expended a sum of Rs 11.5 crore towards capital expenditure in the year 2005-06. Several major facilities were added. These include MALDI ToF, AFM, 400 MHz NMR spectrometer, protein purification system, micro array spotter and scanner, scanning electrochemical microscope, fuel cell test system, CVD unit for carbon nanotubes,



small angle x-ray diffractometer, HR TEM and dual beam environmental SEM. The laboratory is in the process of setting up facilities for micro reaction engineering as a capability for the future. Several other investments towards enhancing NCL's research capabilities are also under way.

ICT Facilities

NCL's investments for augmenting its capabilities in Information and Communication Technology are proceeding on track. NCL commissioned a new communication system at a cost of Rs 7,000,000. As the laboratory moves to more and more web-based systems for its internal management, security of information becomes of paramount importance. Security, access rights, disaster recovery management and redundancy are all issues that are being looked into. NCL is in the process of implementing a campus wide ERP system, which will create an automated work flow for the management of all critical functions of the laboratory.

Infrastructure

Last year, NCL spent Rs 3.00 crore on works and services, of which approximately 50% was spent from the laboratory reserves. A new 1000 KVA substation was commissioned at an estimated cost of Rs 1.00 crore.

NCL Innovation Park

The erstwhile MERADO campus of CSIR was rechristened as NCL Innovation Park

(www.innovationpark.org) and it is emerging as a new Resource Centre of NCL, which will house the Venture Center (www.venturecenter.co.in)— a new Section 25 Company that NCL will float shortly. The Venture Center will provide 10, 000 sq feet fully built up laboratory space as incubator for early stage discoveries to be converted to marketable products or processes.

In addition, the NCL Innovation Park will house several business facilitation functions as well as independent R&D centers of corporate entities, either as stand alone facilities or as JVs with NCL. The funding for the Venture Center has been tied up and will see an investment of close to Rs five crore in the next three years.

Deepak Research and Development Foundation (DRDF) has already occupied a 7500 sq feet facility at the Innovation Park. This is the first corporate R&D facility within NCL campus. NCL and DRDF have signed an MoU to synergize their activities and create mutual value.

The NCL Innovation Park will also house the 'Single Molecule Repository' of NCL. At NCL, scientists synthesize several thousands of new chemical structures in the course of contract research and student research. The Single Molecule Repository will systematically receive, catalog and archive molecules synthesized at NCL. Techniques of data mining based on contemporary tools of chemo-informatics will be used for

the management of the Repository. Systems for submitting samples and facility management will be announced shortly.

NCL Innovation Park is thus poised to emerge as a key Resource Center of NCL that will leverage the strengths of NCL and explore new models of public – private partnerships and wealth creation with industry.

The construction of the new building in the NCL campus to house the laboratories of 'Polymers and Advanced Materials' will commence in September 2006 and is targeted to be completed by first quarter of 2008.

Honours & Awards

Dr K.N. Ganesh won the prestigious TWAS Award in Chemistry. NCL's team led by Shri P.P. Barve, won the CSIR Technology Award for the year 2005, for their contributions to the development of a manufacturing process for ATBS, commercialized by M/s Vinati Organics Ltd. Dr U. Natarajan won the MRSI Award for 2006 and Dr Guruswamy was awarded the CSIR Young Scientist Award in Engineering Sciences. Dr S. Sivaram was awarded *Padma Shri* by the President of India on 29 March 2006.

NCL continues to attract young scientists in areas of its interest. Several scientists joined NCL with exceptional academic credentials and sound training in some of the best academic laboratories around the world.



Synthesis and Characterization of Cumgal Ternary Hydrotalcites as Catalysts for the Hydroxylation of Phenol

