

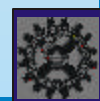


Technology for 10 hp Tractor 'Krishishakti' transferred to M/s Puzzolana Tractors Limited

THE Central Mechanical Engineering Research Institute (CMERI), Durgapur, has signed an MoU with M/s Puzzolana Tractors of Hyderabad to transfer its technology for the newly developed 10 hp tractor Krishishakti. At an informal function held in CMERI on 5 September 2006 Shri Bhaskara Rao, Chief Technical Advisor of M/s Puzzolana Tractors Limited, handed over a cheque for initial amount of Rs 5 lakh to Dr Gopal P. Sinha, Director, CMERI, who handed over the technology documents and drawings to Shri Rao.

In his brief address on the occasion, Dr Sinha heralded the occasion as a first step towards the realization of a small, low-cost and efficient tractor that can be afforded by the millions of farmers across the country. He expressed his keenness to design and manufacture a 'people's tractor' that would cost less than Rs 1 lakh and hoped that the new technology partners would extend their cooperation in realization of this dream. Shri Rao assured all support of his firm in such endeavors. CMERI will receive 15 lakh from Puzzolona for providing know-how and also a royalty at the rate of Rs 750/- per tractor for the next five years.

It is worth mentioning that in India, around 85% households cultivate about 36% of the entire cultivatable land in the country. The average land holding of the small Indian farmer normally does not exceed 4 hectares. Further, with changes being brought about in the land holding policy, holdings measuring less than 10 hectares may also fall under small land holding. It is therefore quite difficult for the average Indian farmer to afford mechanized farming utilizing standard tractors of 20 hp and above ratings, which, in its turn, tells upon the productivity and per-unit yield. There has been a tremendous demand for developing small, compact and easily maneuverable tractors of ratings of 10 hp or less, which are deemed fittest for the small and fragmented land holdings.





It is in response to this necessity that CMERI undertook the development of a small 10 hp tractor for affording farm mechanization and increasing the yield. CMERI had done the nation proud when in 1970 it first designed and developed the 20 hp *Swaraj*, the first indigenous tractor of the country. Thereafter, CMERI designed the 35 hp *Sonalika*, which has gone into major production. A 15 hp tractor in the intermediate range was also designed by CMERI.

The project undertaken at CMERI aimed at development of the small tractor (10 hp) and its matching implements based on available diesel engine and available tractor parts in the market. It was decided that the first prototype, along with a rotavator or cultivator as its matching implement would be designed, manufactured and tested at CMERI.

For technical specifications and other details of Krishishakti, please see *CSIR News*, 56 (2006), 257.



Clockwise from top left: Prototype of the Krishishakti tractor; Dr Gopal P. Sinha, Director, CMERI, handing over the technology documents to Shri Bhaskara Rao, Chief Technical Advisor of M/s Puzzolana Tractors Limited; The development team of the Krishishakti tractor

CSIO transfers Technology for Sub-system of Atomic Absorption Spectrophotometer to ESICO

THE Central Scientific Instruments Organisation (CSIO), Chandigarh, has been providing technological solutions to Indian industry from time to time as per their specific requirements, with an objective to help them upgrade their existing technologies and enhance their competence in the larger national interest.

M/s Environmental & Scientific Instruments Co. (ESICO), Panchkula, who has been in the field of production of analytical instruments for the last more than 20 years, approached CSIO for the know-how of Burner System, Nebulizer and Flow Control System — a sub system of Atomic Absorption Spectrophotometer for bridging the gap technology and speeding up the production of spectrophotometric equipment. The technology of the complete system was earlier given to



The technology transfer documents being signed by Shri A.K. Mukherjee, Administrative Officer, CSIO and Shri V.K. Gupta, Chief Executive, ESICO



M/s ELICO. AAS is useful for trace elemental analysis and finds wide applications in agriculture, health and industrial sectors. At present, the major demand of such equipment is being met through import. The indigenous production of this equipment in this area will thus be a move towards self-reliance in the field of analytical instruments.

The technology of the system has been formally transferred to M/s ESICO on 18 July 2006 in the presence of Dr Pawan Kapur, Director, CSIO, who described this as a technology which will help the societal sectors. The Transfer of Technology (ToT) agreement was signed by Shri A.K. Mukherjee, Administrative Officer from CSIO and Shri V.K. Gupta, Chief Executive, on behalf of ESICO.

CLRI transfers and demonstrates Biodiesel Process Technology

THE Central Leather Research Institute (CLRI), Chennai, has transferred its Biodiesel Process Technology (*International Patent Filed through CSIR: IMPD Ref No. 0290 NF 2003. PCT/IB 03/05349 (21.11.2003). US & JP 20050108927, SI No. 718559 (Nov 24, 2003). Australia Vol. 19 No.30, INID No. AU-A- 2003282270*) to M/s Vel Biodiesel Energy Pvt. Ltd. As per the agreement, the process was also demonstrated to the company at the pilot plant level.

The demonstration was inaugurated by Dr S. Rajamani, Director, CLRI, in the Chemical Engineering Pilot Plant. The first

batch product was shown to Shri S.V. Balraj, Managing Director and the Board of Directors of Vel Biodiesel Energy Pvt. Ltd, in presence of Dr Rajamani. The biodiesel process innovator Shri K.C.Velappan, Scientist, explained the technical aspect to all the participants which also included Senior Scientists and Area Leaders of CLRI. The product, has been used as a fuel in the company's car for a trial run.

The company has expressed its satisfaction with the process demonstration and the training provided by CLRI.



