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Team CSIR



NAL's Carbon Fibre Technology Transfer to Kemrock Industries



THE National Aerospace Laboratories (NAL), Bangalore, has signed a licence agreement with Kemrock Industries and Exports Ltd, Vadodara on 16 April 2007 for production and commercialization of carbon fibre. Dr A.R. Upadhy, Director, NAL and Shri Kalpesh Patel, Chairman and Managing Director, KIEL, were present for the signing of licence agreement. Under the licence agreement, the carbon fibre know-how will be transferred to M/s Kemrock to meet first national needs and exports.



Carbon fibre technology is a strategic technology held by a very few countries in the world. Carbon fibre is a high tech material having wide ranging application, wherever component has to meet strength/stiffness along with lightweight property. NAL has developed this technology under a DRDO/ADA sponsored programme.

Kemrock leads in the field of composites with well integrated manufacturing facilities and a comprehensive product range. The range include High Performance Reinforced Polymer Composites, and a comprehensive range of Unsaturated Polyester & Phenolic Resins. Over and above a strong domestic customer base, Kemrock is a winner of export awards with customers spread over 50 countries in the developed world.

NAL's MoU with M/s Sobha Aviation

THE MoU between National Aerospace Laboratories (NAL) and M/s Sobha Aviation Engineering Services Pvt. Ltd, signed on 17 January 2007 [CSIR News, 57 (2007), 70] for giving product and market support to SARAS aircraft, has been terminated w.e.f. 2 April as M/s Sobha Aviation has not been able to get suitable land for the Project in Bangalore.

Gravity Map of India released

THE National Geophysical Research Institute (NGRI), Hyderabad, in collaboration with Geological Survey of India, Survey of India, Oil and Natural Gas Corporation Ltd and Oil India Ltd has prepared and published the revised gravity map series of India on 1:2 million scale. For the first time terrain corrected Bouguer anomaly maps have been prepared and published. The maps were updated nearly after 30 years.

Earlier, in 1975, the institute had prepared a set of gravity map series on 1:5 million scale. The present series of gravity map has taken into account about 50,000 gravity stations, spread all over India, that is one station at 3' arc interval. These maps will be of immense use not only to the academicians, the researchers and explorationists but also to the students and all those who have something to do with earth system sciences, particularly in the field of solid earth geophysics. These will have crucial ramifications in the field of space research as well.



Dr V.P. Dimri, Director, NGRI (left), Dr Hari Narain, former Director, NGRI (centre) and Shri P.N. Tejale, Director General, GSI, during the release of Gravity Map of India

Shri P.M. Tejale, Director General, GSI, released the map at NGRI and also inaugurated a two-day seminar on 'Notable Research in Earth Sciences for Socio-economic Advances of the Nation.'

In his address, he emphasized the importance of gravity maps and said that in the field of earth system sciences gravity maps have been used with profound success in the study of geodynamics, tectonics,



crustal structural signatures and earthquake processes apart from identification and classification of different crustal blocks, ocean basins, different sedimentary basin and sub basins over a macro scale. Stressing the importance of geophysics he said in the present day concept of earth system sciences, geophysics plays a pivotal role and is therefore, globally recognized as a core subject.

Shri Tejale underscored the need of collaboration among the earth science organizations “we compliment and collaborate rather than compete with each other”, he remarked.

Earlier, in his welcome address, Dr V.P. Dimri, Director, NGRI, underlined the importance of collaboration between various earth science organizations in nation developmental activities “like the one which we are witnessing today”. He summarized the various attempts made by NGRI in the preparation of the new gravity map series and complemented the team efforts of the participating organizations in this national programme.

NGRI's former Director, Dr Hari Narain, under whose guidance the gravity map of India was published 30 years ago, stressed the need to focus the earth science research to face the challenges of resource constrains and natural hazards. Dr Harsh K. Gupta, former Secretary, DOD, GoI and Shri D.M. Kale, Executive Director, ONGC also spoke on this occasion.

Dr Bijender Singh, Project Leader Gravity Group, NGRI proposed the vote of thanks.

National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram

R & D Highlights

THE National Institute for Interdisciplinary Science and Technology (NIST) (erstwhile Regional Research Laboratory), Thiruvananthapuram, pursues R&D programmes in the area of Agroprocessing, Chemical Sciences, Materials & Minerals, Biotechnology and Process Engineering and Environmental Science & Technology. The programmes have a blend of basic research and technology development and commercialization; have specific thrusts on frontier areas of research, National Mission Projects, regional resource-based activities and Research - Industry - Academia linkages. The institute has several major collaborative programmes with major national and international agencies too.

Presented below is a brief account of activities and accomplishments during 2005-06:

Agroprocessing and Natural Products

Technology transfers to industry are the major accomplishments of this division. The Swing Technology (to process fresh/dry spices for essential oils, oleoresins and active principles) was licensed to the two largest spice oleoresin companies in the country, namely M/s Synthite Chemicals, Cochin, and M/s Plant Lipids, Cochin. M/s Synthite was interested to widen the scope of the technology to several spices including onions and garlic in addition to pepper and chilli. The process was demonstrated in the commercial facility of Synthite Chemicals and also in the NIST pilot plant successfully. The licensing to M/s Plant Lipids was followed by successful process demonstration on fresh turmeric and fresh ginger in their premises. Swing Technology has thus been

accepted and appreciated as truly generic technology by the largest spice processors in the country. Following this, the technology has been licensed to seven industrial outfits.

Other major achievements include licensing of an integrated process to produce phytosterols (98%), Vitamin E concentrate (>60%) and bio-diesel from vegetable oil deodouriser distillate to M/s G. One Agro, Ahmedabad. The process was demonstrated to the client using a specially designed multipurpose reactor in the NIST pilot plant at 20 kg levels.

