

# DRDO NEWSLETTER

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**Prime Minister at Kyrgyz-Indian Mountain Biomedical Research Centre, Bishkek, Kyrgyzstan**



# Prime Minister visits Extreme Altitude Field Laboratory in Kyrgyzstan



Clockwise from top: Hon'ble Prime Minister interacting with Indian scientists through video link at high altitude research laboratory Tuya Ashu (3200 m); Eco cardiographic studies being explained to the Prime Minister; Yogic practices at Tuya Ashu being shown to the Prime Minister through video link; and Exercise Physiology experiment being explained to the Prime Minister



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**Cover (from right):** Hon'ble Prime Minister of Kyrgyzstan; Hon'ble Prime Minister of India; Dr S Christopher, Secretary Department of Defence R&D, DG DRDO; Dr Shashi Bala Singh, Director, DIPAS and Dr Manas K Manda, DG (LS), DRDO at the inaugural function of Extreme High Altitude Field Laboratory in Kyrgyzstan

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## Prime Minister inaugurates Extreme High Altitude Field Laboratory in Kyrgyzstan



Tuya Ashu High Altitude Field Station

On 12 July 2015 hon'ble Prime Minister Shri Narendra Modi inaugurated Extreme High Altitude Test Laboratory Phase 2 of the Kyrgyz-Indian Mountain Biomedical Research Centre (KIMBMRC) at Syok Pass at an altitude of 4020 metres. KIMBMRC Project was sanctioned in August 2008 by the Ministry of Defence, India, with an objective to study the biological responses during the process of acclimatisation in two ethnic groups (Indian and Kyrgyz population). Research on human acclimatisation and improving performance at high altitude is important for India and Kyrgyzstan because of similar geographical locations.

Defence Institute of Physiology and Allied Sciences (DIPAS) of DRDO, working in the area of high altitude physiology, nutrition and biochemistry of human in severe stress environment, had established the KIMBMRC at Bishkek and Field Laboratory at Tuya Ashu (3200 m) in Kyrgyz Republic as a collaborative research programme between India and Kyrgyzstan. The centre at Bishkek was inaugurated by Hon'ble President

of Kyrgyz Republic on 5 July 2011. The centre has a state-of-the-art set-up for carrying out physiological and biochemical/molecular studies and is being funded by DRDO.

Hon'ble Prime Minister also visited KIMBMRC at Bishkek and was briefed about the activities and facilities at the centre. He was also briefed about the laboratory set-up at Tuya Ashu Pass and interacted with Indian and Kyrgyz scientists and soldiers through video link. Appreciating the efforts of the scientists the Prime Minister said that the research done at this centre will greatly benefit the health of soldiers who secure the borders at high altitude.

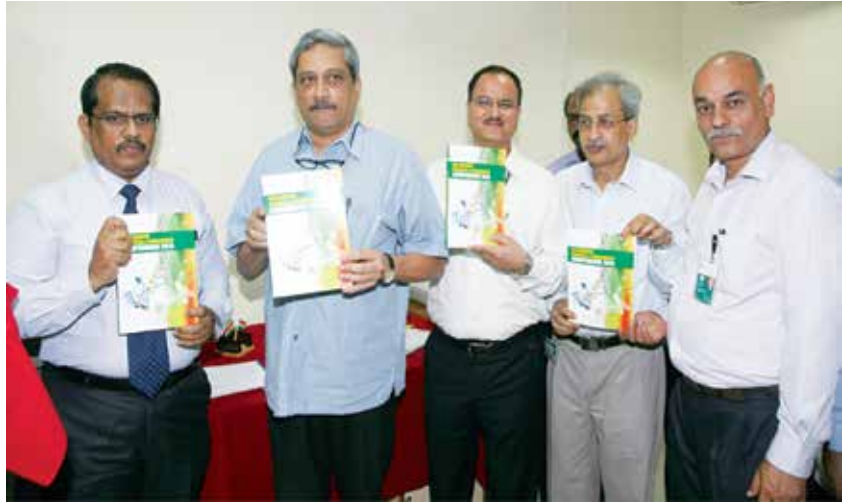
Dr S Christopher, Secretary, Department of Defence R&D and DG DRDO, Dr Manas K Mandal, DG (Life Sciences), DRDO and Dr (Mrs) Shashi Bala Singh, OS and Director, DIPAS, were also present during Prime Minister's visit.