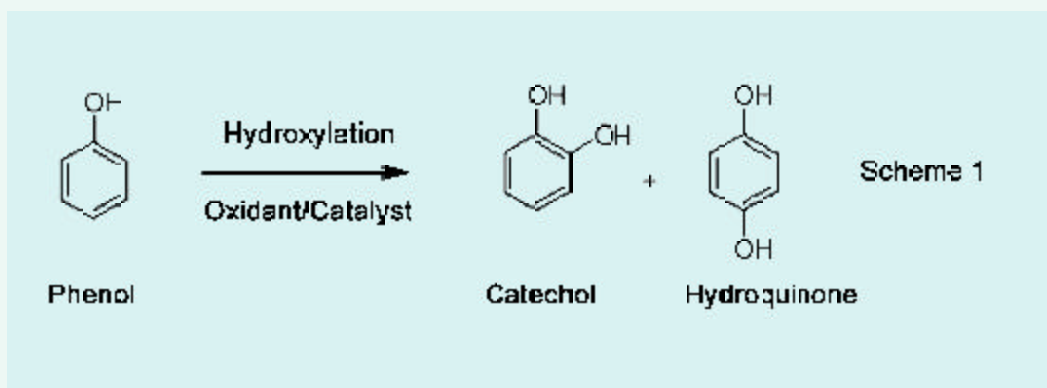
HYDROTALCITE-like compounds comprise a class of anionic clays or layered double hydroxides. These compounds have been receiving an increasing attention in recent years because of their diverse applications. Synthesis of these materials containing transition metal ions, especially copper, in the sheets is of particular interest because of their selective oxidation properties. Hydroxylation of phenol to dihydroxybenzenes (Scheme 1) is an important selective oxidation reaction because both the products namely catechol and hydroquinone find diverse applications e.g. as photographic chemicals, antioxidants, flavoring agents, polymerization inhibitors and in pharmaceuticals.

Recently, S. Kannan, A. Dubey and H. Knozinger of the Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar,

have reported the hydroxylation of phenol over various copper-containing ternary hydrotalcites having different di- and trivalent metal ions and claimed comparable activity of these materials with that of some of the zeolite-based materials. In an endeavor to elucidate influence of the divalent non-transition metal cation on the catalytic performance, magnesium was chosen as a second divalent cation.

Single-phase CuMgAl ternary hydrotalcites with different Cu/Mg atomic compositions were successfully synthesized in the entire composition range studied (from 5.0 to 0.2). Orderliness of the HT-like lattice and thermal stability of these materials increased with increasing magnesium concentration. Activity for selective hydroxylation of phenol, using H_2O_2 as oxidant and H_2O as solvent, increased with increasing copper

concentration while normalized activity showed a reverse trend. A mixed trend in the activity was noted with the variation in substrate: catalyst ratio. Comparison of the activity of as-synthesized hydrotalcites with their corresponding calcined forms indicated that the former are more active than the latter. A variation in the activity trend was noted when compared among the calcined samples, due to varied phase compositions (influenced by Cu/Mg atomic ratio, as evidenced from *in situ* PXRD). The better intrinsic activity for the sample with lower copper content is attributed to better dispersion of the active metal ion. Here Cu^{2+} and its facile redox behavior has been studied by N_2 adsorption measurements, cyclic TPRO, SEM and spectroscopic measurements. This study has been published in *Journal of Catalysis*, 231 (2005) 381-392.





Impact Factors of NISCAIR Journals

IMPACT Factors (IF) of selected peer-reviewed scientific periodicals published world over are analyzed and published by Thomson ISI (USA) as *Journal Citation Reports (JCR)* every year. JCR provides quantifiable statistical data for evaluating the leading journals and their impact on the global research community.

JCR for the year 2005 covers about 7500 journals published from various countries. Among these, 49 are peer-reviewed journals published in different disciplines by the government/autonomous institutions and private publishers in India. Nine of these 49 journals are from CSIR's National Institute of Science Communication and Information Resources (NISCAIR) in New Delhi. It is heartening to note that most of these NISCAIR journals show an improvement in terms of their IFs.

IFs of NISCAIR journals for the years 2005 and 2004 are given in the table.

The highest IF i.e. among the Indian journals is that of *Indian J Biosci.* i.e. 1.031. As is evident from the Table, the overall trend of the NISCAIR journals has been encouraging. The institute is striving hard to further improve the reach and the standard of its journals.

S No	Journal	IF	
		2004	2005
1.	Indian Journal of Chemistry, Sec A	0.509	0.632
2.	Indian Journal of Biochemistry & Biophysics	0.308	0.505
3.	Indian Journal of Chemistry, Sec B	0.476	0.446
4.	Indian Journal of Pure & Applied Physics	0.399	0.495
5.	Journal of Scientific & Industrial Research	0.191	0.232
6.	Indian Journal of Chemical Technology	0.235	0.226
7.	Indian Journal of Marine Sciences	0.150	0.202
8.	Indian Journal of Fibre & Textile Research	0.112	0.190
9.	Indian Journal of Engineering & Materials Sciences	0.087	0.160





New Infrastructural Facilities at RRL, Bhopal

THE Regional Research Laboratory (RRL), Bhopal, has enhanced its R&D facilities by establishing Technology Enabling Centre, Computer Simulation and Design Centre, Microfluidics and MEMS Centre and Computational Fluid Dynamics Centre.