NIST was inducted as participating lab of the Golden Triangle Project (GTP), a National Initiative by CSIR – ICMR – AYUSH, for standardization and validation of Ayurveda drugs. Agro Processing and Natural Products Division also initiated a supra



project on evidence based herbal products with interdisciplinary approach and industry partnership to be undertaken during the XI Five Year Plan.

Biotechnology

The major R & D achievements include the transfer of a technology on microbial xylanase production in solid-state fermentation using a bacterial culture of *Bacillus pomilis* and α -amylase for their applications to an enzyme industry, Kaypees Biotech Pvt Ltd, Mysore, Karnataka. The technology was successfully demonstrated to the industry with approximately 30,000 Y ebdi-glucanase per gram of dry fermented matter and wide range of pH stability was an additional property of the enzyme.

A process was developed and patented on the fermentative production of clavulanic acid by *Streptomyces clavuligerus* in solid-state fermentation. The emergence of antibiotic resistance especially against β -lactam antibiotics has been a major cause of concern recently. The drugs, which used to be first line of defense, are rendered ineffective because of emergence of β -lactamases. Clavulanic acid is a novel potent inhibitor of bacterial β -lactamases and is produced by fermentation. The process developed is for the cost-effective production of the clavulanic acid using agro-industrial residues.

A consultancy project on evaluation of chitinase as biocontrol agent against the insect pest *Helicoverpa armigera* showed that the enzyme produced by *Trichoderma hazianum* was capable of negatively affecting the growth

and metamorphosis of the larvae (when chitinase was used in feed or tropically applied).

Chemical Science and Technology

The major achievements include development of novel carbohydrate based liquid crystals exhibiting macroscopic chirality. This was the first known example of sugar-based liquid crystals exhibiting macroscopic chirality and the work was highlighted as inside cover of *Advanced Functional Materials*, a high impact international journal. This group also reported the first example of transcription of helicity and this was highlighted in the cover page of *Angewandte Chemie*. Several novel sensors for selective detection of cysteine and calcium were also developed.

The Division has identified two major areas for intensified research: "Development of Organic Materials for Photonic, Optoelectronic and Electronic Applications" and "Development of Novel Sensitizers for Photodynamic Therapy".

Materials and Minerals

The R&D work in the area of ceramics has led to the development of sol-gel nano particles, composites and coatings. Transparent hydrophobic and hydrophilic coatings were developed on glass and ceramic surfaces. Ceramic nano and ultra filtration membranes were tested. Research was undertaken to develop resonator materials for microwave and millimeter wave communication, microwave

substrates, tunable microwave materials, low temperature cofired ceramics, and photonic band gap structures (meta materials). A cryo cooler based test facility for evaluating high current superconducting devices was established for the first time in the country, by which testing and evaluation of devices that carry current up to 1200 A at temperatures as low as 7 K can be done. Prototype leads with ratings > 200 A (77 K) and > 400 A (64 K) were developed using home made Ag alloy based superconductor with novel properties and potential applications were being explored.

The activity on societal ceramics resulted in scaling up of processes for eco-friendly materials and construction of an experimental building incorporating all the various novel materials, which was well appreciated by many guests including the Minister for Science and Technology and the DG, CSIR, during their visit to the institute. Development of a novel oxide based composition for solid oxide fuel cells, new lead free piezo electric materials based on alkaline materials and rare earth phosphate were taken up under the electron microscopy and material characterization activity.

Signing of an NDA with M/s Mahindra and Mahindra for developing metal matrix composites brake rotor and an MoU with M/s HAL, Bangaluru, for developing thin wall Mg castings by low pressure die casting, an *in situ* technique for Al-MgA1204 composites, and a thermodynamic



model to predict the equilibrium Si content required to suppress the interfacial reaction and reaction free liquid state processing zone in Al-SiCp composite are the highlights in the area of light metals, alloys and composites. Further, laboratory scale experiments have been carried out, on the production of submicron size pure Al and Al-graphite composites by equal channel angular pressing the latter for the first time.

In the field of minerals, pilot plant studies were completed on synthetic rutile, pig iron and pure iron oxide from ilmenite under the sponsorship of NMDC. Commissioning and operation of a new pilot plant was carried out for Cochin Minerals and Rutile Ltd, following the signing of an MoU.

Process Engineering and Environmental Technology

During the year, several projects have progressed from laboratory scale development to a state of incipient technology transfer through pilot plant and process/hardware demonstration phases. These projects include: (1) Closed retting process for the extraction of coir fiber for which a pilot plant is being set up at NIST, (2) Process for the manufacture of activated carbon from Neyveli Lignite for which a pilot plant has been commissioned at Neyveli, Tamil Nadu, (3) Process for the production of reactive silica from rice husk with its pilot plant at NIST, and (4)

Development of a natural convection drier.

Engineering inputs were provided to M/s Cochin Minerals and Rutile Ltd, in their programme to retrofit an environment friendly process for manufacturing synthetic rutile in their existing facility. The division has also provided knowledge outputs for R&D projects sponsored by General Motors USA and M/s Gharda Chemicals Ltd, Mumbai, in the areas of solidification modeling and sustainable resources recovery from red mud, respectively. Under the theme of total resource recovery, an integrated zero waste based commercial beneficiation flow sheet for silica sands of Cherthala, Kerala, has been developed under a sponsored project funded by Directorate of Industries, Government of Kerala. The development of advanced multiphase reactors for anaerobic treatment of complex wastewater (buoyant filter bioreactor) and low temperature vapour phase hydrolysis of $TiCl_4$ to TiO_2 nano powders (aerosol reactor) were continued with experimental and computer aided modeling efforts. Both these projects form a part of CSIR networked programmes and are likely to attract industrial clients due to their novelty and cost advantages.

