

# CSIR NEWS

VOL 58 NO 12 30 JUNE 2008

Team CSIR



## CSIR-India signs agreement with CSIRO-Australia for joint research focusing on sustainability issue

As a followup of the visit of Shri Kapil Sibal, Minister of Science & Technology and Earth Sciences, to Australia in February 2008, CSIR-India and CSIRO-Australia entered into a strategic partnership on 7 May 2008, for joint research activities focusing on sustainability issues as a part of the overall Australia - India Strategic Research Programme. With this, CSIR, India — one of the world's largest industrial R&D set-up has joined hands with CSIRO, Australia — one of the top 1% of world's research organizations with 3900 patents and 180 spin off companies.

CSIR, India and CSIRO, Australia will jointly fund the research partnership activities to the tune of about 7 million USD and will initially focus on three major areas:

- Agricultural sustainability Apomixis technologies — the next Green Revolution
- Energy Novel membrane materials for hydrogen separation
- Water Carbon nanotubes for water desalination

The agreement was signed in New Delhi by Prof. Samir K. Brahmachari, Director General, CSIR and HE Mr John McCarthy, Australian High Commissioner to India, on behalf of CSIR-India and CSIRO-Australia, respectively, in the august presence of Shri Sibal.

The CSIR- CSIRO agreement will certainly be a miles tone in institutional R&D partnership, which is based on mutual interest and the concept of sharing of risk, responsibility and expected benefits.



Prof. Samir K. Brahmachari, DG-CSIR (left) and HE Mr John McCarthy, Australian High Commissioner to India, signing the agreement between CSIR and CSIRO, for joint research focusing on sustainability issue. Seen in the centre is Shri Kapil Sibal, Minister of Science & Technology and Earth Sciences



## Cell screening method for monitoring protein expression using mass spectrometry

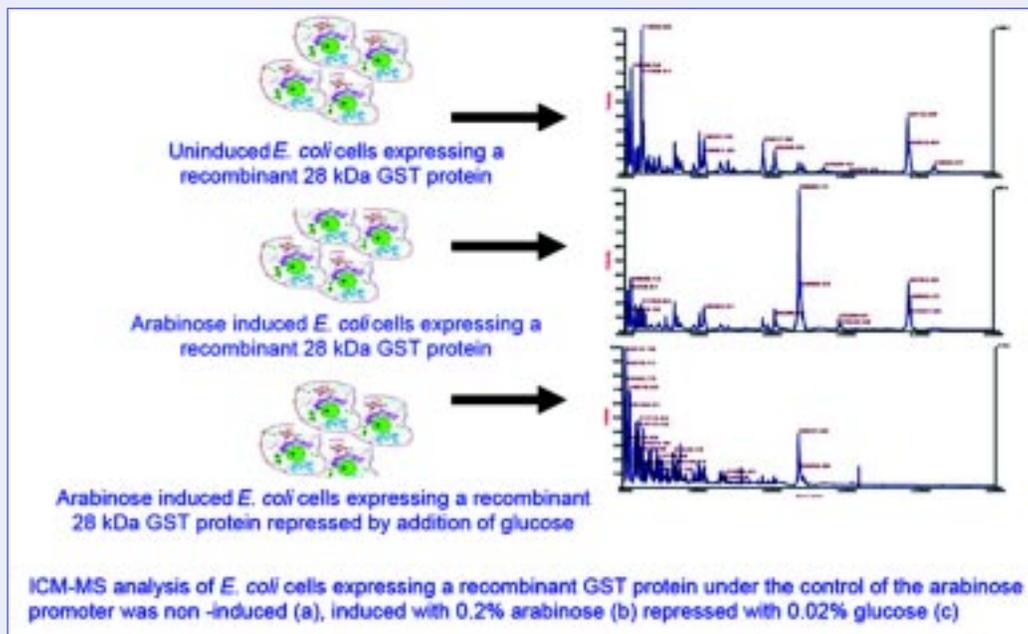
The Intact Cell MALDI-MS (ICM-MS), a mass spectrometry technique, has been used for rapid identification and characterization of clinically important microorganisms, including bacteria, fungi, viruses, and spores. This technique examines the chemistry of the intact bacterial cell surface, yielding spectra consisting of a series of peaks ranging from the mass to charge ratio ( $m/z$ ) of 200 to 100000 Da. Each peak corresponds to a molecular fragment released from the cell surface molecules and highly abundant intact intracellular proteins during laser desorption. ICM-MS has been established for low molecular weight compounds and recently extended to the

analysis of proteins. Change in expression (synthesis) of specific proteins and their activity is associated with the development of any disease. For example, during cancer, development proteins involved in cell proliferations are upregulated, e.g. MAPKs, EGFR, cyclins, etc. Similarly, during inflammation, cyclooxygenase-2 activity is increased. Therefore, understanding the regulation of such proteins is important in view of controlling the disease. ICM-MS offers a very high potential in monitoring protein expression and drug discovery.

Dr Mahesh Kulkarni and other researchers of National Chemical Laboratory (NCL), Pune, have demonstrated a method with a

potential for the rapid screening of drugs that regulate the protein expression directly from an intact cell by laser desorption / ionization, by ICM-MS. The scientists used *Escherichia coli* cells expressing a recombinant glutathione-S-transferase (GST) gene under an arabinose-inducible promoter, as a model system. Using ICM-MS analysis, they detected a 28 kDa peak corresponding to the recombinant GST only under the arabinose-induced condition.