The Technology Enabling Centre has been established at the laboratory to design and develop machinery for making composites using industrial wastes, natural fibre and polymers, commercialize the technology developed and impart training to the users.

The main functions of the Microfluidics and MEMS Centre will be to develop and characterize the Micro Total Analytical System (μ -TAS) and its application in single molecule analysis, and develop miniaturized fuel cells for micro power generation.

The Computational Fluid Dynamics Centre will pursue programmes in the areas of simulation, design and development of different mineral processing unit operations, simulation and design of environmental control technologies and water resource modeling. The CFD application also includes consequence modeling of flammable material explosion and blast hazard analysis by applying PHAST software.

The Computer Simulation and Design Centre's activities will pertain to simulation of film growth,

finite element simulation of tube extrusion and die design, analysis of spring-back in sheet metal bending, effect of friction in hot die forging, FEM characterization of ductile fracture, casting simulation of porthole die extrusion, application of artificial neural network in structural shape optimization and simulation of nozzle pull out.

Dr R.A. Mashelkar, FRS, Director General, CSIR, inaugurated these new facilities recently. He described the establishment of these facilities as representation of an ambition to look at the natural wealth of the country, add value to it and develop the technologies of tomorrow. He underlined the need to innovate cost effective new materials from natural resources.

While at RRL-Bhopal, Dr Mashelkar also witnessed the progress of the laboratory and addressed the RRL-Bhopal staff. The laboratory is well known for its contributions to the areas of wood substitutes, building materials, sisal composites, effective utilization of industrial wastes, components/material for the automobile sector, modeling and design, cellular materials, light materials, tribo materials, minerals processing, environmental modeling, etc.

Addressing the staff of RRL, Dr Mashelkar complimented the laboratory for its progress, particularly in the areas of Natural Fibre Composites, Al Foam, and

Microfluidics and MEMS. He observed that the physical income of the laboratory has gone up by three but the psychic income has gone up manifolds through the commitment and satisfaction of work being done by the scientists.

Highlighting the progress graph of CSIR during 1995-2005, Dr Mashelkar said, "I am dangerously optimistic about the future of the country and it is not a hype, it is real hope. The issue is not about having resources, the issue is about having ideas," he said.

Earlier, Dr N. Ramakrishnan, Director, RRL, presented a report on the activities of the laboratory.

CSIO Industry Meet

AN Industrial Promotion Campaign was organized by the Rajasthan State Industrial Development & Investment Corporation Limited (RIICO) at PHD Chamber of Commerce and Industry at New Delhi to discuss issues related to infrastructure, technology, business potential of various sectors of relevance to the State of Rajasthan. The Central Scientific Instruments Organisation (CSIO), Chandigarh, participated in this event and had close interaction with the delegates. Dr Pawan Kapur, Director, CSIO, highlighted the technologies and expertise available in the laboratory in the relevant areas. Technical brochures and other details were



provided to the delegates.

The event provided a good forum to display the expertise available in the laboratory towards new business development in the areas of Health Care, IT, Optical Instrumentation, Agri-instrumentation, etc. The response of the visitors to the exhibition was encouraging who showed keen interest in the above areas. Various dignitaries who attended the meet included, Managing Director and senior officers of RIICO, member of PHDIC, industrialists and businessmen willing to set up their new units in the state of Rajasthan. It was proposed that similar meets would be organized at other places also.

Single Crystal X-ray Diffractometer Users' Workshop at NCL

THE National Chemical Laboratory (NCL), Pune, organized a three-day 'Bruker-AXS single crystal X-ray diffractometer users' workshop 2006' in the recent past. The workshop was sponsored by Bruker AXS, The Netherlands. NCL was the first laboratory to acquire SMART APEX 1:1 CCD single crystal X-ray diffractometer with latest technology. There are eight such single crystal X-ray diffractometers in the country and the number is growing. The purpose of the workshop was to give hands-on experience on the latest softwares to the users and also to discuss the problems faced by researchers. This was second workshop in the series and the first one was organized at Indian Institute of Science (IISc), Bangalore. About forty participants from IITs, CSIR laboratories, R&D institutes and universities from various parts of the country attended the workshop.

Dr (Smt.) Vedavati G. Puranik, Scientist, Center for Material Characterization, NCL, in her welcome speech, shared her

experience on SMART APEX with the audience. Dr B.D. Kulkarni, Deputy Director, NCL, inaugurated the workshop. Prof. T.N. Guru Row, Chairman, Solid State and Structural Chemistry Unit, IISc, Bangalore, delivered the inaugural talk on 'Charge density analysis on molecular crystals: Insights into intermolecular interactions'.