CLRI Biodiesel Process Technology being demonstrated to Vel Biodiesel Energy Pvt. Ltd



CSIO-BEL Meeting for Production of HUD System for HJT – 36 Aircraft

A meeting of Central Scientific Instruments Organisation (CSIO), Chandigarh and M/s Bharat Electronics Ltd (BEL), Panchkula, was held on 18 July 2006 to discuss the production of a limited number of Head-up Display (HUD) Systems for Hindustan Jet Trainer (HJT-36) Aircraft designed and developed by Hindustan Aeronautical Ltd (HAL), Bangalore. The new HUD would replace the imported HUD system being used in this aircraft presently by the Indian Air Force (IAF) for training of its pilots.

CSIO had earlier developed an HUD System for the Light Combat Aircraft (LCA) 'TEJAS' currently under batch production at BEL, Panchkula. The quality and features of this indigenous HUD system developed at CSIO are far superior to the imported ones. The use of state-of-art technology has resulted in reduction of its size and volume making it compact and light weight.

Based on the feedback on the HUD for LCA received from the test pilots, CSIO has embarked upon a major R&D programme in the field of Strategic Defence Applications. Under this programme, CSIO has successfully developed an HUD System for the HJT-36 Aircraft. It is now contemplating to develop HUD system for various types of Aircraft e.g. the civilian, MKI Su-30, Jaguar and Advanced MIG series, etc. CSIO has identified BEL, Panchkula (a Defence production enterprise of the Government of India) as its industrial partner for the commercial production of the indigenous HUD Systems.



CSIO and BEL discuss the production of HUD system for HJT— 36 Aircraft

NGRI signs MoU with Andhra University



Dr V. P. Dimri, Director, NGRI and Shri P. Vijaya Prakash (second from right), Registrar, Andhra University, exchanging the MoU documents

THE National Geophysical Research Institute (NGRI), Hyderabad, has signed a Memorandum of Understanding (MoU) with Andhra University, Visakhapatnam, on 18 July 2006.

With the signing of the MoU, Andhra University and NGRI have mutually agreed to collaborate with each other in the following areas: Teaching, research and training in selected and advanced thrust areas of S&T with special reference to earth sciences; Intellectual property rights; Consultancy work; NGRI-University joint research programmes funded from outside agencies like DST, DBT, DSIR, etc.; and any other areas of mutual interest.

The MoU would remain valid for four years from 18 July 2006 and is renewable on mutual consent.



Saras test flights

THE first SARAS prototype aircraft (VT-XSD) has now completed 60 flights successfully without any major hitch. The flight tests conducted so far have concentrated on basic handling qualities and performance, simulation of single engine climb and descent, take off and landing with 0° flap etc. The aircraft has behaved largely as expected with some shortfall in the climb performance. The results obtained are being



analyzed and the next block of flights will concentrate on the pressure error corrections and measurement of control forces.

The second prototype aircraft PT-2 is now getting integrated and being equipped at a brisk pace. The new stub-wing and the nacelle are getting ready. The new engine-propeller combination is going through endurance qualification



tests at NAL. SARAS PT-2 is likely to fly by end-October 2006.



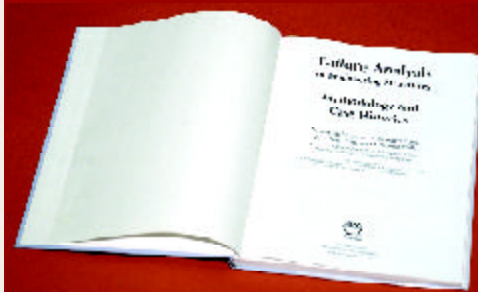
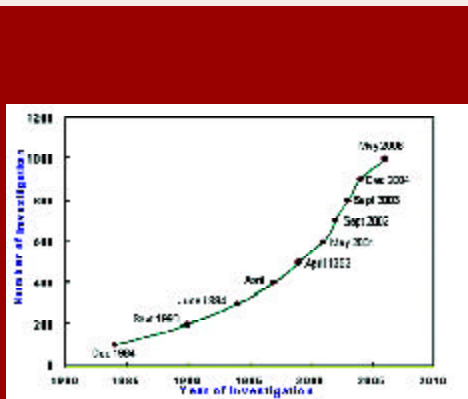
1000 Investigations in Failure Analysis

INVESTIGATION of service failures and accidents is an area of utmost importance. Service failures and accidents lead to loss of machine time and production, and, above all, may cause loss of human life in extreme cases. Minimization of failures and prevention of accidents are challenges posed to the present day technologists. Unless a failure or an accident is investigated and the cause or causes made known, it is not possible to prevent its recurrence. Failure analysis and accident investigation therefore assume great significance in modern society, particularly so in aviation and nuclear industries where high reliability and performance of the equipment is a matter of rule rather than exception.

The aftermath of an accident is devastating. The secondary damages to the aircraft structure or engine are so huge that the investigating team faces a daunting task to analyze the wreckage and identify the components or structures that need to be examined in greater detail to determine the cause of failure. The scenario could become even more complex with pre or post accident fire. Such investigations require multidisciplinary teams and interactions with different organizations. The National Aerospace Laboratories (NAL), Bangalore, with expertise from several related fields readily available under one roof, is therefore ideally suited for aircraft accident investigation.