Furthermore, the regulation of GST protein expression was studied using glucose as an alternative metabolite. Glucose decreased the intensity of arabinose induced GST synthesis suggesting that the technique can be used for screening



Mahesh J. Kulkarni, V. P. Vinod, P. K. Umasankar, Milind S. Patole, and Mala Rao, *Rapid Communications in Mass Spectrometry*, 2006; 20: 2769–2772.

the drugs *in vivo*. The ICM-MS technique when compared to other techniques such as SDS-PAGE, Western blotting, ELISA, etc., offers a simple procedure for sample handling, gives specific and accurate patterns of mass spectra, has the potential for autosampling and the rapidity of analysis combine to meet virtually all the performance criteria required for high-throughput drug screening. Therefore, it can be used to discover novel drugs against specific protein expressions in different diseases and can be extended to eukaryotic system or mammalian cell lines for *in vivo* screening of drugs against specific targets. Recently this technique has been used for classifying sub-population of *Moraxella catarrhalis* based on outer membrane proteins using ICM-MS, suggesting this technique can also be easily extended to study the regulation of cell surface receptors such as EGFR, VEGFR, GPCRs, which are important drug targets of cancer.

## New projects undertaken by CLRI

The Central Leather Research Institute (CLRI), Chennai, has undertaken the following new projects during January-March 2008.

### CONSULTANCY PROJECTS

1. Risk analysis and MCAC studies for speciality aluminum powder plant (PL Mr G. Swaminathan) for M/s The Metal Powder Company Ltd, Chennai
2. Risk analysis and HAZOP studies for chemicals storage (PL Mr G. Swaminathan) for M/s IMC Limited, Chennai
3. Risk analysis study (PL Mr G. Swaminathan) for M/s Global Enviro Tech., Chennai
4. Evaluation of India International Leather Fair IILF-2008 (PL Mr D. Chandramouli) for M/s India Trade Promotion Organisation, Chennai
5. Tannery modernization (PL Dr C. Muralidharan) for M/s Pakkar Leather Export Company, Chennai
6. Mechanics and Molecular Dynamics study (PL Dr V. Subramaniam) for Council of Scientific & Industrial Research, New Delhi
4. Evolving Commercial model relating to Low Float Tanning Device (CLaRI Processor) -and energy saving option for leather processing industry (PL Mr N.K.Chandrababu & Mr D. Lakshmanan) for Petroleum Conservation Research Association (Ministry of Petroleum & Natural Gas), Government of India, New Delhi
5. To bioengineer a corneal stromal substitute using cross-linked connective tissue (PL Dr T. P. Sastry) for Department of Science & Technology (DST), Ministry of Science & Technology, Government of India, New Delhi

### GRANT-IN-AID PROJECTS

1. An approach on surfactant production from marine sources for the treatment of tannery effluent and sludges developed upon primary and secondary treatment processes (PL Dr A. Gnanamani) for Department of Biotechnology, New Delhi
2. Studies on hydration and ligand interactions of bio molecules – A molecular tailoring approach (PL Dr V. Subramaniam) for Council of Scientific & Industrial Research, New Delhi & Department of Chemistry, University of Pune, Pune
3. Assessment of biological activity and toxicity: An *in-silico* investigation based on the Combined Quantum
6. Novel approach towards the synthesis of nano-membranes for the separation of gases: Structure-Property relationships in organosiloxane based polyurethanes and imides (PL Dr B.S.R. Reddy) for Department of Science & Technology (DST), Ministry of Science & Technology, Government of India, New Delhi

### COLLABORATIVE PROJECT

1. Survey of livestock feed intake, milk production etc. and Estimation EF of CH<sub>4</sub> from this source for Tamil Nadu ( PL Dr Mahadeswaraswamy) for M/s Winrock International India, Gurgaon, Haryana



## NEIST Efforts for Yield Improvement of Ginsenoside

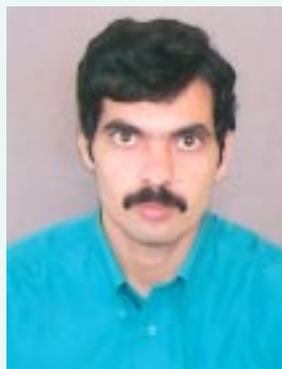
**A**fter an extensive research, the North-East Institute of Science and Technology (NEIST), Jorhat, has been able to improve the quality as well as yield of the ginsenoside alkaloid content of the rare wonder herb Ginseng through the application of Bioreactor method and cell-culture. This herb is found wildly growing in the North-Eastern states. NEIST has also been able to isolate a microbe from the soil in the nearby areas of Golaghat district of Assam, which can suitably be employed for treating the deadly diseases like tuberculosis, etc.

Ginsenoside is a very high value natural product which is used for enhancing human vigour and vitality, longevity, as general health tonic, anti-ageing agent and also as an aphrodisiac. The alkaloid content of Chinese and Korean ginseng is of very superior quality unlike those found in India, which have inferior quality and poor yield. Hence, research was undertaken at the institute to improve the yield and quality and the institute has been successful to a considerable extent in its efforts. Vigorous research is being pursued further.

## Minimal Dilations of Quantum Dynamical Semigroups and Tensor Product Systems of Hilbert Spaces

Shanti Swarup Bhatnagar Prize-winning work of  
Prof. B. V. Rajarama Bhat

**P**rofessor B. V. Rajarama Bhat of the Indian Statistical Institute, Bangalore Centre, has been selected for the Shanti Swarup Bhatnagar Prize in Mathematical Sciences for the year 2007 [*CSIR News*, 57(2007), 331].



Markov processes are random processes where the future depends only on the present and not on the past. They have a wide range of practical and theoretical applications. The stochastic dependence of the future on the present is described through transition probability semigroups. The main work of Prof. Bhat is about non-commutative or quantum versions of these objects. In quantum setting closed systems (i.e., those where there is no interaction with the outside world) follow reversible dynamics and are described by groups of automorphisms. On the other hand, for open systems (i.e., where there is interaction with the outside world) the dynamics is typically irreversible and are governed by semigroups of completely positive maps, or the so-called quantum dynamical semigroups (QDS).

In 1976, Gorini, Kossakowski and Sudarshan considered generators of

quantum dynamical semigroups in finite dimensional matrix theory setting. The structure of general QDS's were obtained subsequently by Lindblad, Christensen and Evans. Now as QDS's are quantum

versions of transition probability semigroups, there is a natural question as to what are the corresponding (quantum) Markov processes. There have been different approaches to tackle this problem. One method is to consider 'weak Markov flows' as described by Bhat and Parthasarathy in 'Markov dilations of nonconservative dynamical semigroups and a quantum boundary theory', *Ann. Inst. H. Poincaré Probab. Statist.* 31 (1995), no. 4, 601-651.

