

# CSIR NEWS

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Team CSIR



## President of India Smt. Pratibha Devisingh Patil launches India Development Gateway (InDG) Portal



Her Excellency the President of India Smt. Pratibha Devisingh Patil launched the India Development Gateway (InDG) Portal on 4 July 2008 at Vigyan Bhavan, New Delhi. Developed by C-DAC and Ministry of Communications and Information Technology, Government of India, InDG is a country-wide initiative that will target specific country needs in the domain of rural and social development.

The Indian Institute of Chemical Technology (IICT), Hyderabad, is a lead partner of InDG. The rural technologies like SAMADHAN, ENVIS developed by Dr U.S.N. Murty, Head, Biology Division, IICT and his group are the integral part of InDG multi-lingual portal.

Shri A. Raja, Union Minister for Communications and IT, Government of India; Shri Jyotiraditya Scindia, Minister of State for Communications and IT, Government of India; Prof. M.S. Swaminathan, Chairman, InDG; Shri Jainder Singh, Secretary, DIT, Government of India and Dr S. Ramakrishnan, Director General, C-DAC, graced the function at Vigyan Bhavan.





## SSH for revealing functional and immune responses in prawn larvae

**S**uppression subtractive hybridization (SSH) is a powerful technique to study gene expression in specific tissues, cell types, at a specific life-stage or in a disease-state. It is an ideal tool for identification of differentially expressed genes. It is a PCR based technique that can be used to quickly compare the expression of mRNA and show the relative difference in mRNA concentration from two different samples. It is

useful to detect alterations in gene expression that is generally associated with a large spectrum of biological and/or pathological processes. Thus, identification of gene expression profiles through subtractive hybridization helps us understand the molecular mechanisms behind any alteration.

The way SSH works is somewhat tricky and, has several procedural steps. The first step being conversion of mRNA to cDNA

*in vitro* using reverse transcriptase. It then involves a hybridization step between the cDNA of tester population (TP) and driver population (DP). The TP is a set of experimental organisms whose gene expression has been altered by some external stimulus that could be a pathogen, chemical, or any kind of stress. Essentially, the TP will be containing differentially expressed genes. The DP (or, reference population) would be a control set without an exposure to experimental stimulus. The TP cDNA is hybridized with that of DP cDNA and through repeated cycles of PCR using two sets of adaptors ligated, the TP cDNA is quantitatively enhanced. By all these steps, there will be suppression of the genes common to both TP and DP. But, there will be enrichment of differentially expressed genes from TP.

The scientists at the **National Institute of Oceanography** (NIO), Goa, adapted the SSH to study the pathogenic effects of *Vibrio harveyi*, a known bacterial pathogen in marine shrimp hatcheries in the country.

The genes upregulated in 15-days old post-larvae of *Penaeus monodon* (Fig 1) and *Penaeus indicus* (Fig 2) after exposure to *Vibrio harveyi* have been identified through other sets of molecular techniques. For this, cDNA libraries were constructed from both the species of prawns. From the 70 cDNA clones sequenced so far, genes

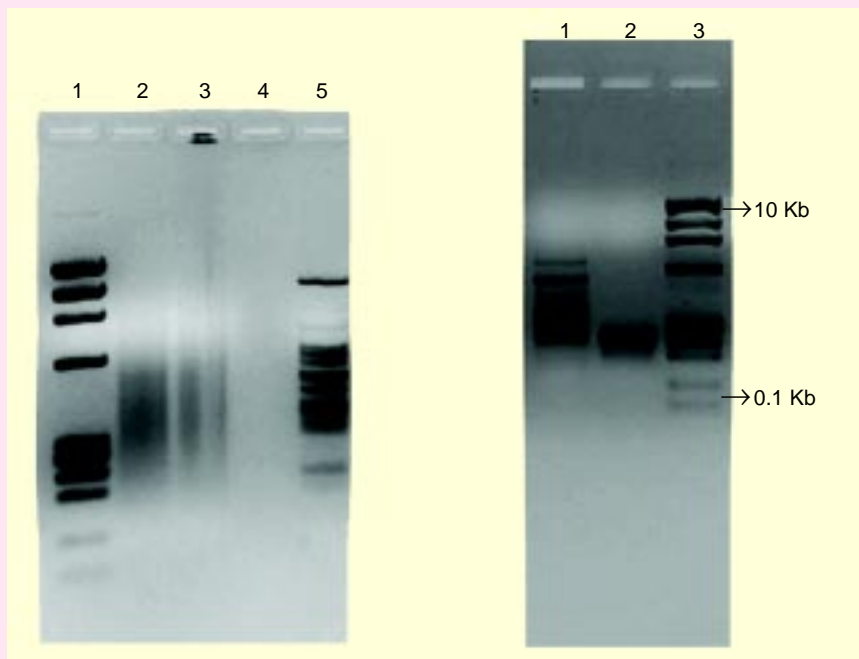


Fig 1. cDNA products from *Penaeus monodon* post-larvae after (lane 5) and before (lanes 2 and 3; lane 4 not loaded) suppression subtractive hybridization procedure. Lane 1 shows the bands from *Hae*III marker DNA. As can be seen in lane 5, there is a greater enrichment of many differentially expressed genes. Such observations suggest that the host, *P. monodon*, responded to the pathogen, *Vibrio harveyi* by upregulating many functional and immune related genes described in the text

Fig 2. cDNA products from *Penaeus indicus* post-larvae after (lane 1) and before (lane 2) suppression subtractive hybridization procedure. Lane 3 shows the bands from *Hae*III marker DNA. As can be seen in lane 1, there is a greater enrichment of many differentially expressed genes. Such observations suggest that the host, *P. indicus*, responded to the pathogen, *Vibrio harveyi* by upregulating many functional and immune related genes described in the text

related to oxidative stress/ATP metabolism such as ATP synthase, cytochrome c oxidase, NADH dehydrogenase have been observed to be upregulated. Also, immune related genes such as ferritin, metalloproteinase, and peptidases are detected. Several cytoskeletal and protein synthesis related genes appear to be upregulated in the post larvae exposed to this bacterium.