## Raksha Mantri releases Life Sciences Products and Technologies Compendium

Shri Manohar Parrikar, Hon'ble Raksha Mantri, released Life Sciences Products and Technologies Compendium 2015 on products and technologies developed by Life Sciences labs of DRDO on 10 July 2015 at Defence Research and Development Establishment (DRDE), Gwalior. Dr S Christopher, Secretary, Department of Defence R&D and DG DRDO; Dr Manas K Mandal, DG (LS) and Dr Lokendra Singh, OS and Director, DRDE, were also present on the occasion.



Raksha Mantri Shri Manohar Parrikar releasing Life Sciences Products and Technologies Compendium

The compendium presents all the significant tangible and intangible products and processes developed by Life Sciences laboratories for active use by Army, Navy and Air Force and Paramilitary forces with spin-off to civil populace.

Life Sciences cluster of DRDO is actively engaged in building human capital of the Services working under harsh climatic conditions by developing state-of-the-art technologies and products in bio-medical, food and bioresources domains. Nine laboratories under this cluster, located in different parts of the country, are working in unison to enhance performance, sustainability and survivability of the soldiers in extreme and toxic environments, high altitudes, deserts, underwater, aerospace, closed microenvironments of ships, aircraft,

weapon systems, and areas of low intensity conflicts. The cluster covers entire gamut of areas ranging from biodefence, nuclear, biological, chemical protection and detection, man-machine interface, life-support systems, human-factor engineering for weapon systems, nuclear medicine for diagnostics and therapeutic applications, nutrition, specialised high altitude agro-animal technologies, biofuel and food technologies for defence operations.

Life Sciences labs, have developed a large number of products and technologies critical for survival of troops in extreme conditions and enhancing their physical and mental performance as well.

## CFEES transfers Technology for Low Pressure Water Mist Gun System

Centre for Fire, Explosive and Environment Safety (CFEES), Delhi, has designed and developed a portable, hand-held and backpack, low pressure twin-fluid water mist gun system for fighting class A, class B and electrical fires in naval platforms like ships, submarines, POL stations, defence stores, trains, process industries,



civilian buildings, hotels, warehouses, village farm stockyards, etc. The system successfully passed fire tests as per international standard EN 3:7-2004 for B233, A55.

A patent on design of the system has been filed and technology transferred to M/s Aska Equipment Pvt Ltd, New Delhi, for commercialisation.

## Indoor Far-Field Rectangular RF Anechoic Chamber Facility established at ARDE

A fully automatic Indoor Far-Field Rectangular RF Anechoic Chamber Facility has been established at Armament Research and Development Establishment (ARDE), Pune, to characterise the communication antennas and RF measurements in simulated free space. Dr KM Rajan, OS and Director, ARDE, inaugurated the facility on 24 July 2015.

Measurement of electromagnetic waves is needed to validate working of a design according to the requirements as electromagnetic waves can be affected by frequency, material, and environment. An anechoic far-field chamber is best suited for simple and correct measurement of electromagnetic waves.

The facility comprises a RF anechoic chamber and a control room. The anechoic chamber has four parts: Shielded chamber, instrumentation unit, standard gain horn antennae and software. Control room houses all instruments for measuring antennae patterns. An internal CCD camera monitors the chamber's



Far-Field Rectangular RF Anechoic Chamber

activities on LCD. The operating frequency range of the anechoic chamber at ARDE is 400 MHz to 18 GHz with capabilities for measuring 3D far-field radiation patterns in any polarisation, gain, directivity, beam width, cross-polarisation discrimination, side lobe levels, antenna efficiency and axial ratio. Currently, the facility is being used for characterising the soft target munitions and anti-tank munitions communication antennas.

## 23<sup>rd</sup> Prof. DS Kothari Memorial Oration

Defence Laboratory, Jodhpur (DLJ), organised 23<sup>rd</sup> Prof. DS Kothari Memorial Oration on 6 July 2015 to commemorate the memory of its founder Prof. DS Kothari. Dr S Christopher, Secretary, Department of Defence R&D and DG DRDO, delivered the oration on Network Centric Airspace Surveillance: A Force Multiplier. Justice NN Mathur, former Vice Chancellor, National Law University, Jodhpur, presided over the function. Dr SR Vadera, OS and Director, DLJ, welcomed the guests and briefed about the contributions made by Prof. Kothari in the field of science and education.

