

## Chandigarh Region Innovation and Knowledge Cluster (CRIKC)

### Annual Report 2016-2017

In the year July 2016 to June 2017, CRIKC continued its usual activities of organizing lectures/conferences/seminars as well as interaction with several international organizations. As an important milestone CRIKC got registered as a Society with Chandigarh Administration adding to its flexibility in carrying out its mission. A state of the art video conferencing facility was created under the umbrella of CRIKC which can be used by any of its institutions. Department of SAIF/CIL along with CRIKC started a vigorous GIAN program and during this year successfully completed six GIAN workshops which brought several international faculty in the PU campus. A brief report on CRIKC activities is as follows.

**June 27, 2016:** A meeting was held at the Vice Chancellor office, Panjab University, Chandigarh with Prof. Arun Kumar Grover in the Chair. It was proposed in the meeting to get the society registered under the Societies Registration Act, 1860 with the Registrar of Societies, Chandigarh. Prof. M. M. Gupta, Secretary of the society was unanimously authorized to get the said society registered under the society registration act.



**July 21, 2016:** India Liaison Representative, Japan Science and Technology (JST) Agency, Dr. Yuji Nishikawa, visited Chandigarh to promote scientific ties with the Panjab University (PU) and Chandigarh Region Innovation and Knowledge Cluster (CRIKC) institutions. Dr. Nishikawa shared that Japan has initiated a number of programs to promote student/researcher exchange programs and joint research work in the field related to ICT, energy/environment issues, disaster risk reduction, infectious disease control and food security, with the Government of India especially, Department of Science and Technology (DST) and Ministry of Human Resource Development (MHRD). There are programs in India called Science and Technology Research Partnership for Sustainable Development (SATREPS) to address issues of global and local concern. In this program JST has completed

three projects involving ‘restoration of holy rivers by Japanese Environmental Technology’, ‘opening doors to low carbon society’ and ‘trump card for disaster planning’. Recently a project has been initiated for smart cities based on sensing, network and big data analysis of multimodal regional transport system. JST is planning to start a collaboration hub for international research program on Information communication technology (ICT) to work on the area of artificial intelligence, big data, etc. He also shared that JST has a program named as Sakura Science Plan (SSP) which aims to encourage visit of young talented, hardworking and S & T aspiring youths from India (upto the age of 40) after high school onwards. This year the JST would support visit of over 500 young talented students/researchers to schools, universities and research institutes for a period upto three weeks. He shared that number of Indian students studying in Japan currently is dismal compared to China, Nepal, Bangladesh, etc. The number of Indian students in Japan is only 700, compared to 90,000 for China and 10,000 from Nepal. He suggested that Japanese Govt has now more initiatives to attract Indians from academia and industry. JST at present is funding projects over 1 billion US dollars to promote research and exchange programs. PU Vice Chancellor Prof. Arun K Grover, Dean of University Instruction (DUI), Prof. Dinesh K Gupta, Director Research Prof. O.P. Katare, Coordinator CRIKC Prof. S.K. Mehta, Prof. Rupinder Tiwari, Prof. Praveen Rishi, Prof. Rajat Sandhir, Prof. Meenakshi Goyal along with many faculty members were present during the interaction with the JST representative. Prof. Grover suggested that the possibility of Joint meeting of be planned between scientists from Japan with faculty/scientists part of the CRIKC institutions be explored so that the two way channel opens between the two countries.



**July 26, 2016:** Australia’s High Commissioner to India, Ms Harinder Sidhu visited Panjab University (PU) and met the PU Vice Chancellor Prof Arun Kumar Grover. In the meeting, Australian High Commissioner evinced keen interest to have closer relationship & cooperation with PU and various Chandigarh Region Innovation and Knowledge Cluster (CRIKC) institutions. PEC Director Prof Manoj Arora, CSIO Director Prof RK Sinha and representatives of CRIKC institutions like CIAB, NABI, INST also attended the meeting held at the PU VC Committee Room. In the meeting, Australia’s High Commissioner Ms Harinder Sidhu emphasized on deepening the academic relationship and stressed for collaborative research between Indian and Australian institutions. She called upon the PU and CRIKC institutions to explore the possibilities of having closer cooperation



with Australian institutions in the field of education and scientific research for availing various funding opportunities. The two sides discussed Australia-India education and research relationship and opportunities for closer cooperation, including those under the Australia-India Strategic Research Fund (AISRF). They also discussed various ongoing partnerships and collaboration between CRIKC and Australian Universities. Australia's High Commissioner appreciated the PU's MoU with Deakin University (Australia) and University of Western Sydney (UWS). After the meeting, Ms Harinder Sidhu said, "it was wonderful to visit such a significant and historic institution. I am optimistic that we can build on the existing Australia India scientific collaboration." Earlier, PU VC Prof Grover informed the Australian delegation about the ongoing cooperation between PU and different Australian Universities. He also referred the glorious history of PU and its contribution in nation building. The other three members of the delegation, who accompanied the Australian High Commissioner included; First Secretary, Department of Foreign Affairs & Trade Ms. Tanya Spisbah; Director Northwest India Australian Trade & Investment Commissioner Mr. Ashish Sharma and Program Officer Media & Advocacy Ms. Vartika Bassi Sethi. Director Research Promotion Cell (RPC), PU Prof OP Katare, CRIKC Coordinators Prof M.M. Gupta, Prof SK Mehta, Associate Director RPC Prof Ramanjit Kaur Johal also attended the meeting.