In his inaugural address Prof. Guru Row spoke about one-electron properties, intermolecular interactions in terms of the atoms in molecule, visualizing mapping electron densities etc. He explained the possibility of collecting the precise and accurate data at low temperature with the help of SMART APEX single crystal X-ray diffractometer. He elaborated the use of 'atom in molecule' approach with special emphasis on improvements in charge density models. He also illustrated the developments in both experimental and theoretical techniques to interpret and analyze the nature of weak intermolecular interactions. He also showed the appearance

of a "region of overlap" to segregate hydrogen bonds from van der Waals interactions based on the criteria proposed by Koch and Popelier. He gave the examples of coumarin and its derivatives for identifying differences in energy surfaces in concomitant polymorphs.

In another invited talk, Prof. A. Nangia, School of Chemistry, Central University, Hyderabad spoke on 'Conformational, concomitant polymorphs:



Dr Leo Starver, Application Scientist of Bruker-AXS B. V., The Netherlands, giving hands-on training



Multiple molecules, kinetic and thermodynamic factors, and polymorph control'. Starting with the importance of polymorphism in organic crystals and pharmaceuticals, Prof. Nangia discussed different types of polymorphism and methods of establishing it. He elaborated on the Host-Guest inclusion compounds, H-bonding and intermolecular interactions and how they can be different in different polymorphs. Usefulness of various methods like Powder X-ray, TGA and DSC to identify different types of polymorphs was shown with the help of experiments carried out in his lab. He touched upon the controversy in naming solvated crystals and pseudopolymorphs. He also showed the fundamental understanding of crystallization and new pharmaceutical phases in a very simple way.

The hands-on training using latest software was organized at the computer laboratory of Digital Information Resource Center of NCL. Dr Leo Starver, Application Scientist of Bruker-AXS B. V., The Netherlands, conducted the training programme. The users discussed the latest results obtained in their laboratories and also the problems faced while solving the difficult molecular structures. Solving of the twinned crystal structures and handling of disordered structures was explained during the technical sessions. There were four short presentations by the participants giving the novel results from their institutes.

Dr Mohan Bhadbhade, Scientist, Center for Material Characterization, NCL, proposed the vote of thanks.

NBRI Golden Jubilee Volume Fifty Years of R & D Service to the Nation

THE National Botanical Research Institute (NBRI), Lucknow, has played a pivotal role in undertaking advanced research and converting the plant resources into valuable and usable commodities. This institute has completed 50 years of its existence. A Golden Jubilee Volume entitled 'Fifty Years of R & D Service to the Nation' was released at the finale function, which gives a brief account of the 50-year journey of the institute from its inception to the present day.

The volume has been authored by Palpu Pushpangadan, Sudershan Kumar and Vinod Kumar Kochhar.

NBRI owes its origin to the golden era of the great Nawabs of Lucknow during the first half of 19th century. It was renamed as the Government Horticultural Garden during the British rule. In 1932 this public park was transformed to a Botanic Garden which was rechristened as National Botanic Garden (NBG), in 1948. NBG was taken over by CSIR on 13 April 1953 and later renamed as National Botanical Research Institute (NBRI) in 1978. Since then the institute has grown into a state-of-the-art national laboratory, promoting research in the fields of ethenopharmacology,

biochemistry, environmental sciences, biotechnology, conservation biology, cytogenetics, floriculture, genetic engineering, molecular biology, plant biodiversity, plant breeding, taxonomy and tree biology etc.

The R & D activities of NBRI were reorganized in 1999 so as to keep pace with the current global trends. It has taken several new initiatives to give emphasis on three modern technologies – biotechnology, information technology (biodiversity informatics) and herbal technology. It is now well recognized at national and international level as one of the best centre of herbal technology. It has also been engaged in scientific evaluation of herbal drugs.