NAL has been playing a leading role in failure analysis and accident investigation for more

than three decades, and is now recognized as an independent centre of excellence in this area. NAL's Failure Analysis and Accident Investigation Group has rich experience in the field having just completed 1000 investigations of service failures and accidents for a variety of industries in the public, private and defence sectors. A quarter of these have been major aircraft and industrial accidents. NAL's investigations have helped solve unique problems as well as recurring problems involving design modification, assessment of performance reliability or life estimation of critical components in various engineering systems or structures.



IICT licenses Five Anticancer Patents to Indus Biotech, (USA)

THE Indian Institute of Chemical Technology (IICT), Hyderabad, has successfully licensed five US patents on anti-cancer agents to Indus Biotech (USA) for upfront payment of Rs 43 lakh. Promoted by non-resident Indians, the Indus Biotech will also pay \$3.50 lakh towards milestone payments and royalty at 3% on net sales. If the sales cross \$30 million, IICT will get a 10% royalty.

IICT sometime back won the best patent award from Indian Drug Manufacturers Association (IDMA) for development of anti-cancer agents and now the institute has gone for successfully selling the patents.

Last year IICT filed for 113 patents – 29 in India and 84 abroad. It was granted 64 patents – 31 Indian and 33 foreign. Its scientists published 447 papers in recognized journals making it the best among the chemical science institutes of CSIR.

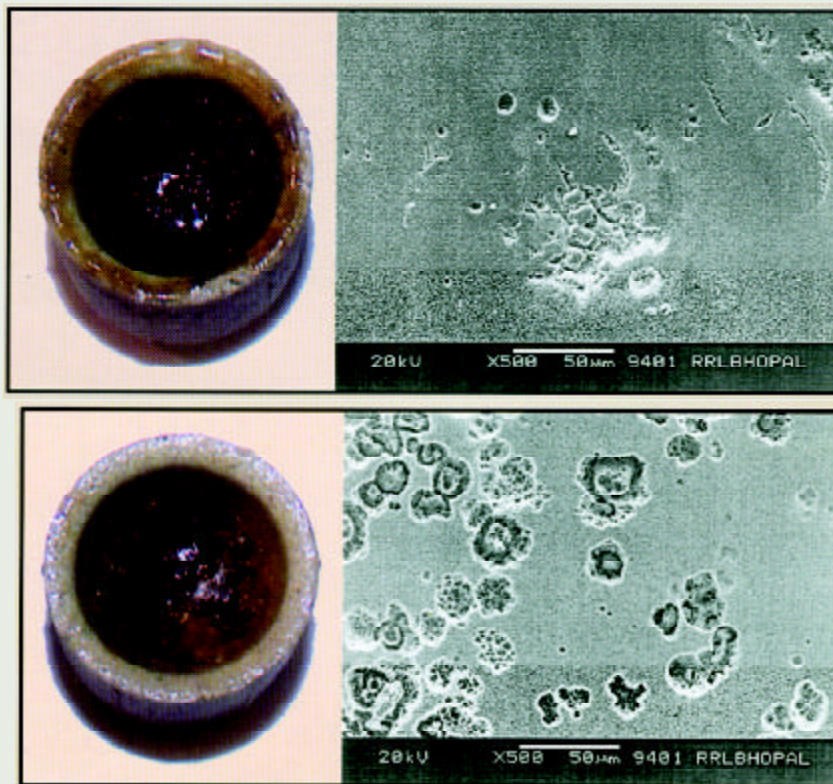


Low Thermal Heating-based Immobilization of Toxic Metals

IN countries such as USA and Japan, remediation of hazardous waste bearing materials is done by vitrification at high temperature ($> 1600^{\circ}\text{C}$). In this process, the toxic constituents break into non-hazardous form (organic) or entrapped (inorganic) into the glassy structure.

The research at present is directed towards developing processes for vitrification at low temperature to reduce cost and minimize toxic vapours. The Regional Research Laboratory (RRL), Bhopal, while working in this direction has developed a process at the laboratory scale by which vitrification can be carried out at temperature ($< 900^{\circ}\text{C}$) for metal finishing and galvanizing waste with low-cost additives. Initial results show that the vitrified mass possess excellent strength and non leaching characteristics. The microstructural studies of vitrified mass indicate the presence of a glassy structure in which heavy metals of the waste are present in an embedded form, and thus in an immobilization state.

The laboratory is working towards upgradation of this technology under a project entitled 'Development of low thermal heating-based phase transformation technology for the immobilization of toxic metals of industrial waste' sponsored by the MOEF, New Delhi. It is expected that the technology developed would find application for safe land fillings of metals-bearing hazardous wastes.



New Projects undertaken at RRL-Bhopal

THE new projects undertaken at the Regional Research Laboratory (RRL), Bhopal, during April to July 2006 include:

- Preparation of turbo rotor wedge of 120 MW TG and establishing its commercial availability, BHEL, Bhopal;
- Development of process for making PTFE lined thrust bearing pads for hydrogenerators, BHEL, Bhopal;
- Field demonstration-cum-training programme on use of fly ash in agriculture in farmers' field at Sarni Thermal Power Station of MPSEB, TIFAC, Delhi;
- Long term effect of pond ash (Angul) on soil fertility and crop yield at CPP, NALCO Phase-VI, NALCO, Bhubaneswar;
- Rapid environmental impact assessment for base metal mining at Ambaji, Rajasthan, GMDC, Ahmedabad;
- REIA and EMP for proposed lignite mine at Umarsar, Kutch, GMDC, Ahmedabad;
- Demonstration of fly ash, waste plastic, bitumen, and aggregate based composition for road, NTPC, Sidhi, MP;
- Rapid assessment of drinking water quality in Madhya Pradesh, UNICEF, Bhopal.