Justice NN Mathur, in his presidential address, elaborated upon the dedication of Prof. Kothari for country's overall technological development by means of his scientific achievements. He also hailed DRDO's R&D achievements and contributions made for the Indian Defence.



Dr Christopher delivering Prof. DS Kothari Memorial Oration

Dr S Christopher, in his oration, emphasised on the requirements of technology development based on country's security challenges. He expressed that the



country needs to be better aware and confident of our abilities to cross the technology barriers that keep us from being the best-in-class in the world.

The function was attended by family members of Prof. DS Kothari; Vice Chancellors of universities at Jodhpur; Prof. CVR Murthy, Director, IIT, Rajasthan; Shri Benjamin Lionel, Director, Combat Vehicles, DRDO HQ; Shri PK Mehta, OS and GM, ACEM, Nasik; Directors of Central Arid Zone Research Institute, Arid Forest Research Institute and Regional Remote

Sensing Centre and representatives of Armed Forces. On the occasion, Shri Bajrang Lal, TO C, Shri Hotu Mal, Technician C and Shri Bhera Ram, Technical Assistant were conferred Lifetime Achievement Award for the meritorious contributions made by them in their respective field of work. Dr MK Patra, Sc E, and his team were also awarded Vikas Purashkar for developing technology in the field of camouflage materials. Dr SK Jain, Sc G, Chairman Organising Committee, proposed the vote of thanks.

## DRDO Manpower Development Activities

Conferences/Seminars/Symposia/Training Courses/Meetings

### Certificate Course in Project Management

Institute of Technology Management, Mussoorie, and Centre for Fire, Explosives and Environment Safety (CFEES), Delhi, jointly conducted a five-day Certificate Course in Project Management (CIPM) from 6 to 10 July 2015. The objective of the course was to acquaint young DRDO scientists with fundamentals of Project Management and various tools and techniques with an aim to develop project handling skills. Emphasis was on Project Planning, Scheduling, Risk Analysis and Time Management to minimise time and cost overrun in projects. Dr CP Ramanarayanan, OS and CC R&D (HR), in his inaugural address, stressed upon the significance of such courses for enhancing project handling capabilities of scientists. Dr SB Singh, OS and Director, ITM, and Dr Chitra Rajagopal, OS and Director, CFEES, were also present. The course was attended by 34 participants.

### Corporate Review Meeting

Armament Research and Development Establishment (ARDE), Pune, conducted Corporate Review (CR) on 30 July 2015. Dr CP Ramanarayanan, OS and CC R&D (HR); Shri Sanjay Tandon, Director, Material Management; Smt Nabanita R Krishnan, Director, Planning and Coordination; Shri Alok Mall, Additional Director, Personnel; Shri Ajay Rungta, Chief Engineer (NF) DCW&E; Shri Rupesh Kumar, Joint Director, DP&C, and CR members from DRDO HQ attended the meeting. Dr KM Rajan, OS and Director, ARDE, gave an overview of the achievements of the lab. Presentations were given on Admin, HR and MMD related issues by respective group heads. The Committee interacted with the young scientists of ARDE and also discussed issues raised by JCM members and representatives of DRTC, PA, Admin and Stores' Staff Associations.



Participants of Certificate in Project Management course with Dr Chitra Rajagopal, Director, CFEES

## DESIDOC celebrates National Library Day

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, celebrated National Librarian's Day (NLA) on 12 August 2015 to pay obeisance to Prof. SR Ranganathan who is considered the father of library science, documentation and information science in India. DRDO laboratories in Metcalfe House also participated in the function.

Shri Gopal Bhushan, Director, DESIDOC, paid tribute to Prof. Ranganathan and described him as a pioneer, visionary and statesman of great excellence. Ranganathan's contribution to the library Science is unprecedented and unparelled and his five laws of library science are relevant even in today's modern times. Elucidating his vision for DESIDOC, Shri Bhushan said, "There is no substitution of books and they will remain as important as they were despite the advancement in technology and changing reading habits. Drawing an inspiration from Prof. Ranganathan, DESIDOC has embarked upon a very ambitious roadmap to map technology and innovation. Several outreach initiatives have been undertaken for evolving DESIDOC into a dynamic centre for interaction where more users would be able to



Shri Gopal Bhushan addressing the audience



grasp more information more quickly."