Application of SSH technique would lead to

(a): designing effective strategies in shrimp health management;

(b): better understanding of disease pathogenesis and in general, the invertebrate immune system.

This work was carried out by Shri Sagar Nayak under the DBT Project granted to the NIO scientists Dr N. Ramaiah and Shri R. A. Sreepada. Working for his dissertation. Shri K. Ajay from Bharathiar University, Coimbatore, also participated in this effort.

## NAL hands over Composite Components/Assemblies for *TEJAS* to HAL

The Advanced Composites Division (ACD) of National Aerospace Laboratories (NAL), Bangalore, has developed a number of composite airframe structural components/assemblies for *TEJAS* (LCA). At a function organized on 7 May 2008 at ACD's premises, the last consignment of all composite components/assemblies developed by ACD(NAL) for *TEJAS* were handed over to HAL, to meet the requirements of Limited Series Production (LSP) aircraft programme. Shri Ashok Nayak, Managing Director, (BC), HAL was the Chief Guest at the function who received the documents from Dr A.R. Upadhya, Director, NAL, in respect of Fin and Wing Spars for LSP 8 aircraft. Shri P. S. Subramanyam, Proj. Director (CA) and Director – ADA, was also present and addressed the gathering. He thanked NAL for the timely supply and support of the composite components. He also congratulated NAL for being the pioneers in the field of Advanced Composites and taking up the challenging tasks of development of composite components.

Dr A. R. Upadhya, Director, NAL, briefed the various R & D programmes handled by ACD, in the past and also about the current programmes for LCA. Dr M. R. Madhava, Head, ACD, in his welcome address gave an exhaustive account of all the research and development activities undertaken by the division since its inception and highlighted the technological achievements made in these programmes.

Shri H. N. Sudheendra, Dy. Head, ACD and Co-ordinator for LCA projects, proposed the vote of thanks.

## Sponsored Projects taken up/completed and Patents sealed/filed by IIP

The sponsored projects taken up/completed and patents sealed/filed by the Indian Institute of Petroleum, (IIP), Dehra Dun, in the recent past include:

### Sponsored Projects taken up

- Studies on different models of two-wheelers, cars, MUV's and LCV's for fuel efficiency
- Studies on non-edible bio-oil (SVOs) as fuel
- Deposit rating study of four Tata Indica CNG passenger cars
- Evaluation of lubricating oils for their EP and wear properties
- Studies to prepare CHG emission inventory from different types of gasoline- and diesel-driven vehicles incorporating driving cycles for the period 1995 to 2007
- Technology for VOC recovery from chemical storage tank emissions
- Physico-chemical characterization of industrial lubricating oils
- Compatibility of blending bio-diesel with the automotive diesel fuel



- Evaluation of metal-based FCC passivator
- Studies to establish the characteristics of CR modified bitumen
- Development of low carbon-emitting adsorption technology for ultra-low sulphur diesel (ULSD) production
- Pilot test on NMP extraction for improving colour and colour stability of wide-cut base oil and its distillates
- Field evaluation and lab testing of Navagni biomass stove

### Sponsored Projects completed

- Development of bio-catalytic process for desulphurization of diesel
- Evaluation of thermophilic bacteria as potential bio-catalyst
- Feasibility of producing high-specification aromatics from straight-run naphtha using IIP's NMP extraction technology
- Feasibility studies for making on-grade bitumen using pitch oil
- Studies on the use of bio-diesel (B-100) in automotive diesel engine for performance emissions
- Improving operation of benzyl alcohol plant

### Patents sealed in India

- A process for preparation of dealuminated crystalline aluminosilicate Zeolite - Y, R.P. Mehrotra, T.S.R. Prasada Rao, Moolchandra, S.D. Phatak, Babulal and S. Suresh, 196931, dt 15.11.2007
- An improved process for extraction of aromatic hydrocarbons from kerosene range using microporous hollow

fibre membranes, Anshu Nanoti and A.N. Goswami, 215089, dt 21.2.2008

- A process for preparation of phospho-sulphurized derivatives of hydrogenated cardanol useful as anti-wear, anti-friction and extreme-pressure additives, O. N. Anand, Vijay Kumar, K.D. Neemla, N.K. Pandey, R.P.S. Bisht and A.K.Gupta, 215707, dt 3.3.2008
- An improved process for preparation of paving grade bitumens from waxy crudes, P.K. Jain, A.K. Saxena and Himmat Singh, 215714, dt 3.3.2008
- An improved process for preparation of alkaline earth metal alkyl aryl sulfonates useful as rust preventives, O.N. Anand, A.K. Singh and K.D. Neemla, 215720, dt 3.3.2008
- A formulation useful as an extreme pressure anti-wear, anti-friction additive for industrial gear oils, O.N. Anand, Vijay Kumar, K. D. Neemla, N.K. Pandey, R.P. S. Bisht and A.K. Gupta, 215826, dt 4.3. 2008
- An improved process for preparation of high-purity sodium alkyl aryl sulfonates from heavy alkyl benzenes, O.N. Anand, A.K.Singh and A.K. Gupta, 215857, dt 4.3.2008
- An improved process for preparation of sulphurized derivatives of non-traditional vegetable oil useful as extreme-pressure, anti-wear additives, O.N. Anand, Vijay Kumar, K.D.Neemla, N.K.Pandey, R.P.S.Bisht and A.K.Gupta,

216128, dt 10.3.2008

- An improved process for production of pure light aromatics, B.S. Rawat, M.K. Khanna, Guru Prasad, Jyotsna Naithani, S.M.Nanoti, Dharam Paul, S.K.Gupta and T.S.R. Prasada Rao, 216246, dt 11.3.2008

### Patent filed Abroad

- A process for production of phenol by liquid-phase selective hydroxylation of benzene using hydrogen peroxide as the oxidant and vanadyl pyrophosphate as the catalyst, Arunabha Datta, S. Sakthivel and Satyarthi Jitendra Kumar, USA, Application No 0294NF2006, dt 11.3.2008