One might ask as to how to model the open system as part of a larger closed system. In other words, we are asking as to whether all QDS's are compressions of semigroups of automorphisms. Unfortunately this is not true except under some very special situations. Extending the work on weak Markov flows, Bhat showed in 'An index theory for



quantum dynamical semigroups', *Trans. Amer. Math. Soc.* 348 (1996), no. 2, 561-583, that all quantum dynamical semigroups dilate to semigroups of endomorphisms (known as E-semigroups). In other words, there may not be automorphisms but we do have endomorphisms. Moreover, this dilation theory is very natural and gives essentially a unique E-semigroup as dilation for the given QDS when we look at the 'minimal dilation'. This makes the result mathematically very appealing and also useful.

Regarding E-semigroups the very first problem is of classification. Classification of relevant groups of automorphisms is clear due to some foundational theorems of Wigner and Stone. However, classification of E-semigroups has turned out to be an extremely hard problem. First attempt was by R. T. Powers. A new idea of classifying E-semigroups by tensor product systems of Hilbert spaces (complete inner product spaces) was brought in by W. Arveson. A non-trivial family of vectors on the product system factorizing nicely is called a unit. Depending upon abundance or deficiency of units product systems are broadly classified into three types. This means that E-semigroups also fall into these three classes. Type I objects here come from the familiar Fock spaces and are well-understood. Examples of other types are hard to come by and are known as exotic E-semigroups. Dilation theory of quantum dynamical semigroups leads to a much better

understanding of E-semigroups. For instance, Bhat has complete parametrization of positive contractive morphisms of type I E-semigroups, and this comes from dilation theory. Moreover, as shown by Powers, this theory helps us to construct type II examples.

Another way of obtaining product systems is by exponentiating sum systems. Direct sum systems on exponentiation lead to only type I product systems. B. Tsirleson showed that exotic type III examples can be got by exponentiating almost direct sum systems. It is a result of Bhat and Srinivasan that it is not possible to reach type II examples by this method.

A much more general theory of product systems comes about by looking at Hilbert  $C^*$ -modules. These are inner product spaces where the inner products are not complex valued but operator valued. Such product systems are also connected with E-semigroups of more general algebras. A lot of progress has been made in developing such a theory by Bhat and Skeide. Recently, Bhat has obtained a simple explicit example of a completely entangled subspace of maximal dimension. This is of importance in quantum information theory.

*B. V. Rajarama Bhat was born in 1966 in Alankar (Karnataka). He received B. Stat. (Hons.), M. Stat. and Ph.D. degrees from Indian Statistical Institute. He wrote his Ph.D. thesis titled 'Markov dilations of non-conservative quantum dynamical semigroups and a quantum boundary theory' under the supervision of Prof. K. R.*

## Patents Filed by CLRI

The Central Leather Research Institute, Chennai, has filed the following patents in the recent past:

- An improved process for making chamois leathers (0255NF2006 / IN)
- A process for the preparation of functional aliphatic hydrocarbons from volatile liquid hydrocarbons for industrial applications (0003NF2008/ IN) has been filed

*Parthasarathy in 1993. After a post-doctoral stint at the University of Pisa (Italy) and the Fields Institute (Canada) he joined the Statistics and Mathematics Unit of the Indian Statistical Institute, Bangalore Center in 1996 and is a professor there since May 2000. He was awarded the INSA Medal for Young Scientists on 7 October 1997 by the Indian National Science Academy, New Delhi. He has received the Swarnajayanthi Fellowship from the Department of Science and Technology, India and the B. M. Birla Science Prize in Mathematics from the B. M. Birla Science Center, Hyderabad. He was elected as a Fellow of the Indian Academy of Sciences in 2006.*



### International Conference on Recent Trends in Collagen

To commemorate its Diamond Jubilee Year, Central Leather Research Institute (CLRI), Chennai, organized an international conference on “Recent Trends in Collagen” at CLRI during 24- 25 January 2008. Prof. M. Vijayan, a Distinguished Biotechnologist, MBU, IISc, Bangalore, and President, Indian National Science Academy, inaugurated the conference. Prof. Barbara Brodsky, University of Medicine and Dentistry, New Jersey, USA, presided over the function. Prof. Brodsky paid rich tributes to Prof. G.N. Ramachandran, an eminent Scientist of yesteryears, and delivered a lecture on “Peptide Models for Collagen”.

Dr T. Ramasami, Secretary, Department of Science & Technology, Government of India, New Delhi, and a former Director of CLRI, gave an impressive key note lecture explaining that in the first half of five decades of CLRI's existence, the focus was on understanding collagen structure, its chemistry and cross linking of pathway among other tissues. The focus during the second half being on energy management within the organic structure of collagen and application of collagen for treating wounds.

Dr K.T. Joseph, former Director Grade Scientist of CLRI, was felicitated for his valuable R&D contribution in Collagen research. The conference had six sessions where deliberations were held on the latest advances in collagen research focusing on Biomaterials, Clinical applications and Industrial relevance of Collagen. Five international and 15 national experts presented their papers. To create awareness and enthusiasm for pursuing research amongst student community, a special Student-Scientist interactive session was organized on 25 January before concluding the conference.

### Seminar cum Meeting of CODATA Task Group for Exchangeable Material Data Representation

The Committee on Data for Science and Technology (CODATA) is a multi-disciplinary body of International Council of Science (ICSU). CODATA has the mission to strengthen international science for the benefit of society by promoting improved scientific and technical data management and use. All the major activities of CODATA are carried out through its Task Groups and Working Groups. At present, there are eleven Task Groups whose details are available on the CODATA website: [www.codata.org](http://www.codata.org). One of these Task Groups is Exchangeable Materials Data Representation to support Scientific Research and Education. A Seminar-cum-Meeting of this Task Group was organized at the National Physical Laboratory (NPL), New Delhi, during 4-5 March 2008. This important event had 41 participants from USA, France, The Netherlands, Czech Republic, Japan, Republic of Korea and India. The Indian delegates were from CSIR's NPL and AMPRI, DRDO's TBRL, DAE's IGCAR, and from INVERTIS— a private establishment.