Speaking on the occasion, Shri SB Taneja, Director, ISSA, Dr MBhutiyan, Director, DTRL and Shri RK Jain, Director, JCB, appreciated services provided by the DESIDOC. Director ISSA stated that DESIDOC may support the lab in packaging the software developed for Indian Armed Forces. All Directors requested that conference/seminar proceedings and video libraries of technical lectures may also be included in the regular services provided by DESIDOC.



Exhibition of publications brought out by DESIDOC

An exhibition of scientific books published by DESIDOC was also organised where books/manuals/monographs were displayed and distributed. On the spot registration drive was also offered for accessing online library services on DRONA. A lucky draw was also conducted and books were distributed to the winners.



## DRDO Societal Activities

### Ophthalmology, Dentistry and Dermatology Check up Camp

Combat Vehicles Research and Development Establishment (CVRDE), Chennai, organised a medical camp during 8-9 June 2015. The camp was inaugurated by Smt Jayashree Varadhan, Addl Director (Mgt) and Chairman Works Committee, CVRDE. A team of doctors from Vee Care Hospitals, Chennai, screened the employees for Ophthalmology, Dentistry and Dermatology. Concerned individuals were counseled about the follow up of the problems. Dr Bhuvaneshwari Rajendran from Kauvery Hospital, Chennai, gave a lecture on the Stress Management and Sleep and explained common causes for stress and how to manage these. She also brought out the importance of good sleep. Dr P Sivakumar, OS and Director, CVRDE, felicitated the doctors who participated in the camp. The event was organised by Major Giddi Sarath Babu, RMO, CVRDE, in coordination with the Works Committee, CVRDE.

### Blood Donation Camp

Under the aegis of IMA Blood Bank, Dehradun, a voluntary blood donation camp was organised by



DEAL employees donating blood in the camp

Defence Electronics Application Laboratory (DEAL), Dehradun, on 20 July 2015. The camp was inaugurated by Dr RS Pundir, Director, DEAL. All the employees participated in the camp with zeal and enthusiasm and donated sixty units of blood. Dr JC Arora and Dr Manish Sharma supervised the camp.

### Breast Cancer Screening Camp

Institute of Nuclear Medicine and Allied Sciences (INMAS) organised Breast Cancer Screening Camp (Mammography) for DRDO employees and their relatives from 1 June to 31 July 2015. Dr RP Tripathi, OS and Director, INMAS, inaugurated the camp and apprised participants of the health services provided by INMAS. Dr Rajeev Vij, PRO, INMAS, informed about the Screening Camp and future initiatives of INMAS.



Dr RP Tripathi addressing the participants

A one-day Seminar on Breast Cancer Awareness was organised as part of the camp on 30 July 2015. Talks on Breast Cancer Screening and Mammography were delivered by Dr Manju Popli and Dr Maria M D'souza. A large number of women employees of Delhi-based DRDO labs/estts participated in the camp.

## Inauguration of DRDO Technical Complex, Bengaluru

Dr S Christopher, Secretary, Department of Defence R&D and DG DRDO inaugurated DRDO Technical Complex at CV Raman Nagar, Bengaluru on 19 July 2015. Dr K Tamilmani, DS and DG (Aero), Dr KD Nayak, DS and DG (ECS), Directors of Bengaluru-based DRDO laboratories, CDA (R&D), CDA (RTC), EMO, PMO, CCE (R&D), GE (I) R&D (East), GE (I) R&D (West) also graced the occasion.





## Personnel News

### Appointment

#### Director, Centre for Air Borne Systems



Shri MS Easwaran, OS, has been appointed, Director, Centre for Air Borne Systems (CABS), Bengaluru, wef 15 July 2015. He obtained BSc (Hons) in Physics and MSc in Physics/Electronics from University of Delhi and MTech in Electrical Engineering from IIT, Delhi.