### Patents filed in India

- A process for direct hydroxylation of aromatic hydrocarbons, Suman L. Jain, Jomy Joseph, Sweetly Sinhal, Bir Sain, R. Sivakumaran and Basant Kumar, Application No 0115NF2007, dt 24.1.2008
- A composition of bio-degradable gear oil, Arun Kumar Singh and Aruna Chamoli, Application No 0670DEL2008, dt 17.3.2008
- A composition of bio-degradable lithium grease, Arun Kumar Singh, Aruna Chamoli and O. P. Sharma, Application No 0667DEL2008, dt 17.3.2008
- A process for conversion of paraffins, olefins and aromatics in a mixed feedstock into *iso*-paraffins, N. Viswanadham, R. Kamble, Amit Sharma, Jagdish Kumar, B. S. Negi, G. Murali Dhar and M. O. Garg, Application No 0776DEL2008, dt 26.3.2008



## US Patents Granted to CFTRI

Process for preparation of thermostable enzyme  
(US Patent No. 7267971)

**T**hermal stability of enzyme is an important aspect of immobilized enzyme based biosensors. These systems can be used for monitoring various fermentation and biochemical processes. Most of the enzymes and biologically derived materials are heat labile and not viable for use beyond 50°C.

The institute has developed a process for the preparation of thermostable enzyme glucose oxidase useful for biological processes at high temperature.

The main advantages of this process are:

- This system can be used in the preparation of heat stable enzyme.
- The stabilized enzyme system can be used in the applications of biocatalysts at higher temperature, for biotransformations and biosensors.
- The glass beads, which are used as a support for immobilization of enzyme, can be used for application in packed bed reactors and bioreactor columns flow injection analysis system for on-line measurement of analytes in fermentation.
- Heat labile enzymes or biological materials can be stabilized using appropriate concentration of silane. This method of stabilization using silanization has the potential to be used for other silicate-containing materials as immobilization matrix.

## Prof. S.K. Brahmachari flags off NAL Golden Jubilee Celebrations

### ‘Taking Technology from Lab to People’

**P**rof. S.K. Brahmachari flagged off the Golden Jubilee Celebrations of National Aerospace Laboratories (NAL), Bangalore, at a glittering function organized in the NAL's S R Valluri auditorium on 6 June 2008. Prof. Brahmachari also launched the NAL's GJC website.

Calling NAL as a performing organization, Prof. Brahmachari said that it is time to relook at what we are doing, what can we do tomorrow and how CSIR can remain relevant in Future? He told the scientists to enter the third quarter with dreams and new ideas; reach the 800 million Indians with technology focus on common man's needs.

The Chief Guest also distributed NAL Outstanding Performance Awards, prizes to children of NAL employees for excelling in the field of sports, academics and extra-curricular activities. He also presented Golden Jubilee mementoes.

Dr S. R. Valluri, the great visionary who served NAL as its longest Director during its formative years, presided over the function. Dr Valluri said when he joined NAL on 23 November 1965, he had definite ideas about his responsibilities of being a trustee of the public goods. He complimented his successors for their outstanding job of building on the foundations laid by Dr Nilakanatan in a multitude of ways. He walked through the history of Indian aeronautics in the last 50 years and also released NAL's Annual Report.

Dr A.R. Upadhyya, Director, NAL, welcomed the august gathering of distinguished invitees, scientists, engineers and former Directors. He said "Fifty years is a milestone in the life of any institution. It is not just counting of years that passed, because that will naturally happen to any institution with four strong walls and a leakproof roof, but taking into account outputs and contributions towards the mission, goal and objectives of institution." In his speech he briefly traced NAL's history stating that the 60s saw the foundations being laid, not just of the buildings, but of many R&D facilities and technologies, 70s saw a consolidation and growth, 80s was noteworthy for involvement in more number of practical applications including the first flight of NAL's LCRA, 90s was epoch making in its own respect due to *Hansa* and the last decade saw a fruition of many efforts resulting in *Saras*.

The function concluded with a vote of thanks proposed by Dr M.R. Nayak, Adviser (M&A).

As a part of the GJC, NAL has planned a number of S&T events including international/national conferences and seminars, lectures and so on from June 2008 to May 2009.



## WORLD KNOWLEDGE PLATFORM FOR AEROSPACE MISSIONS

*Creative Leadership leads to Innovation  
and Non-linear growth in the sector*

### **Dr A.P.J. Abdul Kalam, Former President of India's Address at International Conference on Aerospace Science and Technology (26 June 2008)**

**F**riends, I am indeed delighted to participate in the inauguration of International Conference on Aerospace Science and Technology being organized as a part of Golden Jubilee Celebrations of National Aerospace Laboratories (NAL). It gives me immense pleasure to be with the Aeronautics community participating in this conference from India and abroad. My greetings to the scientists, engineers, technologists and academicians and the users participating in this conference.

During the past five decades, NAL has made significant contribution for the growth of aerospace science and technology needed by Defence, Space and Civilian sector. I have also completed 50 years of working in aerospace technologies. During the last 50 years of my career, one way or the other, I have worked in aerospace system both in ISRO and DRDO and had linkage with NAL and I always considered NAL to be the fountain of knowledge for aerospace technologies.

Let us together review the developments which have taken place from 1950s in aerospace. Now, India can build any type of Satellite Launch Vehicle, any type of spacecraft and launch it from Indian soil. On 28 April 2008, India created history by launching ten satellites in one go with its Polar Satellite Launch Vehicle carrying the total



payload of 824 kg. The ten-pack launch of the Indian Space Research Organisation (ISRO) saw the 230-tonne Polar Satellite Launch Vehicle (PSLV-C9) put into orbit an Indian Mini Satellite and eight foreign nano satellites along with the Indian Cartosat-2A Remote Sensing Satellite. The eight nano satellites were developed by University of Toronto and universities of Japan, Denmark, Germany and Netherlands. I have been delighted to see the high resolution pictures taken by CARTOSAT-2A with less than 1 meter resolution.