A full fledged modern Bioinformatics Division has also been set up recently with latest infrastructure and state of art facilities. The details of recent developments in this division are International Legume Database and Information System (ILDIS), UK – As regional centre for ILDIS for South Asia. The Division holds World Database of over 19,000 legumes; Global Biodiversity Facility (GBIF) – signing an agreement with GBIF. NBRI has been recognized as the GBIF-India node for sharing digitized data via internet; Investing in Nature



(IIN-India), NBRI signed an agreement with BGCI, to launch IIN-India; and Nodal Centre for Asia-Pacific Traditional Medicine & Herbal Technology Network (APTMNet) – Department of Ayush, Government of India has identified NBRI as India's Nodal station for APTMNet. Besides international collaborative R & D programmes the bioinformatics division has initiated many national programmes; Recognized centre of BTIS NET programme, by DBT, Government of India; A database of Indian plants and herbarium specimens on internet and networking of herbaria of CSIR; and CSIR network project on TKDL for developing a database of 1500 plants used in Ayurveda.

The institute has established a Field Gene Bank for the rare, endemic and threatened (RET) plant species of Indo-Gangetic plains. A separated gene bank of neem genetic variants collected from different parts of the country has also been established. The institute is also recognized for its leadership in conservation and sustainable utilization of biodiversity and sustainable use of plant genetic resources as envisaged in the UN Convention of Biological Diversity (CBD).

Over the years it has also diversified its activities to meet the S & T information need of different sectors of the society. Reclamation and development of the sodic soils at Banthra was a pioneering effort in this regard. This area has now become a man made forest with fully sustainable eco-system. Biomass research Centre and Biomass

Biology Group has also done pioneer work in selection, evaluation and tree improvement of wood fuel tree and shrub agro forestry species suitable for difficult and degraded sites. An 'Eco-education Centre' and a novel touch and smell garden for the visually impaired people has been also developed.

Growth Indicators of NBRI

The institute has showed growth in cutting edge areas of herbal technology, biotechnology including molecular biology and genetic engineering, IT-biodiversity informatics and other associated area of plant science researches.

NBRI has affiliation with almost all reputed universities in India. As many as 42 Ph.D. degrees have been awarded and 823 research papers published during 1999-2004. NBRI scientists have been continuously achieving awards and recognitions from various bodies of international repute. The growth in development of new products and technologies resulted in a significant growth in award of patents of 53 (18 awarded and 35 filed).

The growth in new herbal products development area is marked by herbal beer, herbal lipstick, herbal hair dye, herbal oral health products, herbal health protective kits, nutraceuticals, functional food, Bt cotton and neem-based products.

Technologies for Societal Benefits

- Cultivation of ornamentals, betelvine, and *Jatropha curcus* (bio diesel plant)

- Dehydration of flowers and foliage
- High-tech low-cost nursery and tree plantations
- Organic cultivation of vegetables, medicinal plants and other economically important plants
- Development of high yielding varieties of medicinal and other economically important plants (eg poppy, Amarnath)

Industrial Technologies

- Anti-cough, anti-tussive and throat soothing herbal formulations
- Anti-microbial biofertilizers technology
- Antipyretic formulation
- *Bacillus* based microbial technology
- Bio-diesel from *Jatropha curcus*
- Biofertilizers
- Bt cotton for insect resistance
- Extraction of neem oil, development of neem-based pesticides, fertilizers and other products
- Fruit-based herbal health drink
- Herbal dry colours
- Herbal health protective nutraceuticals formulations
- Herbal oro-dental cure
- Luv stick (herbal lipstick)
- Nbir soft (herbal soft drink)
- Nbir (herbal fermented drink)
- Neem-based dental cure
- Nutraceutical products (14)



- Safe eco-friendly, health protective herbal colours and aroma
- Trichoderma-based microbial technology

Future Vision

The NBRI will function as referral centre on matters related to biodiversity CBD, WTO and access & benefits-sharing issues, biodiversity informatics at national and international levels and with the following vision:

1. To be a premier national and international centre on plant science research and development in the areas of plant biodiversity, conservation and sustainable utilization of non-crop and wild Plant Genetic Resources (PGR), bioprospecting, biofuels, biodiversity informatics and plant biotechnology.
2. To be a prime catalyst in conversion of plant wealth in an ecologically sound and economically rewarding manner.
3. To develop as a national referral center for all knowledgebase related to plant biodiversity.

The volume gives a complete view of NBRI's past, which forms the pedestal upon which NBRI stands today as a beacon of light for other competing institutions of the world.

Dr Krishna N. Ganesh appointed Director of IISER, Pune

DR Krishna N. Ganesh, who had been the Head of the Organic Chemistry (Synthesis) Division at the National Chemical Laboratory (NCL), Pune, since March 1994, has been appointed the First Director of the newly established Indian Institute of Science, Education and Research (IISER), Pune.