Focus India 2006 – Conference on Pharmaceutical R&D Efficiencies

THE Indian Institute of Chemical Technology (IICT), Hyderabad, in association with Kasyap Technologies Private Limited, Hyderabad, organized the 'Focus India 2006 – Conference on Pharmaceutical R&D Efficiencies – Integrating Global Strategic Partnerships' at Ramoji Film City, Hyderabad.

The purpose of this conference was to provide an incisive analysis of Indian drug discovery R&D capabilities that enable global pharma R&D companies and institutions take effective decisions in terms of collaborating R&D, establishing subsidiary units and outsourcing with India. The conference was organized as two Forums running four tracks and two conference workshops. The Business Forum consisted of India Advantage Track and Partnership Table while Technology Forum had Discovery Chemistry Track and Discovery Biology Track. The two conference workshops covered the areas of Process Analytical Technology and Clinical Research.

Chairing the India Advantage Forum, Dr P. M. Bhargava, former Director, CCMB and Vice-Chairman, Knowledge Commission, Government of India, said that India would be one of the two top countries along with China in 2020, as far as trained manpower in the phar-

maceutical sector is concerned. It has the largest number of FDA-approved institutions outside the United States and it is one of the few countries in the world with the largest biodiversity. So, India should learn its true potential and try to cash in on the advantages it has got as compared to the other countries in the pharma sector.

Dr Bhargava emphasized that with the continuing government investment, impending alignment with WTO's intellectual property protections and growing comfort with public-private partnerships, India would become a powerful engine of research and innovation, essential for drug discovery R&D and products.

The three-day conference was attended by a larger number of delegates from India and abroad and had 15 visiting speakers from abroad, representing leading pharmaceutical companies and organizations like Pfizer Global, Wyeth Research, Bristol Myers, Squibb, NCBI, MIT, Thomson, Quintiles, Aegis Corporationl, Lundbeck, Fairmount Partners, etc., in addition to leading Indian firms like Dr Reddy's, Ranbaxy, etc. Six senior scientists from IICT participated in the Conference. An exhibition was also organized during the conference in which IICT stall attracted a number of dignitaries.

Ninth Annual CFD Symposium

THE Annual CFD Symposium, organised by the CFD Division of the Aeronautical Society of India (AeSI), was held on 11-12 August 2006.

Dr J. J. Isaac, Head, Propulsion Division, National Aerospace Laboratories (NAL), Bangalore, was the guest of honour. Dr Isaac is working on projects as diverse as supersonic combustion and wind turbine development, and therefore had a lot of interesting observations to share. "CFD is now much more than academic curiosity; it is an extremely powerful tool that we can use, for example, to study internal flows in aeroengines". He also talked of how NAL is using CFD in wind turbine design and development. "India has relatively low wind speeds and dusty environments, so we have to do it very differently here," he explained. Dr Isaac went on to announce that NAL's wind turbine design, supported by NMITLI, "is a potential winner".

Discussing NAL's hypersonic programmes, Dr Isaac said that NAL needed help in making CFD calculations of flow past cavities, or in evolving profiles for turbomachinery applications. He then went on to invite delegates to join NAL's R&D programmes and use NAL's experimental facilities to validate computations. "The best things happen in R&D when diverse

groups work together," he said.

Earlier, Dr Sekhar Majumdar, Chairman, CFD Division, AeSI, welcomed the delegates to the symposium.

Dr T. G. Pai, who has been intimately associated with the *Tejas* development programme, and now a Visiting Professor at IIT, Kanpur, delivered the inaugural address. He cautioned young researchers that using a CFD code without understanding the underlying physics would not make them any wiser; he further advised them to use CFD judiciously: "CFD can be an over-kill if it isn't used wisely". Dr Pai indicated how CFD could be effective in stores separation or weaponization studies, "but the optimal design is still born out of a multi-disciplinary approach".

Dr J S Mathur, Hon. Secretary, CFD Division, AeSI, proposed the vote of thanks.

NAL-NALTech Industry Meet on Carbon Fibre Technology

THE National Aerospace Laboratories (NAL), Bangalore, formally unveiled its carbon fibre technologies to the industry at a one-day industry meet organized in partnership with NALTech on 14 July 2006.

The day-long meeting opened with a welcome address by Dr B. R. Somashekar, Managing Director, NALTech. Dr Somashekar expressed his happiness at the changes now being witnessed in the technology development environment: "we've sometimes waited 20 years for technologies to reach the marketplace, but NAL's carbon fibre technologies for heat treatment of acrylic fibres to carbon fibres, or for resin formulation and prepreg preparation, are now being thrown open in just over two years!".

Inviting the participants to interact, Dr Somashekar explained "how all kinds of CSIR-industry linkages are now possible". Dr A. R. Upadhy, Director, seemed delighted as he told the visiting industrialists, "we have something special to offer you." After explaining how NAL's integrated facility for carbon fibres and prepreps (IFCAP) evolved over the last five years, at the initiative of Dr A. P. J. Abdul Kalam himself, Dr Upadhy proposed two partnership models: the industry could take over the facility built by NAL and run it on mutually agreed terms (that must include the facility's

commitments to India's *Tejas* aircraft programme) or the industry could simply buy out the technology, set up their own facility on their premises and upscale commercially. Dr Upadhy also complimented NAL's M. K. Sridhar and his team, and ADA's P. D. Mangalagiri (calling them the "two bullocks that drove the IFCAP cart") and lauded the efforts of NAL's "two Raos" (Shri M. Subba Rao and Dr R. M. V. G. K. Rao) who have led NAL's composite product development projects with distinction for nearly two decades.