I visualize two scenes: the first one in September 2008, a PSLV takes off from Satish Dhawan Space Centre, Sriharikota, carrying the *Chandrayaan* spacecraft and the spacecraft orbits around the earth. At a specified time, the spacecraft escapes from earth orbit and flies and enters the Lunar orbit and transmits data from the scientific

payloads from India and other nations. The moon impact probe from *Chandrayaan* descends and impacts on the Moon surface at a specified spot. Indian ground station and other stations elsewhere receive data which enables three dimensional atlas of the moon and chemical and mineralogical mapping of the lunar surface. The event makes the nation jubilant and proud. The *Chandrayaan* mission is not just to study the features of moon but there is a much greater purpose. The moon is going to be a source of special materials, minerals and also could be intermediate base for Mars mission.

The second scene which is going to give enormous enthusiasm to youth of many countries by the beginning of next year is the launch of youth satellite by PSLV. This will be a platform giving connectivity to youth of multiple countries. I am going to address the Global Youth Congress on 8 June 2008 at the Hope University London, where 700 youth from 50 countries are assembling. I am going to announce there about the youth satellite to be launched by us which will definitely be a trigger for new thinking and innovation.

India has designed and developed strategic missiles. India has also deployed medium and long range strategic missiles systems. A world class supersonic cruise missile has been developed and has

been led to production through Indo-Russian joint venture. Nation has the capability to build anti ballistic missiles. In the area of aeronautics, our advanced technology helicopters are in service. LCA has completed over 1000 hours of flying and 40 numbers of LCA of different versions are in production. I am sure LCA team should work for producing at least 100 aircrafts before 2015. Power Plant development has to be completed within two years time in a mission mode. The SARAS aircraft produced with NAL effort has to go into production. I would like to talk on the topic “World Knowledge Platform for Aerospace Missions”.

### Virtual Collaborative GRID for Aerospace

Recently, I had visited the Aerospace Centre of Excellence of Satyam and interacted with the scientists and engineers over there. Also seen the presentation of the solutions such as Aerospace Engineering and Avionics Solution, Digital manufacturing: SOA (Service Oriented Architecture) Platform based solution for Adaptive and Agile manufacturing. I had an interesting walk through in the blue tube to watch Me Shadow (Interactive Floor projection) with i-table, it demonstrates the Indian capability in virtual collaborative design environment from multiple design centres across the world.

With this technological background and the core competence in aerospace technologies achieved by our Indian

institutions, I am visualizing a “Virtual Collaborative GRID for Aerospace” for enabling the design to reality - Product life cycle management framework that will enable India to realize its vision for becoming competitive in the development and production of aerospace systems for Defence, Space and Civilian application. This Virtual collaborative GRID need to connect the Academia, Industry, R&D Laboratory in India and abroad through a high bandwidth network along with the hundreds of work centers which will become the foundation for establishing the Virtual Collaborative design centre or platform with full fledged concept to reality product life cycle management environment for the development of any type of passenger aircraft, any type of fighter aircraft, any type of helicopter, any type of spacecraft, any type of launch vehicle, robotic payload for the space missions in a much faster throughput with quality in a cost effective manner.

### Vision 2020 for Passenger Aircraft

Air transportation is a vital component of the communication network which helps to transport people on business, government officials, leisure travelers, transport of perishable and other goods. The networking helps to establish production centers in the interiors where there is advantage of low cost labour, low raw materials cost and low infrastructural cost. The air transportation while helping growth

of interior regions, also helps industry, business sector to produce products at lower costs enabling competitiveness in the global market. The aircraft chosen for operation along with the airport infrastructure provided must be able to provide low cost solutions for transportation of men and materials. It would mean that there is a need for an aircraft whose acquisition and operating costs are low and also it should be capable of being operated from airports with minimal infrastructure and instrumentation facility. It may be pertinent to point out that the infrastructure cost for providing air connectivity between city pairs is lower than that for either road or rail connectivity. Is it a dream or is it possible? Can aerospace community discuss that details in today’s conference?

There is a need for new generation of turboprop and turbojet aircraft that are cheaper to acquire and cost less to operate and are independent of costly airport infrastructure and instrumentation. Safe, nearly all weather access to any location in the country with an existing landing facility is a critical need for all round growth. With this goal in mind, I would recommend NAL to become the nodal agency to work on a 70 seater aircraft which should be so designed that with only change in fuselage length should be able to vary the passenger capacity to 50 or 90. With the technology available in the space programme, missile programme, LCA programme and other aircraft programmes in the country, definitely realization of design, development and leading to



production of 70 seater passenger aircraft before 2020 is possible. I would like to share with you certain experience related to this.

## High-Tech Joint Venture

One of the significant technological breakthroughs of 2005 is the design, development and productionization of Supersonic Cruise Missile-*BRAHMOS* by an Indo-Russian joint venture by the equal contribution of \$150 million each. *BrahMos* is the first supersonic operational cruise missile in the world which can be launched from multiple platforms such as ships, submarines, road mobile and silo, and with modifications from aircraft. This is indeed the result of technological co-operation leading to operational system. The supersonic speed is achieved by a liquid ramjet engine and the guidance is through powerful software embedded in the on-board avionics integrated with high performance sensors. The fast response inertial guidance system with software injected sensors and agile homing head enables the missile to achieve variety of trajectories flying at speed Mach 2.8 and destroy the target with high accuracy. The flight trajectories are simulated through a modular, digital and fully automated Fire Control System which has advanced software for way point maneuvering, with supersonic speed to provide high operational capabilities. This technological innovation is the trend setter in the cruise missile field. The robust design of the missile,

elaborate ground tests and simulation have ensured 100 percent success rate in all the flight tests conducted for the Armed Forces by the joint venture company.