Environment management services were provided to several industrial clients ranging from Kandla Port Trust, WAPCOS, New Delhi and Department of Mining and Geology, Government of Kerala.

NEIST: Serving the Industry and Other Users

THE Consultancy projects completed by the North-East Institute of Science & Technology (NEIST) (erstwhile Regional Research Laboratory), Jorhat, include:

- Geotechnical investigation for new Gas Turbine foundations at Duliajan Power Station.
- Upgradation/beneficiation of iron ore sample. Final Report submitted to M/s Tribeni Metalloys Pvt. Ltd, Motilal Nehru Road, Panbajar, Guwahati.
- Evaluation of six samples of dimensional stones of Nagaland. Final Report submitted to Director of Geology & Mining, Government of Nagaland, Dimapur.

A new consultancy project was undertaken on the preparation of pre-feasibility study report on manufacture of coke breeze from konya coal of Tuensang district, Nagaland on behalf of Directorate of Geology & Mining, Government of Nagaland, Dimapur.

Process released

The institutes process for low dust chalk pencil was released to Sri Bhaskar Boishya, Gotanagar, Jalukbari Guwahati.

Agreement signed

NEIST signed agreement with: State Medicinal Plants Board, a



subsidiary of the National Medicinal Plants Board, for 'Preparation of Road Map in the medicinal and aromatic plant sector of Assam under a collaborative arrangement.

ONGC, Sivasagar for Development of Vegetation in crude oil contaminated drill site at (a) Amguri and (b) Galleki.

Geotech Consultants (P) Ltd, New Delhi, for engaging external agency for conducting soil resistivity test at the NRL Refinery site.

New R&D Facility

The R&D facilities at NEIST have been augmented with the

installation of a GC MS which has the following features:

- Mass range of 1-1.050 amu
- Scan speed upto 10,000 amu/sec (profile and centroid)
- Curved pre-filter for noise reduction
- Ion Bright source for enhanced robustness and sensitivity
- + 10 KV conversion dynode for better performance
- Wide spectral/quantitative dynamic range
- Removable ion volumes for EI and CI
- Contribution ion volume for automated EI/CI operation

- Powerful Xcalibur data system

The mass spectrometer has/will provide:

- EI mode for identifying unknowns - library search information
- PCI for molecular weight confirmation
- NCI for ultimate sensitivity and selectivity
- Simultaneous full-scan and SIM in a single analysis
- PPINICI - hardware/software option
- PCI/NCI scans for sample screening.

Inversion of enantioselectivity in modules responsible for enforcing a high fidelity during translation of the genetic code

AMINOACYL-tRNA synthetases (aaRSs) establish the rules of the genetic code by attaching the cognate amino acid to the corresponding tRNA in a two-step reaction. However, mistakes are often made if aaRSs have to discriminate between structurally similar amino acids such as isoleucine/valine or threonine/serine. AaRSs that are posed with difficult substrate recognition problems possess editing modules through which they remove the non-cognate amino acid attached to the tRNA. Editing of noncognate amino acids is essential because aaRSs that are editing-defective form proteins

with incorrect sequences leading to misfolding of proteins and further neurodegeneration.

In order to remove noncognate L-serine incorrectly attached to tRNA^{Thr}, threnoyl-tRNA synthetases from most archaea uses a unique editing domain structurally similar to D-amino acid deacylases (DTDs) found in eubacteria and eukaryotes that specifically removes D-amino acids attached to tRNA. In order to elucidate the structural basis of the editing mechanism of the noncognate L-serine removal from tRNA^{Thr} by a DTD-like editing module from *Pyrococcus abyssi* ThrRS (Pab-NTD), high resolution crystal structures of Pab-NTD with

substrates mimicking the pre- and post-transfer reactions and with L-serine were determined. The structural results clearly indicate a substrate-assisted catalysis mechanism for the post-transfer reaction and suggest that the pre-transfer substrate is not the preferred one for this scaffold. The free amino acid complex might represent a snapshot of the amino acid entering the pocket rather than that of a complex with the product. The mechanistic insights obtained using the structural analysis has been used not only to invert the enantioselectivity of Pab-NTD but also of the canonical DTD. A single residue has been shown to play a

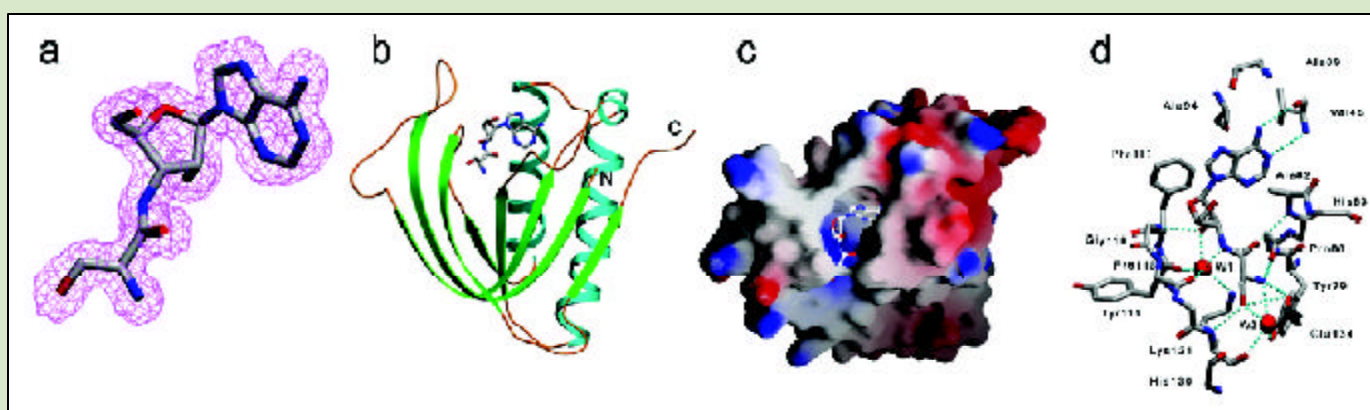


pivotal role in the inversion of enantioselectivity both in Pab-NTD and DTD.