Shri Easwaran joined Electronics and Radar Development Establishment (LRDE), Bengaluru, as Sc B in 1984 and worked for development of the first technology demonstrator phased array-based multi-mode radar, phased array antenna for Akash system, SV 2000 radar system, signal processor for LCA radar and unequal waveguide-based power divider network for slotted array antenna of LCA and ASP radars. During his tenure as part of Group for Forecasting and Analysis of Systems and Technology (G-FAST)—a thinktank of DRDO, he was instrumental in identifying synthetic aperture radar (SAR) as a critical airborne radar requirement and enabled initiation of project for development of SAR in DRDO.

In 2004, he joined CABS as Sc F and assumed charge as Associate Programme Director for the Airborne Early Warning and Control (AEW&C) Programme. He was elevated to the rank of Outstanding Scientist in 2014. He is recipient of many awards including DRDO Scientist of the Year Award in 2010, DRDO Award for Path-breaking Research and Outstanding Technology in 2012 and Agni Award for Self-reliance in 2013. He has over 17 papers to his credit.

### Awards

#### Fellow of Royal Society of Chemistry

Dr GS Mukherjee, Sc F, Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, INSA visiting Fellow, and Ex-President (Engg. Sciences) of 97<sup>th</sup> Indian Science Congress, Thiruvananthapuram, has been admitted as Fellow of the Royal Society of

Chemistry (FRSC). The designation FRSC is given to elected Fellows of the Society who have made major contributions to Chemical Sciences.

#### Fellow of ASM International



Dr G Madhusudhan Reddy, Sc G, Defence Metallurgical Research Laboratory (DMRL), Hyderabad, has been elected Fellow of ASM International for his outstanding contributions in welding science and technology with special emphasis on the development of solutions enabling the fabrication of critical components used in defence and aerospace applications.

### Higher Qualification Acquired

#### Armament Research & Development Establishment



Shri PP Parkhi, Sc F, obtained PhD from Indian Institute of Technology Bombay, (IIT-B), Mumbai, for the thesis titled Missile Autopilot Design using Sliding Mode Control Technique.



Shri RJ Mukhedkar, Sc F, obtained PhD from Defence Institute of Advanced Technology (DU), Pune, for the thesis titled Modelling and Simulation Studies for Military Applications.



Shri Rahul B Sarsar, Sc C, obtained PhD from Defence Institute of Advanced Technology (DU), for the thesis titled Dynamical Study on Intelligent Ammunition for Artillery.

#### Defence Metallurgical Research Laboratory



Dr N Venkateswara Rao, Sc F, obtained PhD from Jawaharlal Nehru Technological University, Hyderabad for the thesis titled Characterisation of Clad Joints of High Strength Low Alloy Steel with Stainless Steel and Titanium.







Dr Shiba Narayan Sahu, Sc D, obtained PhD from IIT-B for the thesis titled Evolution of Cell Structure of Aluminium Foams Produced Using Gas Blowing Agents.

## Research Centre Imarat



Shri JV Satyanarayana, Sc F, obtained PhD from Indian Institute of Science (IISc), Bengaluru, for the thesis titled, Efficient Design of Embedded Data Acquisition Systems based on Smart Sampling.

## Solid State Physics Laboratory



Shri Manoj Umesh Sharma, Sc G, obtained PhD from Kurukshetra University, for the thesis titled Modelling and Fabrication of SAW Delay Lines for Gas Sensing Applications.

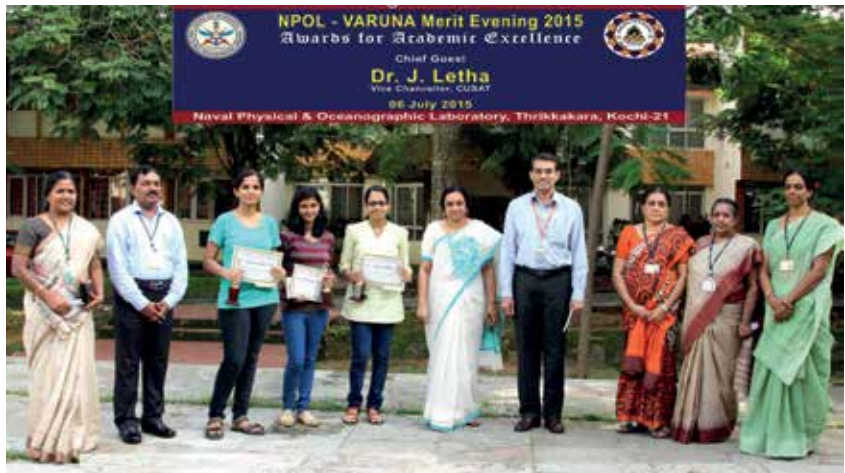


Smt Mamta Khaneja, Sc F, obtained PhD from Indian Institute of Technology, Delhi, for the thesis titled Field Emission Characteristics of Carbon Nanotube Arrays.