Dr K. Shamsundar of ADA, who most kindly graced the occasion, gave a wonderful account of the history of the *Tejas* light combat aircraft ("in 1985 when we started the aircraft project, there was practically nothing to build on!"). He also explained how this prepreg technology development programme was conceived to defeat a possible foreign embargo.

After this inaugural programme, Shri M. K. Sridhar commenced a detailed technical presentation on the development and capabilities of the technology on offer. The morning session ended with the vote of thanks by Dr M. R. Nayak, Adv (M&A) and Head, Technical Secretariat. In the afternoon session, the visiting industrialists went to see the IFCAP complex.



Workshop on Plant Protection for Sustainable Agriculture

BIOTECHNOLOGY is showing its promise to revolutionize agriculture around the world and is assuming an increasingly greater role in India's agriculture research. Biological pest control has undergone a great deal of development during the last two decades in India. The national and state governments have been strong supporters of integrated pest management (IPM) and biological solutions to pest control for many years.

The National Chemical Laboratory (NCL), Pune, organized a two-day workshop on 'Public-Private Partnership in Plant Protection for Sustainable Agriculture', on behalf of Department of Biotechnology (DBT), Government of India, to strengthen these areas further and support and encourage existing as well as new entrepreneurs to step up production units for these



Prof. V. L. Chopra, Member (Science), Planning Commission, Government of India, delivering the inaugural address

products throughout the country. The workshop provided an excellent platform to discuss the relevant issues related to plant protection and forge a relationship between the entrepreneurs and the research scientists. About 50 participants from industries, NGO, regulatory agencies, financial and academic institutions attended the workshop.

Dr S. Sivaram, Director, NCL, in his welcome remarks pointed out that many products aimed at agricultural sector (including pesticides and bio-pesticides) are viewed as 'en-

titlements', which have to be delivered to users at a price below market cost. For a country like India, 'entitlement' of goods and

services is a reality that cannot be wished away. "Therefore, technologies translated from laboratory to such markets require appropriate delivery mechanism. The principles of market economics need to be balanced with principles of social equity. This requires new models of public-private partnerships as well as innovative marketing strategy," Dr Sivaram added.

Informing about the DBT's initiatives for the development of biopesticide technologies, Dr Seema Wahab, Adviser, DBT, highlighted that DBT had made concerted efforts towards the development of biopesticide technology in the country in the last fifteen years in a systematic way by launching various programmes and projects. DBT had established a National Biocontrol R&D Network programme in 1989 to study the control of pests, diseases and weeds of economically important crops in the country. "The main objective of this national network programme is to develop better biopesticide formulations and cost-effective commercially viable mass production technologies of various biocontrol agents and their large-scale frontline field demonstrations against the key pests and diseases of economically important crops in varied agroclimatic zones."



A view of participants of the workshop

Dr Wahab further said that based on the technology developed through DBT's R&D network programme, two biocontrol production units were set up at Tamil Nadu Agricultural University (TNAU), Coimbatore and Madurai to assess their commercial viability. The commercial viability of these model units was established from the first year onwards, which enthused the progressive farmers and entrepreneurs. Already some private individuals, entrepreneurs, progressive farmers, unemployed agricultural and science graduates have started producing biocontrol agents. DBT has taken initiatives to facilitate the registration and commercialization of biopesticides. As per gazette notification of the Central Insecticide Board, the biopesticides have been put under the Insecticides Act. Dr Wahab also stressed on the need to generate toxicological data for biopesticide agents.

While speaking on aims and objectives of the workshop, Dr G. N. Qazi, Convenor of the workshop and Director, Regional Research Laboratory, Jammu, said that no single organization is capable, single-handedly, of meeting the challenge of feeding more than 300 million hungry citizens of this country as well as to keep pace with the population growth, especially among the poorest of the poor. Public and private sectors must join hands and share resources with national and, if possible, even with international organizations to meet such challenges. "We must be willing to share responsibilities, risk and resources to achieve shared

objectives. Before the advent of next Five-Year Plan, it is felt necessary to evaluate the progress of Government initiatives and suggest innovative changes in the system so that more focus is brought about the policies and programmes", Dr Qazi further informed. "We invited experts and other stake holders in the area of crop protection and sustainable agricultural production on a single platform to deliberate the burning issues and come out with a set of recommendations that would guide the manager of science and technology in this sector to come out with newer programmes for the foreseeable future."

Shri S. Dave, Director, Agricultural and Processed Food Products Export Development Authority (APEDA), gave the perspectives of the organic farming in the country. He stressed on the need of educating the farmers on the judicious use of pesticides. State governments and agricultural university extension centres can play a significant role in educating the farmers on the intelligent use of insecticides. At present there are no standards to the indiscriminate use of pesticides. Apart from government standards, private organizations and supermarkets have set their own standards on the imports of agricultural produce with reference to maximum residual levels (MRL). The MRL values are continuously going down in international market with availability of equipment that can detect smaller quantities of pesticide residues in and on fruit and vegetables. There is a need to set the norms and standards on MRLs

based on scientific data. India has been traditionally an organic farming country and he appealed to create India GAP (good agricultural practices). He also informed about the group certification system adopted in the country as the individual farmers can not afford it since their land holdings are small. India is the first country to introduce 'Group certification'. Shri Dave urged to develop certification body and strengthen it.