**August 01-06, 2016:** A GIAN workshop on "HETEROGENEOUS CATALYSIS AND APPLICATION" was delivered by Prof. Alex Ibhaddon from University of Hull, UK. Prof. Sushil Kumar Kansal from the Dr. S. S. Bhatnagar University Institute of Chemical Engg. & Technology, Panjab University Chandigarh was the course coordinator for this course. Total 51 participants attended this course.

Prof. Alex Ibhaddon is internationally acclaimed academician with proven knowledge and expertise in Catalysis, Reactor Engineering, Physical Chemistry and Advanced Materials. Dr Ibhaddon is a Fellow of the UK Royal Society of Chemistry (CChem FRSC), a Fellow of the UK Higher Education Academy (FHEA), a Chartered Chemist, a University professional teacher for over 26 years and Director of Teaching and Learning at the University of Hull. During the course he discussed at length about heterogeneous catalysis and different aspects of catalysis in industry and about his ongoing projects. The scientific and technological breakthroughs in the development of novel concepts in hybrid materials design for heterogeneous catalysis was the prime aspect of this course. He discussed about the capillary reactor design in detail for the production of fragrances, pharmaceuticals, vitamins and agrochemicals. He discussed many aspects for the optimum design of capillary reactors. He elaborated the development of various catalysts used for the semihydrogenation of 2-methyl-3-buten-2-ol. The synthesis of catalysts such as palladium-bismuth intermetallic, palladium-tin and supported Pd and Pd<sub>3</sub>Sn catalysts was discussed. He showed various capillary reactor configurations to the participants in physical form also. His method of delivering the knowledge was interactive and commendable. During the off-time and breaks, he was busy with the young scholars for the discussion of their individual research problems. During the workshop he stressed that the future production of these fine chemicals will not be centralised but it will be produced at the local level using these capillary reactors. Overall the course contents were very lucid and informative. The participants were highly satisfied from the interaction and the course content.

**August 02, 2016:** Prof. H P Khincha, Founder, Society for Innovation and Development (SID) at IISc Bangalore and *Fmr. Vice-chancellor, Visvesvaraya Technological University, Belgaum* delivered a special lecture on "Innovation and Entrepreneurship in India" at the ICSSR Guest House. The event was organized by DST-Centre for Policy Research at Panjab University, Chandigarh in association with CRIKC.

**August 08, 2016:** CRIKC celebrated 2<sup>nd</sup> CRIKC Nanoscience day at the Indian Institute of Science and Educational Research (IISER), Mohali auditorium on August 08, 2016. The function was organized by Institute of Nano Science & Technology (INST) under the aegis of CRIKC. As many as 200 distinguished scientists, young researchers, school, college teachers and students across the region around Tricity attended the conference. Earlier, welcoming such a diverse audience, Prof. Ashok K. Ganguli, INST-Director and Chairman-CRIKC Nanoscience Group shared his dream of making nanoscience and technology popular through CRIKC as an innovative hub of top class institutes in this part of the country with a greater synergy in research activities and collaborations. Panjab University (PU) Vice Chancellor and Chairman-CRIKC Prof. Arun Grover, who fostered the very idea of CRIKC, stressed on the potential contribution of technologies emanated from CRIKC institutes towards smart city proposal of city beautiful, Chandigarh. Prof. Milan K. Sanyal from Saha Institute of Nuclear Physics, Kolkata delivered the prestigious CRIKC Nanoscience Lecture. He inspired the researchers with his lecture on size controlled tunability of nanomaterials with electronics and solar cell application. In the morning session, Associate Director-ARCI, Hyderabad enthused Dr. Tarasinga Rao the audience with excellent demonstration of nanomaterials based technologies, which he has translated from laboratory to industrial companies. Some of the health and energy relevant

technologies include antibacterial and self-cleaning textiles undertaken by leading Jeans manufacturers such as Flying machine, Wrangler and new generation lithium ion battery for energy storage application in Mahindra electric cars. Post-lunch session comprised of research lectures from various CRIKC institutes including IISER, PU, CSIO, INST and PGIMER. Another highlight of the program was involvement of school, college students and teachers under INST initiated outreach program where their enthusiastic participation with posters and flash presentation was noted.