The deliberations of this meeting focused on: Emerging area of materials data for scientific research in the field of materials design; Identifying materials data resources and issues to access these resources – online databases, softwares, knowledge bases, and documents; Data format and semantics issues to share material information and knowledge – markup language, ontology, and knowledge representation; Description and standardization of nano material data for its characterization – properties, definitions, and measurements; and Integrating materials data exchange into undergraduate and graduate education by developing examples or potential candidates of using



materials databases in undergraduate and graduate education.

Specific deliberations were held on issues related to molten salts, integrating creep and material data bases and thermal property data bases and simulation of thermal properties. The plan for a centralized Materials Database in India was also presented.

The Chairman of the Local Organizing Committee, Dr Krishan Lal, who is also President of CODATA, gave a presentation on 'Challenges and Opportunities before CODATA and the Crucial Role of Precision Measurements in Data Science'.

The task group is making efforts to strengthen the Data Science Journal of CODATA. A report on this Seminar will be submitted to the Journal.

The delegates were also taken round to a few laboratories in NPL.

The focus of the Task Group Meeting was on taking stock of the present situation and planning of the future activities.

## National Seminar on Assam Gas Cracker Downstream Processing

A two-day national seminar on 'Assam Gas Cracker Downstream Processing' under the theme 'Technology based strategy for development of NE India' was held at the North East Institute of Science and Technology (NEIST), Jorhat, during 15-16 February 2008. Held at NEIST auditorium, the inaugural function of the seminar was presided over by Dr G. Thyagarajan, former Director of the institute. Shri B. K. Handique, Minister of State for Chemicals and Fertilizers, Government of India, was the Chief Guest who inaugurated the function and Shri Dip Gogoi, Member of Parliament, was the Guest of Honour. Notable among others present were Shri Sujit Bhujabal, Director, Department of Chemical and Petrochemicals, New Delhi; Prof. (Dr) S. K. Nayak, Director General, CIPET, Chennai; Shri R. K. Kashyap, Chief Operating Officer, Brahmaputra Cracker and Polymer Limited, Guwahati; Shri Vijay Merchant, Chairman, Environment Committee, Plastindia Foundation, Mumbai; Shri Ibotomba Shingh, Manager (Project), CIPET, Changsari, Assam; Shri O. P. Taylor, Managing Director, Assam Petrochemicals Ltd, Namrup, Assam; Shri Amar Seth, Vice President, Plastindia Foundation, Mumbai; Shri N. B. Narjaree, General Manager, Small Industry Development Bank of India, Guwahati; Shri A. K. Agarwal, Deputy Industrial Advisor, Department of Chemical and Petrochemicals and Shri Sumit Basu, Reliance Industries,

Kolkata, besides the scientific community of NEIST.

In his welcome address Dr P. G. Rao, Director, NEIST and Chairman, Organising Committee, said that science has made self-sustaining and exponential growth over the years. Science is not a separate entity of the society and hence it cannot be separately accountable for development, rather it constitutes an integral part of the social development as a whole. Vigorous efforts are needed to harness the resources to meet the challenges of free-market economy and global integration and for that suggestions from experts like the ones in the present seminar are of utmost importance. He dedicated the seminar to two of the senior scientists of laboratory namely Dr P. C. Tamuly and Shri D. K. Dutta who were to superannuate towards the end of the month.

Delivering his speech as the Chief Guest the Hon'ble Minister Shri B. K. Handique said that he was looking for such a timely seminar. By choosing the subject with special reference to the Assam Gas Cracker Project, NEIST actually had done a yomen service in the context of proverbial industrial backwardness. Regarding the environmental problems owing to plastic, he said that against the per capita consumption of 100 kg of plastic in the western countries, its consumption in the North East India was just 1 kg and plastic have percolated down to all the sectors of the economy.



Under the circumstance and given the potential, the plastic can play a major role for removing industrial backwardness of the region as well as problem of employment generation and NEIST has a definite role to play in it, he said. The objectives of the Gas Cracker Project as divulged by the Minister are: (1) To tackle the unemployment situation - about 1 lakh jobs will be created within a span of two decades; (2) To integrate polymer into the downstream industries; (3) To put NE India in the national polymer based industries' map; (4) Indian plastic industry is at the cross-road and Indian polymers have to play significant role in the Asia-Pacific, the fastest growing economy in plastic industry sector.

Speaking in the same vein the Guest of Honour Shri Dip Gogoi appealed to develop technologies in the context of global free-market scenario based on the strategies for need-based technology structure, total quality management and environmental concerns. He complimented NEIST for its sustaining efforts for the development of NE India.

In his presidential speech Dr Thyagarajan mentioned that there is a misconception and misinformation in the mind of people about plastic as a polluting stuff. To dispell the misconception it is necessary to have the environment treatment system in place before the actual start of the plant and in that connection he suggested to integrate the environmental technology with the chemical technology in a manufacturing unit. Citing examples, he said that only two states in India, namely Gujarat and Maharashtra, have done it successfully. Regarding the Gas Cracker project in Assam he said that skilled professionals and technicians will get good employment. He advised the NEIST authorities to have Polymer Science in its future research planning.

The seminar had three plenary lectures delivered by eminent experts, four technical sessions in the areas like Petroleum & Petrochemicals, Biotechnology & Bioprocess, Chemicals/Fine Chemicals/Materials and Agro Technology/Agro-based Products and Rural Development which was followed by a panel discussion session. A total of 16 technical papers were presented in the seminar. To commemorate the event a souvenir was also brought out on the occasion, which was formally released by the Chief Guest.