To encourage farmers to adopt organic farming, Shri Dave appealed the scientists to study the effect of organic farming on yield of agricultural produce. Yield may be affected in first or second year as there would be change in nutrients, it may return to the normal subsequently but it needs to be validated by scientific data.

Prof. V. L. Chopra, Member (Science), Planning Commission, Government of India, in his inaugural address listed two major components of sustainability and higher production, viz. (i) degradation of natural resource base as micronutrients are taken out from soil with every crop, there is a need to maintain the right proportion and (ii) protection of plants against diseases and pests. He said that there is general perception that chemicals are effective and consistent. There is a need to remove this perception by conducting more research. "We need to invest more than what we are currently doing on biocontrol agents," Prof. Chopra emphasized.

Dr M. V. Deshpande, Scientist, Biochemical Sciences Division, NCL and nodal scientist for



organizing the workshop, proposed the vote of thanks.

The technical session started with the lead talks by leading scientists and industrialists, such as R.J. Rabindra (Project Directorate of Biological Control, Bangalore), K.P. Jayanth (Bio-Control Research Laboratories, Bangalore), M.C. Gopinathan (EID, Parry (I) Ltd.), S. Narasimhan, (Asthagiri Herbal Research Foundation, Chennai), T.M. Manjunath (Monsanto, Bangalore), Rakesh Tuli (National Botanical Research Institute, Lucknow), and S. Ghosh (National Bank for Agriculture and Rural Development (NABARD), Pune) presenting the current status, critical researchable gap areas which need immediate attention and future prospects for microbial, predator and plant-based biopesticides. The presentations on manufacturing and marketing of biopesticides, genetically engineered crops and role of regulatory bodies and financial institutes like NABARD served as starting points for the discussion session.

Four themes, namely biocontrol agents, botanicals and pheromones, manufacturing, marketing and commercialization, and genetically engineered crops in plant protection were identified for group discussion. The participants presented their 'proof of concept' research activities, problems faced during technology development and their future concept proposals. M.V. Deshpande (NCL, Pune), J.S. Yadav (Indian Institute of Chemical Technology, Hyderabad), Anil Kush (Indo-American Hybrid Seeds, Bangalore), T.M. Manjunath (Monsanto, Bangalore) worked as moderators. Formulation and shelf life studies, validation of the data by carrying out the multilocation field trials, cost effective production and maintenance of the quality of the products were identified as the thrust areas of future activities under microbials. Acceptability of transgenic crops by the farmers was suggested to be the major concern for large-scale field demonstration trials. Identification of different plants other than neem, was also suggested. The initiative of DBT to bring together all the stakeholders was appreciated in the public private partnership meeting.

Before this workshop NCL had organized an interactive meet with seed industry to understand the R&D requirements of the seed industry and realign some of NCL's R&D efforts in that direction.

Workshop on Vitrified Ceramic Tiles

THE Central Glass and Ceramic Research Institute (CGCRI), Naroda Centre, Ahmedabad, took up a project entitled 'Development of an appropriate body mix through part and/or complete replacement of Ukraine clay in the production of Vitrified Ceramic Tiles' jointly sponsored by Floor Tiles Association, Morbi, and Commissionerate of Industries, Gujarat.

The project was taken up with the following objectives:

- To develop alternate body mix for vitrified tile production
- To minimize the consumption of Ukraine clay by developing alternative sources of raw materials in Gujarat and neighbouring states
- To reduce the cost of production of vitrified ceramic tiles.

The project was initiated in April 2005. The first part of the investigation on physico-chemical properties of various ceramic raw materials, including some new promising and selected China and plastic clays for production of vitrified granito floor tiles, has been completed. Following the completion of first part, a workshop was organized in Morbi to discuss the development of an appropriate body mix that uses substitution of Ukraine clay, partly or completely, in the vitrified tile body composition. Twenty-six participants from different vitrified tile units of Morbi, Himatnagar, Kalol and different mine owners and raw material suppliers from Gujarat, participated in the programme.

The workshop was presided over by Shri Girishbhai Pethapara, M.D. of Deco Group of Industries, Morbi, President of Vitrified Tile Manufacturers Association, Gujarat, and President of Indian Council of Ceramic Tiles and Sanitary Ware (ICTAS).

At the outset Shri R.M. Savsani, T.O., CGCRI Naroda Centre, and one of the investigators of the project, introduced the dignitaries to the participants



and briefly explained the purpose of the workshop.

Dr K.N. Maiti, Scientist-in-Charge, CGCRI Naroda Centre, and Principal Investigator of the project, in his welcome address thanked Shri Girishbhai for taking keen interest and sponsoring the project and for allowing for conduct of factory trials of the optimized body mixes in his unit.

Shri Parvesh Agrawal, Scientist, CGCRI Naroda Centre, and investigator of the project, delivered a lecture on 'Physico-chemical properties of raw materials selected for production of Vitrified Granito floor tiles'. He said that no single clay available in Gujarat and neighbouring states possessed the properties equivalent to those of Ukraine clay and thus, it is essential to mix different plastic and China clays in a pre-determined proportion and beneficiate to develop a blended clay almost equivalent to Ukraine for the production of vitrified ceramic tiles.

Dr Maiti, delivered a lecture on 'Production of Vitrified Porcelain Tile and Latest Trends'. Porcelain tiles, he said, should have water absorption less than 0.5%, high degree of whiteness, mechanical strength, toughness, surface hardness and translucency. Deposition of glass like silica film on vitrified tiles surface by sol-gel deposition may be a possible solution to improve the stain resistance of vitrified tiles. He explained the basis of selection of Indian raw materials and the techniques and the criteria for development of various body mixes incorporating selected Indian clays.