Overall, this high impact research conducted at the Centre for Cellular and Molecular Biology (CCMB), Hyderabad and published in the prestigious EMBO Journal [Hussain, T; Kruparani, SP; Pal, B; Dock-Bregeon, AC; Dwivedi, S;

Shekar, MR; Sureshbabu, K; Sankaranarayanan, R, Post-transfer editing mechanism of a D-aminoacyl-tRNA deacylase-like domain in threonyl-tRNA synthetase from archaea, EMBO J., 25 (17) (2006), 4152-4162] provides a fascinating example of how nature has inverted the enantioselectivity of molecules that are involved in

enforcing a high fidelity during translation of the genetic code. The CCMB team is currently in the process of understanding the structural basis of inversion of enantioselectivity in these modules that will provide valuable clues for rational design of enantioselectivity in enzymes.



Crystal structure of Pab-NTD with Post-transfer analog complex

- A 2Fo-Fc map contoured at 1.0 σ , shown around the ligand.
- A ribbon diagram showing the structure of Pab-NTD post-transfer complex.
- A surface representation of the complex showing the post-transfer substrate in the editing pocket.
- Interactions of the post-transfer substrate at the editing site in Pab-NTD.

CSIO signs MoU with GNDU

THE Central Scientific Instruments Organisation (CSIO), Chandigarh and Guru Nanak Dev University (GNDU), Amritsar, have signed a memorandum of understanding (MoU) to promote academic and research co-operation in the areas of Food Science, Material Science, Sensors, Electronics, Chemistry, Sugar Instrumentation, Computer Science, HRD, etc.

As per the MoU, 10-15 selected students of M.Sc., B.Tech., and M.Tech. from GNDU in the respective areas of specialization can pursue project work at CSIO. Also, five staff members or research fellows from CSIO can be registered for Ph.D. programmes at GNDU at any given time with joint supervision, on emerging areas of research & applications.

The MoU with GNDU is a step towards sharing its vast knowledge base of an R&D institute with an academic institute of excellence in the country that will help quality manpower generation and optimum utilization of scarce valuable resources in various niche areas.



NEIST: Workshops and Training Programmes

Workshop on Hazards at Koliabor

AS a part of the programme scheduled earlier on 'Hazards - Minimizing the risk, Maximising Awareness', a two-day zonal workshop on the theme was organized by the North-East Institute of Science & Technology (NEIST) (erstwhile Regional Research Laboratory), Jorhat, in collaboration with the Koliabor College NSS Unit in the Koliabor College premises on 17-18 February 2007 with the financial support extended by Rastriya Vigyan Evam Prodyogiki Sanchar Parishad (RVPS), Department of Science & Technology, Government of Delhi.

The inaugural function was chaired by Dr H. K. Chaliha, Principal of the Koliabor College

and Co-ordinator of the workshop. Notable among others who attended the workshop were Dr D. C. Goswami, Scientist G, NEIST and Principal Co-ordinator of the programme; Shri M. J. Boruah, SDO(C), Koliabor; Dr M. M. Saikia, Head, Department of Disaster Management, Administrative Staff College, Guwahati; Shri Gunin Hazarika, former Industry Minister, Government of Assam; Prof. Basistha Kalita, NSS Programme Officer; Shri Nandita Hazarika, State Project Officer, Disaster Waste Management, Government of Assam; Shri R. K. Kurmi, Retired Flight Engineer, Airforce & Principal, Motor Driving Training Institute, Jorhat; Shri C. Nath, CO,

Koliabor; Dr Saurav Borua and Dr P. C. Neog, Scientists, NEIST; Shri Gautam Sarma, Instructor, Civil Defence, Tezpur, Dr Budheswar Gogoi, M& HO, Bokakhat, Shri P. Katak, BDO and so on and so forth. A total of 70 participants took part in the workshop besides representatives of some local colleges, a few NGOs, tea gardens of Koliabor and others.

Speaking on the occasion, Dr D. C. Goswami gave a brief speech on the importance of organising the workshop the aim of which was basically to create an awareness among the general public about hazards and its mitigation measures.

The workshop included inaugural function, technical session and a valedictory function.

Training-cum-Awareness Programme on Cultivation of Aromatic Plants

NEIST continues to organize training cum awareness programme on cultivation of aromatic plants under a DBT sponsored project, in various places of NE India. Since village-to-village training cum demonstration programmes were carried out at Jelkajhar, Bongaigaon, Betbari, Panitanki and Tamulpur of Bodo Territorial Area District (BTAD), Assam, in the recent past.

Ten growers from each village took part and the total number of participants was 50. Training was imparted on cultivation and processing of citronella, lemongrass and patchouli. Shri Bhupen Rai, ex-MLA, Assam, inaugurated the programme. Planting materials were supplied free of cost for initial plantations. In the programme, two NGOs namely Manav Shakti

Jagaran, Nalbari and Prayas, Rangia, Kamrup, extended a helping hand in motivating the village people to take up the cultivation of aromatic plants for socio-economic development. Dr T. C. Sarma, the Principal Investigator of the DBT project, coordinated the programmes. An area of 10 ha has been covered under the cultivation of citronella in Bongaigaon area of BTAD.