In successful design, development, production and marketing of *BRAHMOS* missile, an innovative way of technology co-operation has emerged between India and Russia for multi-billion dollar business. The message I would like to convey out of this programme is: It is possible for India with core competence in multiple fields to work with many countries in joint venture mode bringing together multiple core competence of partnering nation's leading to successful enterprises.

This programme gives me the confidence that vision for the realization of a 70 seater passenger aircraft with it variant is possible through world knowledge platform for aircraft system.

## World Knowledge Platform

Based on the above experience, we should look at possibilities of world knowledge platform between India and partnering nations which will integrate the core competencies of multiple Indian institutions and necessary countries to develop a world class passenger aircraft needed for world market.

**Knowledge GRID:** Initially, the mission of World Knowledge Platform is to connect and network the R&D Institutions, Universities and Industries using fiber broadband from the partner nations on selected R&D Missions. The

underground fiber cable infrastructure already existing is only waiting to be lighted up with state-of-the-art optical networks to ignite the minds of the knowledge workers in many countries. This knowledge GRID will support multitude of seamless connections supporting both synchronous and asynchronous communication, carrying either text or audio or video. In the industrial environment, it can be used to design complex aircraft systems using virtual prototyping.

**Missions of World Knowledge Platform:** The "World Knowledge Platform" will take up the missions, in some of the key areas discussed further for enabling timely availability of a cost effective state of the art aircraft in service before 2020.

1. **System design:** Modular system design leading cost effective variants of passenger aircraft of different capacities. Objective should be to reduce acquisition cost by 25%, operation cost by 25%, maintenance cost by 50% and emission reduced by 70%.
2. **Avionics:** Design and development of integrated avionics with COTS technology and open system architecture.
3. **Power Plant:** Next generation modular power plant for varying thrust condition.
4. **Structures:** Composite airframe, NLF adoptive wing including structural health monitoring system. Self clean, de-icing and abrasive resistant coating system.
5. **Control system:** Fly-by-wire



flight control system. Aim for all electric architecture.

**6. Maintenance:** Advanced maintenance systems using IVHM, SHM and faster trouble.

**7. Integrated Health monitoring:** Development of integrated monitoring system for all utility system over the entire fleet for enhancing reliability and reduce maintenance cost.

**8. Simulator and flight testing:** Development of state-of-the-art simulator which will reduce the over all time required for training of the pilots and also reduce the number of hours of flight tests needed for certification for induction into operation.

This programme should be able to utilize all the science and technological developments which has taken place in our aerospace programme such as: In the composite technology, the Carbon-Carbon heat shield nose tip of *Agni* and high temperature Radomes and large composite wing of LCA show the strength of the country in the composite products. The Digital Fly-by-Wire control system and the control laws developed for LCA with the formation of national team, made the aircraft state-of-the-art. LCA has been successfully flight-tested and is going to production phase.

### Conclusion

Dear friends, I have seen three dreams which have taken shape as vision, mission and realization. Space programme of ISRO (Indian Space Research Organization), AGNI programme of DRDO (Defence

Research and Development Organization) and PURA (Providing Urban Amenities in Rural Areas) becoming the National Mission. Of course these three programmes succeeded in the midst of many challenges and problems. I have worked in all these three areas. I want to convey to you what I have learnt on leadership from these three programmes.

1. Leader must have a vision.
2. Leader must have a passion to transform the vision into action.
3. Leader must be able to travel into an unexplored path.
4. Leader must know how to manage a success and failure.
5. Leader must have courage to take decision.
6. Leader should have nobility in management.
7. Every action of the leader should be transparent.
8. Leader must work with integrity and succeed with integrity.

For success in all the missions, it is essential to have creative leaders. Creative leadership means exercising the vision to change the traditional role from the commander to the coach, manager to mentor, from director to delegator and from one who demands respect to one who facilitates self-respect. For a vibrant aerospace mission, we need large number of creative leaders.

With these words, I inaugurate the International Conference on Aerospace Science and Technology. My greetings to all the members of NAL and participants of the conference success in their mission of making new strides in aerospace science and technology.

May God bless you.

## CROSSLINX 2008

The Department of Leather Technology, Anna University in association with the Central Leather Research Institute (CLRI), Chennai, organized an International Level Students' Technical Symposium CROSSLINX '08 during 26-28 February 2008 at CLRI. Shri N. K. Chandrababu, Head, Tannery Division, gave welcome address. Dr T. Ramasami, Secretary, Department of Science & Technology, Government of India and Mr Rafeeq Ahmed, MD, Farida Group, inaugurated the programme and delivered a special talk.

The first technical session of the seminar on 'Role of Technology: An interface between environment and society' was inaugurated by Shri V. Balaraman, CEO and Managing Director, Adrenaline Systems Ltd. Shri V. Raja Sreenivasan, Managing Director, VRS Leathers Pvt. Ltd and A. M. Sathick Batcha, Managing Director, Green House Promoters, Chennai, were the Guests of Honour on this occasion. The event concluded with Science Day celebration where Dr S. P. Thiagarajan, former Vice Chancellor, University of Madras, gave a special talk.



### In-house Seminar at CGCRI

With a view to exchanging information and boosting networking among its various divisions, the Central Glass & Ceramic Research Institute (CGCRI), Kolkata, organized an In-house Seminar on 4-6 April 2008. Scientists up to the EI level and the Research Fellows made the presentations and the senior scientists as well as the project assistants participated in the deliberations. One of the basic objectives was to encourage the younger scientists who with blossoming R&D careers and yearning for new ideas, contribute with their full potential.

Dr H.S. Maiti in his inaugural address stressed the need of greater and more sustained focus of the younger scientists since the globalization has brought in tough competition. He said, unlike other professions, the science career demands innovative skills, hard work, speed and attention to micro-details. He urged the young research

workers to strive hard to act like leaders both at national and international levels and not tread the path of followers.

Initially, the Heads of ten R&D Divisions gave an overview of the activities in the respective Divisions and identified the areas in which future R&D activities would be needed. This was followed by 27 oral presentations and 27 poster presentations.