## AGM of ISAMPE, Bangalore Chapter at NAL

The Indian Society for Advancement of Materials and Process Engineering (ISAMPE), Bangalore Chapter organized its Seventh Annual General Meeting on 4 April 2008 at Dr S.R. Valluri Auditorium, National Aerospace Laboratories (NAL), Bangalore. Dr R.M.V.G.K Rao, Chairman, ISAMPE, Bangalore Chapter, welcomed the members and introduced the Chief Guest Lt. Gen. (Dr) V. J. Sundaram. Dr A. R. Upadhyya, Director, NAL, graced the occasion and released the first circular and call for papers of the INCCOM-7, scheduled to be held on 4-5 December 2008 as part of NAL's Golden Jubilee Celebrations.

The meeting started with a stimulating technical lecture by Lt. Gen. Sundaram, PVSM, AVSM, VSM (Retd.), Advisor, Micro and Nano Systems, National Design and Research Forum. Dr Sundaram, brought out a comprehensive account of the recent advances in the development and use of MAVs for a host of applications including agriculture, disaster management, defence security, animal husbandry, health care, and many R&D end uses. He explained the multi-disciplinary nature involved in the development of MAV's, encompassing aerodynamics, propulsion, materials, structures, navigation, controls, and guidance and so on with a touch of bio-inspiration. The talk was flavoured with an exposition on the Micro, Nano and Nano-Bio systems coupled with a range of sensors including those based on the carbon nanotubes (CNT) and the nano-biotechnologies. He also narrated the exciting events covering the National Flying Competition MICAV-07, held in October 2007 at ADRDE, Agra, with participation of several educational and R&D institutions. He enthralled the audience through the video clippings, reflecting the young competitor's passion for fixed wing / rotary wing / flapped wing MAVs and optical - flow guidance and micro-devices. The clippings also showed the flights of a flapped wing MAV in an auditorium and UGV launched fixed wing MAV in an auditorium and UGV launched fixed wing MAV



in an open field. The talk also highlighted a crisp account of the MAV-08 International competition, again held at ADRDE, Agra, in March 2008, and explained the razor thin line demarcating the winner and the loser in this competition. Dr Sundaram concluded urging the ISAMPE to become a forum of new materials and technologies of the future.

Dr P. Ragothama Rao, Co-Chairman, ISAMPE, Bangalore Chapter, thanked the speaker for his grand exposition of MAVs, and the Director, NAL for all the support and encouragement received in organizing the event.

The business session that followed saw Dr C. M. Manjunatha, Secretary, ISAMPE, Bangalore Chapter, outlining the achievements of the chapter during 2007-08, and Dr Anjana Jain, Treasurer of the Chapter, presenting the statement of account. Shri M. Venkateshwara Rao, Jt Secretary, proposed a vote of thanks.

## Rural Development: NISTADS organizes an Interaction Meet and Awareness Camp at Sampla

The National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, organized a two-day Interaction Meet and Awareness Camp in the Sampla cluster of Haryana during 14-15 March 2008. The event formed part of the DST-sponsored project on "Technological Upgradation of Traditional Skills of Rural Artisans through Information, Training and Adaptation of Science and Technology in Sampla, District Rohtak, Haryana. It was held in four informal meets at which the artisans interacted with experts from different fields to gain modern knowledge pertaining to their profession. The complete deliberations at these Camps were conducted in Hindi and at times, in *Haryanavi Hindi*.

### Meet I : Problem-solving of Rural Artisans and Linkages Development with R&D Institutions

After a brief introduction, Shri S.S. Solanki, Scientist, NISTADS, explained that the artisans from unorganized sector generally face four types of problems: (i) Technology and skill-related, (ii) Finance-related, (iii) Marketing-related and (iv) Information-related problems. He opined that lack of awareness and access to information were the biggest problems for the tiny sector of entrepreneurs. Through awareness enrichment, solutions for the remaining three types of problems could be found. He called upon the artisans to discuss their problems with the

experts freely. He also mentioned some of the rural technologies developed by CSIR and added that several CSIR institutes organize training programmes in specific fields like pottery and leather, for entrepreneurship development in the rural area.

Experts at this meet were Prof. S.K. Adlakha, Head, and Dr Indra Mani Principal Scientist, Division of Agricultural Engineering, Indian Agricultural Research Institute (IARI), New Delhi. Since products manufactured in this cluster are iron-based, welding forms an integral part. The artisans were advised that instead of the traditional rod welding, they should use wire welding, which is more economical, saves time and improves quality of products. Also, the cluster being famous for making water tankers, they were advised to use epoxy paints to increase the durability of the tankers. The experts also attended to the several queries regarding improvement in manufacture of various products. The artisans were also invited to visit IARI to have the latest information about different machines and which they could use to improve the manufacturing of their products.

### Meet II : Problem-solving of Rural Artisans and Linkages Development with Financial Institutions

The meet was attended by over 50 artisans of the cluster. The experts at this meet were: Shri Raj Kumar, Deputy



## Conferences/Seminars/Meets

General Manager, National Bank for Agricultural and Rural Development (NABARD), Rohtak and Smt Amarjeet Kaur, General Manager, Central Cooperative Bank, Rohtak. These experts listened to the problems of artisans and observed that all their problems related to finance, skill development, raw material, infrastructure development and marketing since the artisans were 'unorganized'. The artisans were told that the solution to their problems lies in joining hands and constituting an 'Artisans Association'.

Shri Raj Kumar informed that NABARD has several schemes for the non-farm sector, but it finances only the projects/ schemes submitted by established associations, federations, non-governmental groups (NGOs), etc. and not from individuals. Some of the schemes more relevant to this cluster of artisans, outlined by Shri Raj Kumar are as follows:

- (i) District Rural Industries Development Programme (DRIP)
- (ii) Rural Entrepreneurship

Development Programme (REDP)

- (iii) Skill Development Programme
- (iv) Full Cluster Development Project
- (v) Youth Training Programme
- (vi) Product Marketing Scheme
- (vii) Exposure Visits Scheme

Shri Raj Kumar provided brief details about these schemes and outlined the facilities provided by NABARD under each programme.