At the initial stage of the investigations, Dr Maiti informed, three compositions were taken up for industrial trial at M/s Decolite Ceramics, Morbi, with identical process parameters and controls maintained in the factory. All the three body compositions were found suitable for the production of vitrified floor tiles. Two of the body mixes matured at the usual firing temperature of 1199°C while the third one required the firing temperature of 1205°-1210°C; Most importantly, the thermo-mechanical properties of all the body mixes conformed to the requirements of vitrified ceramic tiles as well as the limits of rejections at the different stages of production.

Dr Maiti emphasized that the complete replacement of Ukraine clay by Indian clays has been achieved successfully. It will also decrease the cost of production significantly. The outcome of the project would provide great relief to the granite floor tile manufacturers in Gujarat.

Dr Maiti further said that a real

product innovation can be achieved using different raw materials from those normally used and modifying the chemical and mineralogical composition of body. For development of super white bodies, Dr Maiti presented two routes i.e. (i) conventional route, by using raw materials having lower chromophores and adding zirconium silicate and reactive alumina and (ii) non-conventional route, through addition of white fired bentonite and glass ceramics. He also spoke about the standard process control parameters required to maintain for the production of ceramic tiles.

Shri R.M. Savsani, in his presentation explained that ceramic tiles are classified (grouped) according to their per cent water absorption as per IS 13712. He also narrated the important tests required for vitrified tiles.

The workshop concluded with a vote of thanks proposed by Shri Ramjibhai Patel, Manager, Ceramic Tile Manufacturers Association, Morbi.

CECRI celebrates Foundation Day

THE Central Electrochemical Research Institute (CECRI), Karaikudi, on its Foundation Day this year had a lecture by Prof. S.K. Joshi, former Director General, CSIR and presently Hon. Distinguished Scientist, CSIR and Vikram Sarabhai Professor, JNCASR.

Prof. Joshi, in his lecture on

'Nano-Science and Nano-Technology: Grand challenge and great opportunities', explained: Nano-materials have at least one dimension less than one hundred nanometer. Study of nano-materials is inter-disciplinary, spanning chemical, biological, physical, engineering, computer and environmental sciences. The



properties of these materials change non-linearly with size. So it is possible to get new generation of structurally and functionally different materials. For example, strength to weight ratio of a nano tube is 500 times of that of steel, which makes the nano tube the strongest and most flexible material. Its electrical conductivity is very high. The sophisticated instruments, e.g. STM (Scanning Tunneling Microscope) and AFM (Atomic Force Microscope), now available at CECRI, are very much needed for research in nano materials.

Confining electrons within a space of few nanometers cause them to exhibit quantum behaviour. This changes their discrete energy level, and in turn, their optical, magnetic and electrical properties. Increase in the surface area means increase in chemical activity. Also less grain size gives more strength. Nano-crystalline nickel is as strong as hardened steel.

The nano materials can find applications practically in any field including electronic, magnetic and opto electronics systems, catalysis, energy and structural applications, cosmetics, biomedical and pharmaceutical applications, drug delivery and water treatment. The government has allotted one thousand crores for the next five years for the study of nano-materials.

Earlier, Prof. A. K. Shukla, Director, CECRI, welcomed the distinguished gathering.

Dr D. C. Trivedi, Deputy Director, proposed the vote of thanks.

CGCRI Khurja Centre celebrates Silver Jubilee



Dr Rajesh Mishra, Member of Parliament from Varanasi Constituency going around the exhibition

ESTABLISHED in 1981 to cater to the needs of ceramic and glass industry in the region, the Central Glass & Ceramic Research Institute's Khurja Centre has completed 25 years and celebrated its Silver Jubilee on 4 August 2006. Complementing the Khurja Centre for its many accomplishments, Chief Guest on this occasion Dr Rajesh Mishra, Member of Parliament, said that CGCRI Khurja Centre has acquired a leading place in the scientific and technological arena and is spreading the aroma of knowledge in its area of expertise among the users and manufacturers.

Dr L.K. Sharma, Scientist-in-Charge, extended a warm welcome to the Chief Guest and other distinguished invitees and highlighted the accomplishments of his Centre.

A Photo album highlighting the achievements of CGCRI Khurja Centre was released on the occasion by the Chief Guest. Product Quality Competition and Drawing Competition were held as a part of the Silver Jubilee Celebration. Representative from 36 ceramic industries participated in the Product Quality Competition by displaying their products and winners were given prizes.

Shri J.S. Yadav, Pottery Development Officer, Khurja, proposed a vote of thanks.

Total Synthesis of Natural Products using Cyclohexadienes

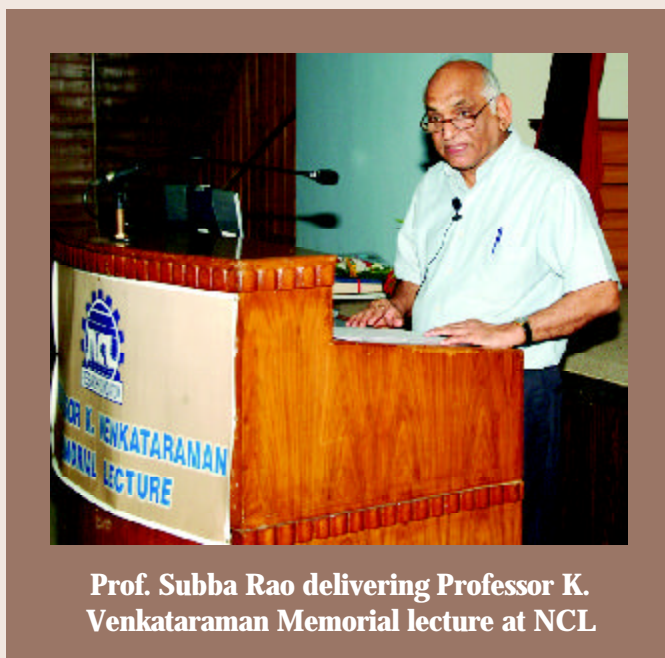
Prof. Subba Rao delivers Prof. Venkataraman Memorial Lecture