The response and the feedback was exceptional. The young researchers took commendable care in making their R&D presentations and projected their future activities. Notable presentations were those in which the results were directly linked to the development of technologies such as fibre optics, bio-ceramics, sol-gel, solid oxide fuel cell, Li-battery, sensors, ceramic membrane and structural ceramics.

It was felt that this kind of in-house events should be organized once in six months.

### Structural Health Monitoring for the RTA-70

The cost of maintaining an aircraft is currently around 15-35% of the direct cost of operating the aircraft. This cost over its lifetime can exceed the cost of acquisition of the new aircraft. The annual budget globally for maintenance of commercial aircraft is estimated to be around 62 billion dollars. Hence it is not surprising that the aircraft and airline industries worldwide are looking towards bringing this cost down. Structural Health Monitoring (SHM) aims to achieve this by dispensing with periodic maintenance and bringing about a need-based maintenance paradigm.

A network meeting was held on 22 May 2008 at the National Aerospace Laboratories (NAL), Bangalore, to bring together researchers, practitioners, and experts to assess the state-of-the-art, identify gaps and evolve viable road maps towards implementation of SHM technologies in the Regional Transport Aircraft (RTA-70). The RTA-70 aims to enhance the connectivity within India, thereby helping in the economic development of the regions. Cost would be an important aspect of this aircraft, and



A view of Poster Session during the Seminar at CGCRI



keeping in view the potential cost benefits of SHM, it is proposed that SHM would be one of the core technologies built into the design of RTA-70.

The meeting, following an introduction to the RTA by Dr Kota Harinarayana, discussed broadly four themes: aircraft requirements, SHM hardware, software for SHM, and Integrated Vehicle Health Management (IVHM). Participants from NAL, CADES, ADA, IISc, CGCRI, IIT Chennai, NML, CSIO, and CEERI, spoke on the maintenance issues, inspection requirements and the various sensing and inspection options available. Dr S. Nair, CTO of NeST Technologies, Cochin, presented their successful experience in packaging and marketing fibre optic technologies, some of which were developed in research labs such as CGCRI. Dr Gandhe of Satyam spoke about wireless sensors that could be employed in SHM systems.

Diagnostic and prognostic tools form a vital aspect of an SHM system. It is also critical that the possibility of false alarms is minimized if not totally eliminated. Hence there is need to develop robust tools that are insensitive to any failures, uncertainties or randomness. Speakers from IISc, R&D Establishment (Engrs) Pune and NAL offered a glimpse of the tools, algorithms and methods that could be employed.

There were presentations from Honeywell India and GM India Science Labs, on IVHM, which is an overarching aspect that carries SHM in its fold. The need to design an SHM system that is capable of integrating seamlessly with existing IVHM systems was stressed.

Thus, during the meeting, SHM technologies were examined and analyzed from all possible angles. More than 20 speakers offered their thoughts, views and expertise. In the final analysis, one could conclude that the technology readiness level of each aspect of SHM is fairly high. However, the SHM system as a whole and its elements need definition and detailing keeping in view the RTA requirements.

## Workshop-cum-Training Programme on Sericulture for Production of Better Cocoon Crop



Dr R. Chakravorty, Director of Central Silk Board, Lahdoigarh, delivering lecture. Seated on the dais (from left) are: Dr B. G. Unni, Coordinator NEIST; Dr P. G. Rao, Director, NEIST and Dr U. S. N. Murty, Project Coordinator, IICT

A two-day workshop-cum-training programme on 'Sericulture for Production of Better Cocoon Crop' was organized by the Indian Institute of Chemical Technology (IICT), Hyderabad, at North-East Institute of Science and Technology (NEIST), Jorhat, in collaboration with NEIST, for the progressive sericulture farmers of Upper Assam on 22 - 23 April 2008. This workshop was held under the project entitled 'Implementation of new technology and training programme for rural development in sericulture at North East states of India (Assam and Manipur)' sponsored by CSIR in Eleventh Five Year Plan (EFYP) under RSWNET category to Dr U.S.N. Murty, Head, Biology, IICT. The workshop was attended by special invitees, and scientific community from NEIST and Central Silk Board (CSB), Lahdoigarh.

Dr P.G. Rao, Director, NEIST, in his welcome address expressed the need to transfer the scientific achievements and technologies from the laboratories to the society at large. According to him the workshop was the right forum for a good interaction between the scientists and the sericulture farmers to address to the



## Workshops/Training Programmes



Field demonstration and interaction with farmer

chronic problems faced in rearing of silkworm. Dr Rao hoped that the programme, which had experts from IICT, CSB and NEIST, would be of immense benefit to the farmers.

Dr B.G. Unni, Coordinator of the programme from NEIST, in his introductory remarks said this programme was the first among the series of such workshop-cum-training programmes to be organized all over the North Eastern region of India in the next five years by IICT in collaboration with NEIST; Central Muga Eri Research & Training Institute (CMER&TI), CSB, Jorhat; and NABARD Unit, Sibsagar and Jorhat.

Dr U.S.N. Murty, while delivering his lecture on the activities of IICT in sericulture development said that the ultimate aim of the workshop cum training programme was to transfer the technologies in sericulture from lab to the field. Dr Murty informed that IICT has been involved in the

programme for the last 15 years and the first of such activities was to control Uzi fly infestation' bacterial infection prevalent in sericulture, application of biocontrol agents, modeling of economical rearing houses with better ventilation for prevention of insect infestation, development of mulberry hybrid for better yield and profitability. He said that rural India has the largest number of farming communities and 72% are marginal farmers who are unorganized.

Dr R. Chakravorty, Director of CMER&TI, CSB, Jorhat, in his address said that some technologies are successful at field level while others need refinement. He mentioned that through application of new technologies, the production in Muga cocoons, reached a record yield of 105 metric tonnes during previous year, and the target for this year is 150 metric tonnes. However, the production is dependent on many factors such as source of seeds

(disease free laying eggs, dfls), availability of good quality food plants and other environmental factors. Hence scientists should take a fresh look at the adoption of technologies wherein the farmer is the beneficiary.