Interaction meet in Sampla in progress



Repairing of Harrow and Trolley in Sampla



Harrow being manufactured in Sampla



Water Tanks made by artisans in Sampla



He informed that if artisans association can identify 30-35 young unemployed willing youths, then NABARD can arrange a training programme for them, of say about a month's duration for their skill development, at no cost to them. NABARD will also help them in establishing their own entrepreneurs or getting employment, invariably through campus selection. He cited the example of 'Training for Inventor Manufacturing', as a successful case of entrepreneurs development arranged by NABARD.

Under its unique scheme of 'product marketing', NABARD provides for the rent of show-room for two years, salary of one employee for one year, and expenditure on decoration of show-room for the recommended and identified product; and according to him, two-year period is sufficient to allay the teething troubles of marketing a project, if it has quality and acceptability. NABARD can even arrange lectures/ training for skill upgradation or professional re-orientation if such a request is made by the association/ federation and the beneficiary-trainers are identified.

Regarding getting bank loans, Smt Amarjeet Kaur suggested that before submitting a project proposal to a bank for grant of a loan, an artisan should include following information in it: (i) What he wants to do, (ii) Why he wants to do that project, (iii) How much loan is needed and what is the basis of that loan amount requirement, (iv) How

much is the potential profit, and (v) How the loan will be returned to the bank. If all this information is provided, there is no possibility of its rejection and bank will have to reply within 45 days. She suggested that artisans should also understand what type of bank loan should be used for what purpose.

### Meet III: Awareness Generation Among Rural Artisans

It was arranged in the village Behrana. More than 50 artisans and other rural persons participated. In this awareness generating meet, the experts were Shri Naresh Kumar Tanwar, General Manager, Cooperative Bank, Jhajjar, Shri Raj Kumar, Deputy General Manager, NABARD, Rohtak and Shri Surender Singh, ADO, Madana Kalan, Jhajjar, besides Shri S.S. Solanki, Dr P.V.S. Kumar and Shri P.R. Bose, all Scientists of NISTADS.

Shri Tanwar outlined different schemes of the Cooperative Bank and stressed that the bank loan should be utilized for the purpose for which it is taken on easy repayment terms. He suggested that 'Revolving Cash Credit Scheme' was the best option for the rural persons present in this meet.

Shri Raj Kumar repeated the schemes outlined by him in Meet II, and suggested to the artisans to form a *Kissan Club* of which all rural people of the village could become member and avail the facilities provided by NABARD. The *Kisan Clubs* have evolved as a power tool for rural development throughout

the country, he added.

Shri Surender Singh outlined different schemes of Haryana Government for rural development.

The artisans were suggested to always take a 'receipt' for the application they submit to any department because once an application is registered, it will have to be disposed-off within 45 days. They were also suggested to take advantage of 'Right to Information Act' for getting any information. Most of these rural people heard about this Act for the first time and enquired more details about it.

### Meet IV: S&T to Artisans Workshops

During these workshops the S&T experts directly interacted with the rural artisans. Dr S.K Adlakha suggested to the artisans to use standard parts as far as possible in their products which will increase market acceptability of their products due to easy and omni repairability. He also suggested to use 'heat treatment' for increasing the life of their products. He inspected various zig-zag fixtures (*Jugads*) developed and being used by these artisans and suggested modifications in them.

Thus, basically the Interaction Meet and Awareness Camp were an attempt to generate awareness among rural artisans of Sampla Cluster regarding the different schemes of central and state governments and help them improve the techniques they use were well attended and proved to be a successful attempt.



### **Futuristic Materials as Catalyst and Adsorbents (CATWORKSHOP-2008)**

The Institute of Minerals and Materials Technology (IMMT), Bhubaneswar, organized the title workshop under the auspices of Catalysis Society of India during 18-20 February 2008. Prior to the workshop, a two-day tutorial was conducted on TPX program during 15-16 February in which 25 research scholars from across the country participated.

The workshop was inaugurated by Dr Paul Ratnasamy, former Director, National Chemical Laboratory and presently INSA Ramanujam Research Professor and chaired by IMMT Director Prof. Barada Kanta Mishra. The aim of the workshop was to identify new challenges and emerging materials to be used as future catalysts. The forum provided a platform to researchers especially young talents pursuing catalysis as their career.

More than 300 delegates from educational institutes, national laboratories, industries participated and took active part during the deliberation. Altogether three plenary lectures and 25 invited talks from eminent personalities from India and abroad and 108 poster presentations covering the areas such as energy materials, nano materials, biomaterials, hybrid materials, mesoporous and microporous materials were deliberated upon. Ten posters were adjudicated as best posters and given cash prizes.

### **Workshop on Sisal Fibre Technologies for Sustainable Rural Employment Generation**

The Advanced Materials and Processes Research Institute (AMPRI), Bhopal, has been continuously working on sisal technologies in a mission mode approach towards creating sustainable sisal based products. To strengthen the activities in this direction and to develop a meaningful network of people working on sisal technologies, a workshop on 'Sisal Fibre Technologies for Sustainable Rural Employment Generation' was organized by AMPRI during 22-23 February 2008 to develop sisal culture in the country. The workshop, planned under rural technologies dissemination activity of CSIR, focused on cultivation aspects, cost effective fibre extraction methods, diverse applications, effective utilization of sisal waste, financing, marketing and employment potential of sisal fibre.

Delegates from research organizations, NGOs and industry participated in the two-day workshop. Dr P.C. Angelo of PSG College of Technology, Coimbatore; Dr D.K. Biswas, Scientist in charge, Sisal Research Station, Bamra, Orissa and Dr N. Ramakrishnan, Director, AMPRI started the inaugural session. During the inaugural session Dr N. Ramakrishnan, while delivering the theme address highlighted the role of use of sisal for various applications. He said that since sisal is a green fibre, which is biodegradable, it will be preferred by even multinationals for high-end applications. It has a variety of applications—from very low end to very high end.