Training on Mushroom Cultivation for Self Help Group

A one-day training programme on cultivation of edible mushroom was organized by NEIST Branch, Itanagar, Arunachal Pradesh jointly with Legong Arunachal Farmers Welfare Society, Mirem village

under a DBT-sponsored project. Altogether 225 members from 22 women Self-Help Groups (SHGs) from different villages of Bilat and Ruksin circles attended the training which was held at Bilat village of

Ruksin circle of Arunachal Pradesh on 12 February 2007. The participants were demonstrated the production technique of edible mushroom and imparted training. Shri Omak Apang, Local Lagislator,



AP and former Union Minister, graced the occasion and showed keen interest in the mushroom cultivation programme and emphasized the need for exploring the locally available wild varieties of mushroom. He encouraged the women SHGs to take up systematic cultivation of mushroom for socio-economic development and also appealed to diversify the age old activities. He suggested the BDO to lay out a project with NEIST Branch for commercial cultivation of edible mushroom. Shri P. B. Chetri, Branch Manager, Rural Bank, Ruksin, assured micro-finance to the SHGs for the same.

Training Programme for Assistants of Accounts Cadre

EIST, at the instance of Human Resources Development Centre, Ghaziabad, organized a three-day training programme for Assistants of Accounts Cadre of CSIR laboratories in the eastern zone during 22-24 January 2007. A total of 29 trainees took part in the programme. The resource persons for the training programme were drawn from CSIR Headquarters; HRDC, Ghaziabad and the host laboratory which included Shri S. N. Sharma, Shri R. L. Sharma, Shri A. Wahid, Shri Padam Singh and Dr P. G. Rao, Director, NEIST, who spoke on the topics such as (i) Role of Finance & Accounts in CSIR, (ii) Different forms of Audit, (iii) Payments relating to works and procurement, (iv) Bank reconciliation, (v) Understanding and operating IMPACT, (vi) IMPACT : Accounts, (vii) IMPACT : MIS Reporting, (viii) IMPACT : Project Accounting, (ix) Project Costing, (x) Financial Planning and Management - Practices at RRL-Jorhat, (xi) Medical claims + TA, (xii) Pensions and (xiii) Budget + LTC.

CMERI Golden Jubilee

ESTABLISHED in 1958 to foster the growth of mechanization, automation and industrialization in the nation, the Central Mechanical Engineering Research Institute (CMERI), Durgapur, completed five decades of its proud presence and leadership in mechanical engineering as it stepped into its 50th Year on 26 February 2007. A number of eminent personage converged on the day of the inaugural programme of the Golden Jubilee celebrations. The galaxy included, Prof. S.K.Basu, former Director of CMERI; Prof. Amitabha Ghosh, Professor, Indian Institute of Technology, Kanpur; Shri V. Shyamsundar, Managing Director of Durgapur Steel Plant; Prof. N.R. Banerjee, Vice-Chancellor of Bengal Engineering & Science University;

Dr Chandra Shekhar, Director, CEERI, Pilani; Dr Amelendu Sinha, Director, CMRI Dhanbad; Shri Nikhilesh Jha, Joint Secretary (Administration), CSIR; Dr S.K. Srivastava, Director, CFRI, Dhanbad and many other luminaries.

Before introducing the dignitaries and extending a warm welcome to all, Dr Ranjen Sen, Scientist, CMERI, readout a message received from the Rashtrapati Bhawan:.. *“The President of India Dr A.P.J. Abdul*



Shri V. Shyamsundar, Managing Director, Durgapur Steel Plant, lighting the Inaugural Lamp during the inaugural programme of the CMERI Golden Jubilee Celebrations



Golden Jubilee Celebrations

Kalam, is happy to know that the Central Mechanical Engineering Research Institute, Durgapur, is celebrating its Golden Jubilee on 26 February 2007. The President extends his warm greetings and felicitation to all those associated with the Institute and wishes the Golden Jubilee celebrations all success."

In his inaugural address, Dr Gopal Prasad Sinha, Director, CMERI, welcomed the august gathering and extended a very warm and hearty greetings to the dignitaries from the industries, academia, media and CMERI family members in traditional Indian style.

In his short inaugural speech, Dr Sinha first recounted the earlier successes of CMERI in the various fields. He mentioned about two major products designed and developed by CMERI which have occupied prominent position in the list of sixty innovations, drawn by CSIR, on which India can be proud of: the **Swaraj Tractor** and **India Mark II Hand Pump**. Thereafter, Dr Sinha drew attention to the audience towards the agromachinery sector in which CMERI has contributed greatly. The **Swaraj Tractor**, the first indigenous tractor helped usher the green revolution in India and **Sonalika Tractor**, the most energy efficient and eco-friendly tractor have made the nation proud. The latest venture in this area is the 10 HP **Krishishakti** developed exclusively for the common Indian farmer with limited



Prof. S. K. Basu, former Director, CMERI, delivering the CMERI Golden Jubilee eminent Lecture on 'Recent Trends in Design and Manufacturing in Nanotechnology and Bio Applications'.

landholdings.

Subsequently, he articulated the present research vision and performance of the institute during the Tenth Five Year Plan. The CSIR programmes envisage the evolution of a class of Advanced Manufacturing Technologies aimed towards upgrading the manufacturing base of nation. The programmes involve the network participation of nine CSIR laboratories under the nodal leadership of CMERI. In the eleventh Five-year plan, CMERI has proposed two major projects : the first pertains to the entry of CMERI into fascinating world of **Modular Reconfigurable Micro Manufacturing System** (popularly known as **MRMMS**) and the second for developing **Mobile Robotic Vehicles for Surveillance and Disaster Mitigation**.