The training session included lectures by resource persons from IICT, CMER&TI, NEIST and NABARD Sivasagar Unit. Dr Murty in his lecture during the training session described the need for establishing Rural IT Centres (Samadhan Kendra) in the entire NE region for sericulture farmers and also suggested the need of using newer technologies in sericulture for better cocoon production. Some of the technologies are establishment of  $V_1$  variety of mulberry, introduction of 2<sup>nd</sup> crop of sericulture in J & K, introduction of sericulture in non-traditional areas, design of low-cost model rearing house and application of data mining tools through internet for effective integrated control of vector and vector borne diseases in rural areas, and value added product from cocoons like neutral lipids from silkworm. Dr Murty mentioned that pupal oil contains large amount of  $\alpha$ -Linoleic acid, (ALA) which is highly nutritious. Its component can be used for nutraceutical applications.

Dr Unni in his lecture informed the farmers about some of the viable technologies developed recently by his group for better production of silk in terms of quality and quantity.

Mr Diganta Mech, Scientist from CMER&TI, delivered lecture on the technological advancement in Muga culture. He gave a

demonstration on the cultivation of Muga host SOM plants (*Machilus bombycina*) and recommended proper management for better yield of quality leaves by adoption of systematic block plantation (3×3 metres) by which 150 plants per acre can be accommodated as against 71 plants under traditional stray planting systems. He mentioned that the plants are ready within three years and the trees can be maintained to a manageable height of 10-15 feet with intermittent pruning that are ready within 3-5 months, thus cultivating six different crops.

Mr H. C. Biswas, District Development Manager from NABARD, Sivasagar Unit, in his lecture informed the farmers about the various schemes of financing sericulture activities like host plantation and muga rearing, etc. through bank loans. He also worked out the economics of a model sericulture farm which can be maintained at a nominal cost by the farmer.

A farmer's interaction session, with the resource persons from NEIST, IICT, CMER&TI, NABARD, and representatives from Assam Krishak Mahasangha, (state level organization) was also organized. The queries and problems faced by the muga farmers were discussed and advice was provided to them. The farmers who attended the programme were from the districts of Sivasagar, Dibrugarh, Jorhat and Golaghat. A demonstration and field visit to muga farm was also conducted. The trainee farmers visited the farm of CMER&TI at Lahdoigarh and were demonstrated the modern technologies that can be adopted for food plantation and post harvest processing of cocoons.

The farmers expressed their gratefulness for the opportunity to undergo such training, the knowledge gained would be useful in their respective sericulture farms.

The second workshop of this series is scheduled during September/October 2008 in Assam.

## Workshops/Training Programmes organized by IIP

The Indian Institute of Petroleum, (IIP) Dehra Dun, organized the following workshops/training programmes:

- Workshop-cum-training programme on 'Vehicular Pollution' during 7-11 January 2008 in New Delhi for the officers of State Transport Departments, Ministry of Shipping, Road Transport and Highways. Road Transport Officers from Kerala, Maharashtra, Rajasthan and West Bengal States participated.
- Training programme on 'Petroleum Refining Technology' was organized during 18 February-11 April 2008 for the Chemical Engineers of IOCL, New Delhi. Thirty-three engineers participated in this training programme.
- Training programme for Chemical Engineers of BPCL, Ernakulam, during 18 February-14 March 2008. Ten engineers participated.
- Training programme for engineers (other than Chemical Engineers) for BPCL, Ernakulam, during 24 March-4 April 2008. Twenty engineers participated.

## Visit of Russian Delegation to NAL

A Russian Delegation visited the National Aerospace Laboratories (NAL), Bangalore, on 17 April 2008. Dr Ranjan Moodithaya, Head, KTMD, welcomed the delegation and gave a brief idea of diverse activities at NAL. A member of the delegation, Mr A Tarasov was keen to visit the wind tunnel while Mr Filatov and Mr Ogarkov were interested in the composite facility.

They also expressed interest in the *Hansa, Saras* and the 70 seater aircraft. Dr Ranjan attended all their queries regarding the cost, weight and test results, and those pertaining to humidity, temperature, impact damage and validation studies. They also wanted to know what changes were expected 20 years from now.

Mr M. K. Sridhar, Head, Materials Science Division, said that the parts have been designed primarily at NAL in collaboration with Aeronautical Development Agency.

The delegation also visited the 4 ft Trisonic Wind Tunnel and Advanced Composites Division of NAL.



### **LERIG 2008**

As part of its Diamond Jubilee Year Celebrations, the Central Leather Research Institute (CLRI), Chennai, organized during 28 - 30 January 2008, the 42nd Leather Research Industry Get - Together (LERIG) 2008, in association with all stake-holders of the Indian leather sector as an international event. The theme of LERIG was appropriately chosen as "Development Initiatives, Augmentation Measures, Opportunities and New Directions (DIAMOND)". Dr A.B. Mandal, Director, CLRI welcomed the participants. This important event was inaugurated by the Chief Guest Dr M.S. Swaminathan, Chairman, MSSRF, who also distributed CLE Sponsored MODEUROPE, Design and Educational Awards after his inaugural address. Dr K.V. Raghavan, Chairman, RC, CLRI, presided. He highlighted XI Plan priorities, Technology and Indian trade perspectives for the Indian leather sector. Mr M. Rafeeq Ahmed, President, AISHTMA, delivered key note address. Mr Roland F. Herrmann, Consulate General of the Federal Republic of Germany, Mr M. Mohammed Hashim, Chairman, KH Group of Companies, Chennai and Mr Habib Husain, Vice Chairman, CLE, were Guests of Honour and spoke during the occasion. Dr Dennis C. Shelly, Director, Leather Research Institute, Texas Tech. University, USA, delivered Prof. B.M. Das memorial lecture. The panel discussion of the event was Chaired by Mr A. Sahasranaman, Hon. Director, ILFO. Eleventh Plan Priorities of the Indian Leather sector and road map to achieve the export targets were discussed.