Technical sessions during the first day covered: Cultivation and Agro technologies, Composites for Engineering Applications and Yarn, Looming and Textile Technologies. The papers presented related to sisal agro forestry; problems and prospects of sisal cultivation, economic viability of starting sisal plantation in drought prone areas; development of biodegradable natural fibre composites; use of sisal fibre composites for engineering applications, for example, in automobiles, as asbestos substitute for brake composites in railways, as building materials, geotextiles, and packaging industry, etc.

The topics covered on second day were: Rural technologies; Employment potential; Technology transfer and entrepreneurship development and Value addition and waste utilization.

A book on '*Sisal Fibre Technologies for Sustainable Rural Employment Generation*' was also released during the workshop. The book is a treatise on the available sisal fibre technologies, targeted to various people/organizations working on sisal fibre. The deliberations of the workshop will be useful for creating sustainable strategies for sisal based economy for the country.

## Workshop on 'Enhanced and Synthetic Vision for Transport Aircraft'

A two-day workshop on 'Enhanced and Synthetic Vision for Transport Aircraft' was organized by the Multi Sensor Data Fusion Group, Flight Mechanics and Control Division (FMCD) at the KTMD Seminar Hall of National Aerospace Laboratories (NAL), Bangalore, on 25-26 April 2008. The regional transport aircraft (RTA-70) proposed to be developed at NAL is expected to have the capability of reliable and safe operation from airports with minimal infrastructure and instrumentation facility, under all-weather conditions. Enhanced and Synthetic Vision (ESV) technology aided by satellite navigation has the potential to meet this requirement. The main objective of the workshop was to examine the state-of-art and identify gaps in technology/knowledge base in this area and chalk out a plan of action for ESV development at NAL.

In his welcome address at the inaugural session, Dr A. R. Upadhyaya, Director, NAL, deliberated on the need for ESV technology development for RTA. He said that the lectures and ensuing discussions at the workshop would benefit the scientific group initiating this technology activity at NAL and hoped that it would provide the necessary network of organizations to carry out the work. Dr Kota Harinarayana, Raja Ramanna Fellow, NAL, in his inaugural address brought out the

role of reliable, dependable air connectivity independent of costly ground infrastructure as a driver for accelerated economic development of the interior regions of our country. He emphasized that the RTA program aims to achieve this air connectivity by building in the capability to land at airports with minimal ground infrastructure under all weather conditions, using ESV integrated with GPS/WAAS/LAAS at 25% lower costs in terms of acquisition and operation and 50% lower maintenance cost.

In his keynote address Dr Kibe described the role of space and ground based augmentation system for Integrated Enhanced Vision System. He said that GPS integrated with WAAS and ADS-B can provide the increased navigational accuracies required for landing. He identified the need to perfect the technology for proper registration or accurate overlay of Synthetic Vision with Sensor images lest it lead to "Hazardously Misleading Information".

The two-day workshop had fourteen invited lectures delivered by scientists and technologists from India and abroad who shared their work experience in related technology areas and thoughts on its use for ESV development. There were six thematic sessions. In the first session, Dr Jharna Majumdar, Professor, East Point College of Engineering, Bangalore, with her

vast experience in development of "Image exploitation system for unmanned aerial vehicle", brought out the research areas in image processing that need to be addressed for ESV and some aspects of video geo registration. Prof. B.N. Chatterji, IIT-Kharagpur, covered issues related to content based image retrieval. In the second session on "Visual Cues for Pilots/Human Machine Interface", Sqn Ldr J. Sreeram, ASTE, Bangalore, gave an insight into the flight test perspective on display concepts for synthetic vision followed by Wg. Cdr Renganathan, Coral Technologies, Bangalore's presentation giving an overview of computer graphics for modern cockpits and cockpit procedure trainers. This was followed by presentation of the activities at FMCD in the areas of synthetic vision and image fusion.

On second day, Dr Ronald Kruk, Chief Scientist, CAE, Canada, in his very lucid and informative presentation brought out the role of laboratory, simulator and flight test components in ESV development, as part of the third session. Dr Dinesh Ramegowda, Honeywell Technology Solutions, Bangalore, covered the multi-spectral enhanced vision system development at Honeywell. The fourth session included two lectures on issues and solutions for image fusion by Dr S.C. Jain, DEAL



Dehra Dun and Dr Subrata Rakshit, CAIR, Bangalore. In the fifth session on “Sensor Technologies”, Dr S.S. Negi, IRDE, Dehra Dun, detailed the latest developments in infrared sensor technology while Dr Nilesh M. Desai of ISAC, ISRO, Ahmedabad, covered the microwave remote sensing and synthetic aperture radar. Dr P. P. Mohanlal, VSSC, Trivandrum, discussed the GPS aided INS for space capsule recovery experiments and launch vehicle systems.

The workshop concluded with a 90 minute brain storming panel discussion by the panel members consisting of eminent scientists and transport aircraft pilots. Issues related to system requirement, sensors, pilot interface and system certification were discussed. The workshop provided a platform for the experts from various organizations to come together to arrive at a road-map for ESV development for RTA.

## National Science Day Celebrations at IITR

Many CSIR laboratories celebrated the National Science Day (NSD) (28 February). On this occasion, the Indian Institute of Toxicology Research (IITR), Lucknow, organized an exhibition showcasing the research activities of the institute.

Prof. Roop Rekha Verma, an eminent educationist/social activist and former Vice Chancellor, University of Lucknow, inaugurated the exhibition. Around 150 students, from various schools of the city visited the exhibition and interacted with the scientists.

A film show entitled ‘Battling the Toxicants’ which gave an overall view of the various activities of the institute, was also shown to the students.