Dr Jhankar Basu, Scientist, CMERI, then presented a small capsule that took audience down the memory lane through a succinct portrayal of the achievements of

CMERI during the five decades of its service to the nation.

Prof. S. K. Basu, former Director, CMERI, formally flagged off the year-long Golden Jubilee celebrations by lighting the lamp and releasing the Events Calendar for the year.

The **Foundation Day Eminent lecture** was then delivered by Prof. S.K. Basu. He spoke at length on '*Recent Trends in Design and Manufacturing in Nanotechnology and Bio*

Applications'. He introduced the audience to the fascinating area of Nanotechnology through a number of examples in diverse areas. He then proceeded to describe applications of Nanotechnology in the manufacturing sector as well as in bioscience. Prof. Basu concluded his lecture by suggesting research themes which he felt scientists should take up. These include Nanostructure Composite Material, Nanostructure Coating and thin films, Nanostructure Material with Taylor Magnetic properties, Advanced Material Architecture for energy conversion, Nobel biomaterials and Organic materials for Electronics, etc.

Shri V. Shyamsundar, Managing Director of Durgapur Steel Plant, delivered an inspiring speech on the '*Role of Research Organizations in the Growth of Steel Sector*'. In his thought provoking speech he deliberated on the global steel scenario and per capita consumption of steel, which is one of the important indices of the socio-



economic development of any country. He revealed that India has a remarkably low per capita consumption of steel, which, he felt, should register quantitative growth if India aims to become a truly developed nation. He emphasized on the necessity of reorienting the prevalent research approach. He opined that research, has to be customer linked, innovative and application-oriented with direct involvement of the industry. The need of the hour is to concentrate on futuristic research in the steel sector to ensure compatibility between the type of technology vis-a-vis domestic resources and domains. In this context, he mentioned about the collaborative work of SAIL with the various academic institutions, national laboratories, industries and other organizations and listed the improvement of surface quality and dimensional accuracy of roll products and value-added products of SAIL.

Shri Shyamsundar concluded his talk by adding that aggressive research efforts must be undertaken to create manufacturing capabilities of special type of steel and new products, energy efficient utilization of waste and arresting environmental degradation. Public Sector steel companies, he felt, need to enhance their R & D expenditure in the coming years to finance internal research efforts and sponsor outside research that may provide a framework for inter-disciplinary co-operation with the private sector, cutting across the national boundaries. He emphasized that Research and Development efforts

need to be further reinforced to suitably reorient them to meet the objectives of global competitiveness of Indian steel sector in a time bound manner.

Prof. N.R. Banerjee, Vice-Chancellor of Bengal Engineering and Science University, bestowed his fraternal wishes to CMERI for its Golden Jubilee celebration programme and expressed his best wishes to CMERI for introducing the M.Tech Programme in Mechatronics in collaboration with CEERI, CSIO and his university.

Speaking on '*Managing Research Workers in Research Organizations*', Prof. Banerjee identified three factors responsible for the performance of a person. One who is guided by achievement motivation gets a sense of fulfilment when he or she creates or recreates new knowledge, new equipment, or new technology. It provides motivation to the person to contribute more towards the work. Second is ability in terms of competence, kinds of habits, and attitude that one has towards work with time discipline and task discipline. He expressed the hope that CSIR laboratories would provide better services for realizing the vision 2020 and CMERI will contribute greatly in terms of transforming this dream into reality.

Prof. Amitabha Ghosh, Chairman, Research Council of CMERI, in his epitomizing lecture, expressed concern about the trend of engineering students neglecting careers in core-engineering sectors such as Mechanical Engineering, Electrical Engineering and basic Sciences. He stressed that it is our

Delegation from European Commission visits NAL

A high level delegation from European Commission visited the National Aerospace Laboratories (NAL), Bangalore, on 9 March 2007. Dr A. R. Upadhyaya, Director, NAL, welcomed the delegation. Dr Jose Manuel Silva Rodriguez, Director General, European Commission made a brief presentation on European Union (EU) S&T Policy and Opportunities for Research collaboration between EU and India. Thereafter NAL and European commission had extensive discussions regarding mutual co-operation.

responsibility to motivate the brighter and younger generation to take up careers in the core sectors and encourage them to join the National laboratories as scientists.

Other eminent guests and erstwhile scientists of the institute also spoke warmly about CMERI and their close and cherished association with the institute.

Shri S.N. Shome, Chairman of Golden Jubilee Celebration Committee, finally proposed the vote of thanks concluding the programme.

On this occasion Prof. Amitabha Ghosh inaugurated the new **Technology Treasure** of CMERI, which was opened for the engineering college students and the other guests.

National Science Day Celebrations at CSIR Laboratories/Institutes

THE National Science Day (NSD) is celebrated by the various CSIR laboratories and institutes on 28 February every year to commemorate the anniversary of the discovery of 'Raman Effect' by Sir C.V. Raman, Nobel Laureate.

Highlights of celebrations at CIMAP, CSIO, ITRC and NEIST this year:

Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow

At CIMAP, 'Raman effect of scientific skills scattering to provide future mega projects' was visible on the occasion with whole of Lucknow's Science and Academia converging at CIMAP as a part of joint celebration of the Science Day. A unique symposium on 'Excitement through Plant Sciences', academically supported by 'UPASTA' (Uttar Pradesh Association for Science & Technology Advancement), was organized in which almost all academic and scientific institutions of Lucknow such as CDRI, ITRC, NBRI, BSIP, IISR, CISH, Biotech Park, KGMU, SGPGI, UPTU, Lucknow University and BR Ambedkar University participated. The symposium was inaugurated by Prof. Asis Datta, Director, National Centre for Plant Genomic Research (NCPGR), New Delhi. Prof Datta delivered the Science Day lecture on 'Plant Genomics and Its Contribution in Shaping the Future of Food and Nutritional Security'.