PROFESSOR G.S.R. Subba Rao, Department of Organic Chemistry, Indian Institute of Science, Bangalore, delivered the fifth Professor K. Venkataraman Memorial lecture at the National Chemical Laboratory (NCL), Pune. Prof. Venkataraman, the first Indian Director of NCL, made seminal contributions to the area of organic synthesis and to the development of industrially important processes for dyestuff industry. The earlier lectures were delivered by distinguished scientists like Dr A.V. Rama Rao, Prof. Goverdhan Mehta, Prof. M.V. George and Dr Nitya Anand. Prof. Subba Rao spoke on 'Total synthesis of natural products using cyclohexadienes'. The lecture was held on the 106th birthday of Prof. Venkataraman.

Prof. Subba Rao's research interests cover organic synthesis, natural product chemistry, reaction mechanisms, organometallic chemistry and combinatorial chemistry. He has developed new strategies for synthesis of natural products using cyclohexadienes, readily available from the Birch reduction of aromatic substrates.

Prof. Subba Rao in his lecture touched upon a very powerful reaction viz. Birch reduction, which involves reduction of aromatic compounds. The reaction is performed by dissolving metals in ammonia to furnish the dihydro benzenes (cyclohexadienes). He discussed the utility and mechanism of this reaction. He himself had employed this reaction to obtain dihydro benzenes as intermediates and used these to construct a variety of natural product polyketides employing Diels-Alder reaction and retro Diels-reaction to construct poly substituted aromatic compounds with excellent regioselectivity and stereoselectivity in very high overall yields.

He also demonstrated the power of this protocol which was responsible in establishing the correct



structure of a natural product stemphol. The versatility of his approach was demonstrated through the synthesis of a variety of natural products ranging from xanthenes, complex polycyclic compounds, macrolactones (lasiodiplodin, curvularin), biphenyls (alternariol), phthalides (mycophenolic derivatives) which are used as powerful immunosuppressants in kidney transplants.

Thus, Prof. Subba Rao described his elegant work on the utility of cyclohexadienes, which demonstrates his highly innovative ingenuity which is simple to access a wide variety of skeletons and complex natural products.

Earlier, Dr M.K. Gurjar, Head, Organic Chemistry (Technology) Division, NCL, in his welcome remarks narrated the pioneering contribution of Prof. Venkataraman to the field of organic chemistry and also introduced Prof. Subba Rao to the audience.



Honours & Awards/Appointments

Dr Suman Lata Jain



Selected for the DST Award to participate in the meeting of Nobel Laureates and Students in Chemistry at Lindau, Germany, Dr Suman Lata Jain, Research Associate, Indian Institute of Petroleum (IIP), Dehra Dun, got the opportunity to interact with 21 Nobel Laureates by way of round table discussions, informal small group meetings and attending to the lectures delivered by them. After the Lindau meeting Indian group also visited premier German Scientific and Research Institutions for one week.

Dr Jain has also been awarded a 6-months Post Doctoral Scholarship by the Embassy of France in India, to work with Dr Rene Gree, Directeur de Recherche CNRS, Universit'e de Rennes, France.

Dr S. K. Srivastava takes over as Acting Director, CFRI

DR S.K. Srivastava, senior most Scientist at the Central Fuel Research Institute (CFRI), Dhanbad, has taken over the charge of Acting Director of the institute w.e.f. 1st July 2006. Dr Srivastava did his M. Sc. in chemistry in 1970 and Ph.D. in 1973 from BHU, Varanasi. He joined CFRI as PDRF in September 1975. He was appointed Scientist 'A' at National Metallurgical Laboratory (NML), Jamshedpur in 1977. He came back to CFRI as Scientist 'B' in 1978. Prior to his present assignment, he was Scientist 'F', he was Head of the Fuel Science and Technical Information Divisions. Dr Srivastava's field of work is thermodynamics, kinetics, coal chemistry, coal pyrolysis, catalytic coal gasification, coal beneficiation, coal liquifaction, environmental pollution related to coal based industries. He has published more than 110 research papers, reports and articles and guided many students for B.Tech. M.Tech. and Ph. D. degrees. He has delivered several invited lectures at various places. He visited Germany, United Kingdom, Australia, Singapore and USA. He is Laboratory Representative for Customer Satisfaction Evaluation.



Dr Joseph P. Pichamathu wins WMO's Vilho Väisälä Award

DR Joseph P Pichamathu of the Materials Science Division at National Aerospace Laboratories (NAL), Bangalore, is the winner of the World Meteorological Organization's Professor Dr Vilho Väisälä Award for the year 2006, for his paper titled "Directional variation of visual range due to anisotropic atmospheric brightness" that appeared in *Applied Optics* 44(8): 1464-1468 in March 2005. The award carries a diploma, a medal and cash in US dollars.

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