The major exhibits pertained to:

- Colour detection strip (CD Strip), developed by IITR for the detection of a non-permitted, carcinogenic oil soluble dye, butter yellow in mustard oil;
- Detection of several permitted (Carmoisine, brilliant Blue FCF, Tartrazine, Ponceau 4R, Sunset Yellow, etc.) and non-permitted colours (Rhodamine B, Orange II, Metanil Yellow, etc) in various food commodities by paper chromatography;
- Posters related to various adulterants, e.g. argemone oil and contamination of butter yellow in mustard oil;



Prof. Roop Rekha Verma, former VC Lucknow University, inaugurating the exhibition. Seen on extreme right is Dr Ashwani Kumar, Acting Director IITR

- Bioactivity and safety evaluation of herbal formulations;
- Identification of medicinal plants by the combination of plant morphology and chemotyping of the metabolites;
- Explanation of hepatoprotective and antidiabetic potential of plants;
- Safety evaluation of plastic and polymeric materials, biosafety assessment;
- Noise level monitor for recording of noise levels, respirable dust sampler for monitoring of air pollutants, namely SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> and flue gas analyzer for analysis of particulate matter;
- Cell lines for evaluating phototoxicity of drugs, and effect of UV radiation on the growth of maize and pulses (*mung dal*);
- Technique for decolorization of effluent using certain species of bacteria;

Body fat examination using bioelectric impedance analysis was performed for the school children and the public. The examination included determination of body mass index as per WHO guidelines (1995). Body fat percent and visceral fat level (also known as abdominal obesity) was determined using Japan Society for Study of Obesity (2002) recommendations;

More than forty percent had body mass index within the normal range. Body fat percent analysis of these subjects revealed that 41 subjects (36%) had normal body fat percent. Visceral fat analysis was done for 54 adult subjects, 32 (59%) of these had normal amount of visceral fat. The subjects were advised to improve their physical status based on the body fat examination.

## PAU Team visits MERADO

**L**ed by Dr Manjit Singh Kang, Vice Chancellor, a team of senior faculty members of the Punjab Agricultural University, Ludhiana, recently visited the Mechanical Research and Development Organisation (MERADO), Ludhiana. The team comprised Dr V. K. Saigal, Dean, College of Agricultural Engineering, Dr S. S. Ahuja, Sr. Engineer-cum-Head, Department of Farm Power & Machinery and Dr B. Dogra. The purpose of visit was to explore the areas of common interest and synergize efforts in future endeavour.

Briefing the team about the facilities and expertise available at MERADO, Shri V.R. Dahake, Scientist-in-charge, MERADO, said that MERADO's strength lies in design through CAD/CAM, solid modeling and state-of-the-art manufacturing facilities (CN Turn Mill and Five Axis Milling Machine). These primary facilities are well supported by Metrology, Non-destructive and Destructive testing and Bio diesel Laboratories. MERADO had successfully transferred several

technologies, i.e. complete technology package — detailed engineering and manufacturing drawings, manufacturing notes, etc.

The PAU team interacted with the MERADO scientists and appreciated the expertise available at MERADO and showed interest in using the same as and when required. Shri Dahake assured the team of all support.

The team was also taken around to show the various technologies developed at MERADO, e.g. oil expellers of various capacities (1 to 50 tonnes/day) (technologies released to 17 industries), and light weight power tiller, etc. The team was also shown the technologies being developed in the field of bio-fuels, e.g. semi-continuous bio-diesel plant of 600 liters/day capacity (technology is ready for release) and production of bio-gas through bio-methanation of de-oiled *Jatropha* cake. Escalation of oil prices (~130 \$ a barrel), depleting fossil fuel resources, energy security, apart from air pollution have forced the scientific community to take up research on bio-

fuel as an important source of energy. The team appreciated MERADO's initiative towards *Jatropha* plantation.

While briefing the team about



Shri V.R. Dahake, Scientist In-charge, MERADO, explaining Dr M. S. Kang, VC, PAU, about the bio-diesel plant



MERADO's contributions to Agricultural Machinery, it was pointed out that agricultural machinery is a complex field calling for multi-disciplinary inputs from agricultural scientists, agricultural engineers, mechanical engineers (modern tools of solid modeling, analysis and design, precision manufacturing through CNC machines) materials, sensors, electronics and computer science (towards automation). Keeping in line with modern trend in agriculture (precision, conservation farming and mechanization), the network based research utilizing facilities and expertise in CSIR labs, ICAR, institutes, agriculture universities / departments/ IITs, etc. need to be considered.

Shri Dahake, thanked Dr Kang and the accompanying faculty members for the visit showing interest in the MERADO expertise.

### INSA Lecture Award for CCMB Scientist

**D**r Amitabha Chattopadhyay, Deputy Director, Centre for Cellular and Molecular Biology (CCMB), Hyderabad, has been awarded the prestigious Bires Chandra Guha Memorial Lecture (2008) of Indian National Science Academy (INSA), New Delhi, for his pioneering contribution on the role of membrane lipids in the organization and function of G-protein coupled receptors, and its implications in health and disease.

The award carries a citation, a cash prize of Rs 25,000/- and travel incentives.

Dr Chattopadhyay joined CCMB in 1989 as a Group Leader and has published more than 120 research papers in peer-reviewed national and international journals, and edited and reviewed five books. He has received several awards for his outstanding research contributions in biological sciences, such as the Shanti Swarup Bhatnagar Prize, Raman Research Fellowship, and Dozor Visiting Fellowship (Israel), to name a few. Also, he is a Fellow of all the three Indian Academies of Science, besides being a Member of the Editorial Boards of several reputed international journals.



### Dr Ram Rup Sarkar selected for INSA Medal



**D**r Ram Rup Sarkar, Scientist, Centre for Cellular and Molecular Biology (CCMB), Hyderabad, has been selected for the prestigious Indian National Science Academy (INSA) Medal for Young Scientist (2008) for his outstanding contributions to theoretical biology; ecology and epidemiology with a special emphasis on deterministic and stochastic modeling that are useful in monitoring, forecasting and controlling such systems. The award carries a bronze medal, a cash prize of Rs 25,000 and other incentives.

Dr Sarkar, after completing his Ph.D. from Jadavpur University in 2004, joined CCMB as a Scientist and has published more than 30 research papers in national and international journals. He has won several other awards including CSIR-DAAD Exchange of Scientist Fellowship, and delivered several lectures in India and abroad.