Dr S.P.S. Khanuja, Director, CIMAP, in his welcome address said that this is for the first time that S&T force of Lucknow has come together to celebrate National



Dr S.P.S. Khanuja, Director, CIMAP, delivering the welcome address

Science Day. Dr Khanuja also presented in brief the salient achievements of CIMAP in different areas of medicinal and aromatic plants. He said that with CIMAP's efforts India is poised to become the leading producer and exporter of several medicinal and aromatic plants and their products in near future. He stressed the need for joint efforts in certain niche areas of science which will bring the

economic prosperity in the society.

Delivering his key note lecture Prof. Asis Datta said that the plant genomics has revolutionized agricultural research; a series of important traits can be addressed from a general perspective using gene function analysis from model plants. There is an urgent need for a more focused debate on the role of modern agricultural biotechnology because land and water for

agriculture are diminishing resources. There is no option but to produce more food and other agricultural commodities from less



Prof Asis Datta delivering Science Day Lecture



arable and irrigation resources. The need for more nutritional food, through higher yields per unit of land, water, energy and time is possible through new agricultural biotechnology. 'We need to examine how science can be mobilized to raise further the biological productivity ceilings without associated ecological harm', Prof. Datta added.

Prof. P.K. Seth, CEO, Biotech Park and President of UPASTA; Prof. R.P. Singh, Vice Chancellor, Lucknow University; Prof. A.K. Mahapatra, Director, SGPGI; Shri N.N. Upadhyay, Secretary, Science & Technology, U.P. Government; Dr Rakesh Tuli, Director, NBRI and Dr N.C. Mehrotra, Director, BSIP; were also present on the occasion.

The institute remained open for school students in the forenoon. About 500 students from different schools and colleges of Lucknow and adjoining areas visited CIMAP with

their teachers. They were taken around the Manav Garden, Gyanika, Plant Tissue Culture Lab and Poster and Model exhibition in the 'Expressions'. They interacted with the scientists and showed their keen interest in new areas of science being pursued at CIMAP and other institutions at Lucknow who had displayed their posters in the exhibition. The students from rural areas said that this was a unique experience for them and they would like to visit CIMAP again for more interaction with scientists here.

In-silico Laboratory inaugurated at CIMAP: Earlier



A view of the inauguration of In-silico lab

during the day an *In-silico* lab was inaugurated at CIMAP by Prof. Datta. The lab will facilitate research & development work in the area of drug designing, proteomics and genomics. Later in the evening, the concept knowledge garden of CIMAP 'Manav Upavan' was visited by large number of people from different parts of the society.

Central Scientific Instruments Organisation (CSIO), Chandigarh

CSIO celebrated National Science Day by holding an Open Day in the forenoon. All the labs of CSIO were kept open for general public. A large number of visitors including the students from various schools, colleges, university and general public went around various laboratories of the institute. They interacted with the scientists and were given exposure to the technologies developed at CSIO.

Later in the evening, Dr R.N. Sarvade, Director, Snow and Avalanche



Seated on dais (from left) are: Dr R.N. Sarvade, Director, SASE, Chandigarh, Shri A.K. Dimri, Scientist, Shri S.K. Sadana CoA, CSIO



Study Establishment (SASE), Chandigarh, delivered a lecture on ‘Snow and Avalanches Research in India — Present Status and Future Scenario.’ He highlighted the different aspects of research in the area of snow avalanches and its future prospects in India. The topic was explained threadbare which was well received by the audience.

Shri S.K. Sadana, CoA, CSIO proposed the vote of thanks.

A Scientist of CSIO demonstrating a technology developed at CSIO during the Open Day



Industrial Toxicology Research Centre (ITRC), Lucknow

At ITRC, around 150 students from five schools attended the NSD celebrations. A few students of M.Tech from Institute of Engineering and Technology were also present. A film on ITRC entitled ‘Battling the toxicants’ was shown to the teachers and students. Delivering the welcome address Dr Ashwani Kumar, Dy Director and Chairman of the programme, welcomed the teachers and students of various schools of Lucknow. He said that the students are the ambassadors of the scientific community and through them the scientific activities of the laboratories are disseminated to the masses.

Dr A.K. Saxena, Dy Director described a few basic scientific terms to the students.

Later, a scientists-students meet was organized in which the students put up a number of queries



Seated on dais during NSD celebrations (from left) are: Dr A.K. Saxena, Dy Director; Dr Ashwani Kumar, Dy Director and Chairman -organizing committee; and Dr Poonam Kakkar, Convener -organizing committee



A view of the students participants of various school

to the scientists. Shri Shukla, a teacher from Navyug Radiance School shared his views on ITRC’s efforts to popularize science. In response to queries from students, Dr Poonam Kakkar, Convener of the programme, informed that Lucknow is the hub of scientific activities with four CSIR laboratories and SGPGIMS, KGMU, Dental University, Biotech Park and various other engineering and dental colleges. She also briefed the students about research opportunities and the on going programme of ITRC regarding creation of scientific and environmental awareness for school children.