## NPOL-Varuna Merit Evening

Naval Physical and Oceanographic Laboratory (NPOL), Kochi, conducted Merit Evening-2015 to felicitate the academic excellence of Bhavan's Varuna Vidyalaya (BVV), a joint venture of NPOL and Bhartiya Vidya Bhavan, on 6 July 2015.

Dr J Letha, Vice Chancellor, Cochin University of Science and Technology was the Chief Guest. Dr T Mukundan, Sc G, Chairman, School Management Council, welcomed the guests and highlighted the consistent academic excellence of BVV over the years.



Meritorious students with Shri S Kedarnath Shenoy (fourth from right)

Shri S Kedarnath Shenoy, Director, NPOL, lauded the achievements of students and appreciated the efforts put up by dedicated teachers and parents. Dr Letha stressed on

the importance of creativity in both education and career and the need to think and do things differently. She distributed awards to the meritorious students.

## Visitors to DRDO Labs/Esstt

### Armament Research & Development Establishment

A delegation led by Shri Jaideep Govind, Additional Secretary, Ministry of Home Affairs, visited ARDE on 13 July 2015. The delegation was shown Low Intensity Conflict products and firing demonstration of 5.56 mm Joint Venture Protective Carbine. They were apprised about the DRDO products which could be used by Central and State Police forces engaged in various CI/CT operations.



Visitors being briefed about ARDE products



# डीआरडीओ न्यूज़लैटर

## Centre for High Energy Systems & Sciences

Dr Satish Kumar, DS and DG (MSS), DRDO, visited the outdoor facilities of Centre for High Energy Systems and Sciences (CHESS), Hyderabad, on 2 July 2015. Shri Suranjan Pal, OS and Director, CHESS briefed him about critical technologies related to directed energy laser systems, lab's recent technical achievements and infrastructural facilities. DG also witnessed the demonstration of the active imaging and precision beam pointing capabilities of brass board module of 1 kW fiber laser-based beam director system.

## Defence Laboratory

Dr S Christopher, Secretary, Department of Defence R&D and DG DRDO, visited Defence Laboratory, Jodhpur (DLJ), on 6 July 2015. Dr SR Vadera, OS and Director, DLJ briefed him about the technical activities, achievements and infrastructure of the laboratory. Dr Christopher also visited various technical facilities of the laboratory.

## Defence Scientific Information & Documentation Centre

Dr CP Ramanarayanan, OS and CCR&D (HR), visited Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, on 6 August 2015. Shri Gopal Bhushan, Director, DESIDOC, presented an overview of DESIDOC activities and new initiatives being undertaken.



Dr CP Ramanarayanan briefed about DESIDOC activities

## High Energy Materials Research Laboratory

Air Marshal Pankaj Aneja, VSM, DG (Systems), visited High Energy Materials Research Laboratory (HEMRL), Pune, on 6 July 2015.



Air Marshal Pankaj Aneja showing keen interest in experiment

## Solid State Physics Laboratory

✧ Dr S Christopher, Secretary Department of Defence R&D and DG DRDO, visited Solid State Physics Laboratory (SSPL), Delhi, on 21 June 2015. Dr RK Sharma, OS and Director, SSPL, briefed him about the activities and achievements of the laboratory. Dr Christopher showed keen interest in the activities being pursued by the laboratory.



Dr S Christopher briefed about SSPL activities

✧ Dr G Satheesh Reddy, SA to RM, visited SSPL on 15 July 2015. He was briefed about ongoing activities by Dr RK Sharma, Outstanding Scientist and Director, SSPL. He reviewed activities of newly created Advanced Semiconductor Technology Centre (ASemiT). He also had detailed discussion with senior scientists of SSPL.