Earlier, a press meet was organized on 23 January 2008. At this meet CLRI Scientists and important leather industry representatives and officials from Council for Leather Exports participated. Director CLRI explained to the media about the three day annual programme (LERIG 2008). Leather exporters and CLE officials explained the trends in Indian leather exports and the opportunities in future.

### **World Metrology Day and National Technology Day celebrated at NPL**

The National Physical Laboratory (NPL), New Delhi, celebrated the World Metrology Day and National Technology Day on 16 May 2008.

Mr Neeraj Munjal, Managing Director, M/s Shivam Autotech Ltd, Gurgaon, was the Chief Guest and Dr Ramani Iyer, Forbes Marshall, Pune, was the Guest of Honour on this occasion.

Dr Anil K. Gupta Head, Engineering Materials, in his welcome address spoke about the importance of National Technology Day as well as World Metrology Day. Commenting on the significance of metrology to the economy, he said, "Confidence in measurements is an essential prerequisite for international trade and facilitates almost every task in the industrialized world."

Dr Vikram Kumar, Director, NPL, in his opening remarks observed that the world is running at Internet speed, and time and distance have been compressed. But despite rapid changes, some things do not, and cannot, change. The accuracy in measurement is vital not only in the world of science, but also in the world of business. In fact, metrology, the science of measurement, touches our lives in many ways and it is because of the need for a common standard of measurement that the Metre Convention was signed by 17 countries in 1875. The Convention was to ensure uniformity of measurement standards worldwide, through the adoption and use of the International System of Units (SI). Dr Vikram Kumar said, "We are proud to have built up a national metrology programme, with state-of-the-art facilities and a core of highly professional staff. Our industries now have direct access to a reliable, competent and internationally-recognized facility for their measurement needs." He further informed that in the previous year (2007), the theme was "Metrology in Environment". There is rigorous involvement of chemistry in metrology. Environment pollution is not only owing to air, water, soil, climate change, sound but radiation is also responsible for environmental pollution. He also said that all above areas need research and development and informed about the efforts made towards metrology in chemistry including CRMs and other developments at NPL.

Dr Vikram Kumar further said that the year 2008 being

an Olympic year, World Metrology Day is being celebrated to depict the important role that measurement plays in fair judging of the various aspects of performance in sports. NPL- UK has worked closely with BIPM and its international partners and peers to produce a series of ten posters in the run up to the Beijing Olympics to emphasize this- Speed, Time, Distance, Height, Mass, Pressure, Dosimetry, Amount of substance, Traceability, Standard units & the SI system.

In India, these theme posters were sent to schools, colleges and Directors of CSIR Labs.

Also, though all over the world WMD is celebrated on 20 May, but we celebrate WMD along with National Technology Day preferably between 11th to 20th May every year and also call industries to participate from time to time in these type of occasions. Thus, this year we are celebrating this day on 16 May. On this particular day NPL gives awards to team of scientists for their efforts for getting their patents granted or technology transferred during the year. Certificates and cash prizes are given on this occasion, said Dr Vikram Kumar.

Speaking on the occasion, the Chief Guest Dr Neeraj Munjal remarked that NPL technology was the backbone of their company, M/s Shivam Autotech. Ltd (a Hero group Company). This company has improved its turnover many fold. He showed brief video clips of M/s Shivam Autotech. Ltd, Gurgaon.

The Guest of Honour Dr Ramani Iyer gave a talk on "Metrology and its need and

## Dr Navin Chandra appointed Acting Director of AMPRI

**D**r Navin Chandra, Scientist-G, has been appointed Acting Director of the Advanced Materials and Processes Research Institute (AMPRI), Bhopal, with effect from 10 June 2008. He succeeds Dr N. Ramakrishnan, who has taken voluntary retirement.

Dr Navin Chandra joined CSIR at its Central Electrochemical Research Institute, Karaikudi, as a Scientist in 1978 after completing his Ph.D from B.H.U., Varanasi. In 1987 he moved to Regional Research laboratory (presently AMPRI), Bhopal, and rose to become Scientist-G in 2006.

Dr Navin Chandra's specializations include Materials Science and Technology, Chemical and Ceramic Processes, Industrial Waste Utilization and Environment Management, Nano Materials Synthesis, Characterization and Applications. A recipient of several national/international awards, and with good research publications record, he has guided six Ph.D. students and visited USA, UK, Germany and Russia.



## Dr R.K. Kotnala awarded MRSI Medal

**D**r R.K. Kotnala, Scientist, National Physical Laboratory (NPL), New Delhi, has been bestowed with MRSI Medal Award 2008 for his significant contributions to the field of Material Science and Engineering, particularly the magnetic materials, on 15 February 2008 at the annual general body meeting (AGM) of Material Research Society held at Sri Chitra Trinual Medical College, Thiruvananthapuram.

The award carries a medal, cash prize, a certificate and an invitation for medal lecture at AGM.



importance in the society". According to him the greatest challenge lies before us regarding availability of water. It would be a great day when we will not see any women running in quest of water

and standing in queue. Dr Munjal and Dr Iyer also gave away the cash prizes/certificates to the awardees.

Dr R.K. Garg, Scientist & Secretary, MSI, proposed a vote of thanks.



## Honours & Awards/Announcements

### Dr (Ms) M. Lakshmi Kantam



**D**r (Ms) M. Lakshmi Kantam, Scientist-F and Head, Inorganic & Physical Chemistry Division, Indian Institute of Chemical Technology (IICT), Hyderabad, has been nominated by Director General, CSIR, to represent CSIR as Member of the Organising Committee for the National Women's Science Congress to be held in Bangalore during December 2008 January 2009.

Dr Lakshmi Kantam is Chairperson, Chemical Sciences, Women's Scientist Scheme (R&D) of Department of Science and Technology (DST), New Delhi.



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