North-East Institute of Science and Technology (NEIST), Jorhat

At the North-East Institute of Science and Technology (NEIST), Jorhat, a meeting was organized which was graced by invited guests, eminent scientists, entrepreneurs, media persons, students and teachers besides the scientific brethren of the institute. Dr B. D. Kulkarni, Scientist, National Chemical Laboratory (NCL), Pune, and Prof. K.A. Natarajan, Indian Institute of Science, Bangalore, were the Chief Guest and Guest of Honour respectively. Dr P.G. Rao, Director, NEIST, presided over the meeting. Dr R.K. Sharma, Scientist F, welcomed the distinguished guest and gathering. Dr P. R. Bhattacharyya and Dr R.K. Akhikary, Senior Scientists of the institute, gave brief introduction of speakers.

Delivering his speech on the 'Chemical Process Designing, Bioreactors, etc.' Dr Kulkarni dwelt at length on the designing of various chemical processes and bioreactors. Prof. Natarajan gave a lucid presentation on 'Microbes, Minerals and Environment and Beneficiation of Minerals by Microbes'. He also explained the bioleaching phenomenon and biomimetic strategies of mineral processing and biological remediation technologies which are now-a-days suitably employed for mineral beneficiation.

In his presidential remarks, Dr Rao touched upon the theme of the National Science Day and spoke briefly about the achievements of NEIST over the years.

Earlier, the institute held 'Open Day'. A large number of students, teachers and other public thronged the laboratory in the morning hours and went round the various departments to see the various on going research activities of the institute and interact with the scientists.

CSIR Programme on Youth for Leadership in Science (CPYLS) organized at ITRC

THE Industrial Toxicology Research Centre (ITRC), Lucknow, organized the CSIR Programme on Youth for Leadership in Science (CPYLS) during 6-7 February 2007. Five students from the top 50 merit holders of U.P. Board, CBSE and ICSE Boards' class X examination of 2006 participated in the programme.

Prof. Pradip Sinha, Head, Biosciences & Bioengineering, IIT-Kanpur, was the Chief Guest on the occasion and he delivered a popular lecture entitled 'Selling Dreams in the Bio-space'. Explaining the amalgamation of various disciplines of science, he said that most of the discoveries in the earlier times were related to physical sciences, but now in this century biological sciences are progressing at a faster rate. The students were introduced to several new and upcoming fields such as Computational Biology, Biomechanics, Tissue Engineering, and Biomimetics. Stating that science is an ocean of knowledge and that as no boundaries exist between biological and physical sciences, anybody working diligently and patiently could achieve his dreams. He lauded the efforts of CSIR in popularizing science among the students through CPYLS programme and providing motivation at the right time by "catching them young".

Earlier, Dr D.K. Saxena Chairman, HRDC, ITRC, while welcoming the students, their parents and the Chief Guest, emphasized the importance of scientific knowledge for the



The participant students of CPYLS at ITRC after receiving the certificates of participation by Dr C. M. Gupta, Director, ITRC



growth of the country. Explaining the genesis of the programme he informed that the programme was basically meant to encourage class X students to continue their interest in science and opt science as a career.

Dr F. Jaffery, Convener of the programme, proposed a vote of thanks.

The students visited various laboratories and facilities and interacted with the scientists. This helped students acquaint with the modern approach to toxicology – at molecular and genetic levels and also the impact of toxicants and pollutants on human health, with modern tools. Techniques for detecting and quantifying chemicals and toxicants were shown to them in the Dyes & Food Adulterants Lab, Developmental Toxicology and the Analytical and Petroleum Toxicology Labs. The application of proteomics; Polymerase Chain Reaction (PCR) technique and its applicability in biological research; and microassays for high throughput screening of antioxidant potential of natural products were also demonstrated. Dr D. K. Chowdhuri, Scientist, ITRC, delivered a talk on 'Modeling in Biotechnology'.

On the second day, the Herbal Research, Environmental Monitoring Lab, Cell and Tissue Culture facilities, assessment of

the impact of chemicals on growing embryos, and protocols for assessing the impact of occupational hazards on workers were demonstrated to the students. They were also taken round the library and digital library facility where the students participated in a Science Olympiad. Students were also familiarized with 'nanotechnology' via an animated talk delivered by Dr Alok Dhawan, Scientist, ITRC.

At the valedictory function, students expressed their views and experience at ITRC. They were quite impressed by the facilities available at ITRC. The modern instruments and techniques particularly in the environmental toxicology, cell culture, and proteomics laboratories fascinated them most. While airing their opinions, the students expressed their satisfaction and gratitude towards CSIR's programme which, they expressed, immensely benefited them in enhancing their knowledge and interest in science.

ITRC Director Dr C M . Gupta inspired them by quoting examples of several renowned biologists who shifted their career from physical sciences. Dr Gupta also presented a memento, letter of appreciation and certificate of participation to the students.

NAL at ELKOM DHRUVA 2007

THE National Aerospace Laboratories (NAL), Bangalore, participated in an exhibition ELKOM DHRUVA 2007 organized by NSS College of Engineering, Palakkad at Fort Maidan, Palakkad during 14-17 March 2007. The District Education Officer, Palakkad, was the Chief Guest at the function. The exhibition was visited by a large number of people, particularly the student community, who evinced great interest in NAL's facilities. The NAL display was managed by the team comprising Ms Sasikala G.R. Murthy and Shri Vasant R. Pilare from KTMD.

CRSI Bronze Medal for Dr N. C. Barua

DR N. C. Barua, Scientist F and Head of Natural Products Chemistry Division, North-East Institute of Science & Technology (NEIST), Jorhat, has been conferred the Chemical Research Society of India (CSRI) Bronze Medal for the year 2007 for his significant contribution to chemistry. His major contribution is in the area of total synthesis of bioactive natural products. During the last few years he has synthesized several natural products in the stereoselective manner and published several research papers in reputed international journals.

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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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