Dr Ganesh (born 1953) after securing a Ph.D. (1977) from Delhi University, proceeded to the University of Cambridge, UK, where he worked for his second Ph.D. (1980) in chemistry. On his return to India in 1981, he joined the Centre for Cellular and Molecular Biology, Hyderabad, where he established a microsynthesis facility for oligonucleotide synthesis. He moved to NCL in 1987 to establish a bioorganic chemistry research group. He has used a judicious combination of bioorganic and medicinal chemistry concepts with synthetic organic chemistry and biophysics to address some of the challenging problems in DNA molecular recognition. His main research interests are in the area of chemical modification of DNA and RNA from the point of Nucleic acid therapeutics and diagnostics. Conjugation of polyamines to DNA and PNA to influence their cell permeation properties, synthesis of fluorescent DNA for diagnostics and design/study of conformationally

constrained PNA analogues as new class of antisense agents, DNA/PNA-drug/protein interactions, molecular origin of triplex stability and mechanical properties of collagen, DNA/PNA nanotechnology are some of the ongoing projects in his laboratory.

He has published around 140 interdisciplinary research papers in international journals of repute and guided 21 students for the Ph.D. degree.

Dr Ganesh has received a number of scientific recognitions including the prestigious Shanti Swarup Bhatnagar Prize in Chemical Sciences (1998), Millennium Medal of Indian Science Congress (2000) and Silver medal of Chemical Research Society of India (2004). He is a Fellow of the three major Science Academies in India—Indian Academy of Sciences, Bangalore, Indian National Science Academy, New Delhi, and National Academy of Sciences, India, Allahabad. In 2005, he was awarded the Third World Academy of Sciences Medal (TWAS Medal) in Chemical Sciences.

He is currently holding the prestigious J.C. Bose Fellowship of the Department of Science and Technology, New Delhi. Dr Ganesh is a Member of the Editorial Committee of *Chemistry, An Asian Journal*, launched by Verlag Chemie in 2006.



Prof Ashok Pandey wins Thomson Scientific Award

PROF. Ashok Pandey of the Regional Research Laboratory (RRL), Thiruvananthapuram, is one of the five research professors from India to receive the 'Thomson Citation Laureate Award' — an honour bestowed in recognition of groundbreaking and influential contribution to, and accomplishments in research and development (R&D) worldwide. The other awardees are: Prof. Kalyanmoy Deb, Indian Institute of Technology, Kanpur (Computer Science); Prof. Gautam R. Desiraju, University of Hyderabad, (Chemistry); Prof. C.N.R. Rao, Jawaharlal Nehru Centre of Advanced Scientific Research, Bangalore, (Materials Science) and Prof. Ashoke Sen, Harish Chandra Research Institute, Allahabad (Physics). Prof. Pandey has been given the award in Biology and Biochemistry. The awards were presented by Thomson Scientific's Executive Vice President, Keith MacGregor, in a function held in Taj Residence in Bangalore on 27 July 2006.

For selecting the awardees, Thomson Scientific team looked for the most highly cited authors among



the Indian scientists in specific industry categories during 1996-2005. To qualify for the award, one of the criteria was that the researchers had to have at least four papers in the top one per cent according to the scientific community.

The number of times those papers were cited in other academic works, the total number of papers that the researchers had written and the citation index of the papers were also taken into consideration.

These awards reflect the growing influence that Indian R&D specialists are having upon the global R&D community. With its highly educated workforce, India is being increasingly recognized for its innovative skills — a fact reflected by the growing number of Indian research papers contributed (from 75,923 in 1996-2000 to 98,558 in 2001-2005) and the worldwide citations to Indian research (from 113,824 in 1996-2000 to 221,563 in 2001-2005). According to Thomson Scientific, the Awards' organizer and part of The Thomson Corporation, India has the third highest rate of increase in total citations in the world, after China and South Korea, during 2001-2005.

POGO-SCOR Fellowship to Dr Mangesh Gauns



DR Mangesh Gauns, Scientist at the National Institute of Oceanography (NIO), Goa, has been awarded the POGO-SCOR Fellowship for training in microzooplankton grazing and flow cytometry analysis of marine picoplankton, under the supervision of Dr Michael Sieracki, at Bigelow Laboratory for Ocean Sciences, Maine, USA. The Partnership for Observation of the Global Oceans (POGO) and its partner, the Scientific Committee on Oceanic Research (SCOR), award the fellowship to promote training and capacity building leading towards a global observation scheme for the oceans. The fellowship provides travel cost and a stipend for three months at the host institute.

Dr Mangesh has over 21 research papers to his credit and has received several other awards and honours in his short career.