**August 22-27, 2016:** A six-day national workshop on ‘Applications of NMR and LCMS for Structural Elucidation of Small Molecules (NMR-LCMS 2016)’ organized by the Department of CIL/SAIF/UCIM Panjab University (PU), was concluded at PU today. As many as 45 participants mainly researchers and scientists of various CRIKC institutes participated in the prestigious workshop. Prof. S. K. Mehta, Director SAIF/CIL elaborated upon the high end facilities available at the centre. He also enlisted the activities and lectures conducted by the department of SAIF/CIL. He thanked the speakers (Prof. N. Suryaprakash from IISc Bangalore, Prof. Vijay Khanna from Ahmednagar, Maharashtra and Prof. Vairamani from SRM Chennai), conveners (Dr. Deepak B. Salunke, Dr. Subash Sahoo and Er. Ramesh Sharma) and participants for their valuable time and active participation. He also thanked university for providing the financial support out of PURSE grant for the workshop. The PU Vice Chancellor, Prof. Arun Kumar Grover while addressing the function emphasized that university should be seen for promoting research both in the field of instrument’s Hardware and Software. Prof. Arun Kumar Grover advised the participants that they should spread the word around, in their peer groups for organizing the workshops at this place as per their field of interest. He said be innovative, as Government of India has provided the monetary support.

Prof. Praveen Rishi, Dean Science, said that the workshop is the need of the hour, researchers those who had come for attending such workshops should imbibe as much knowledge as possible to become more skilled. She congratulated the conveners and organizing team for their hard works. Prof Sanjay Chhibber Coordinator Purse-II explained the role of PURSE grant in promoting research activities at Panjab University.

Prof. M. Vairamani, Dean Biomedical Engineering, SRM, Chennai, also graced the occasion. Finally, Dr. Subash Sahoo, delivered the vote of thank to the chair, participants and other dignitaries of the workshop who helped in making the workshop a success.





**August 29-30, 2016:** Distinguish Professor P. K. Varshney, Department of Electrical Engineering and Computer Science, Syracuse University, USA visited PEC University of Technology during Aug 29-30. His visit involved several interactive sessions with Heads, Electrical Engg, Electronics & Communication Engg., and Computer Science and Engineering of PEC. He also visited Center of Excellence (Product Design), Entrepreneurship Development Cell, Electrical Engg. Deptt., Computer Science & Engg. (including Cyber Security Research Center) and Electronic & Comm. Engg. of PEC. He then interacted with the Heads of CRIKC institutions at the VC office Panjab University and also visited CSIO during his visit.

**September 23-25, 2016:** PEC-INDUSTRY Conclave was organized to boost up the spirit of innovation, creativity and technical development, eminent experts from the industry gathered together at PEC. The event was graced by the presence of the Chief Guest, Mr. Satish Agnihotri (CMD, Rail Vikas Nigam Ltd.), and the Guest of Honour, Mr. Arvind Bali (Director & CEO, Videocon Telecom & Handset). The honourable Director of the Institute, Prof. Manoj K Arora, Ms. Uma Batra, Deputy Director, Mr. Manish Jindal, Registrar along with the various delegates, heads of the departments, faculty members, Phd. Scholars and ME students attended the event.

Dr. Manoj K. Arora initiated the inaugural session by lighting of the lamp which was followed by Mr. Satish Agnihotri who addressed and applauded the initiative of the conclave, it being in line with the vision-“Make in India”. He seeded the idea of creating a business model to promote competition among young engineers.

During Session-I, Mr. Arvind Bali highlighted latest buzz in the IT world: IOT/OTT Revolution. This was followed by a talk delivered by Dr. Sanjay Mandal (Professor, IISER Mohali), on identifying and understanding the customers and their needs. The importance of Innovation was stressed upon by Mr. Atul Gupta (Co-founder & CEO Red Alkemi, ERP). He emphasized on the need for development of new technologies for survival and prosperity in every business field. Mr. Parmit Garg, (Project Director, DMRC) addressed the audience about his exciting journey to metros in India and also discussed the recent research and innovation in this field. Dr. Vasundhara Singh (Head Applied Sciences, PEC), delivered a talk on Sustainable Chemical Technologies.

The second day of the event kicked off with the first technical session comprising speakers like Mr. Gurvin Singh (Managing partner of Coetec India), who delivered an illuminating speech on taking forward the industry institute partnership and the required reforms for higher education including a rigorous internship program and partnerships of educational institutes with SMEs to maximize efficiency. The second speaker, Dr. Praveen Kalra (Coordinator, Centre of Excellence, PEC) listed some fascinating projects undertaken in association with industries and institutes. He talked about PEC's partnership with PGI in producing novel patents and successful ventures. Prof. Rupinder Tewari (Co-ordinator, DST-Centre for Policy Research, Punjab University, Chandigarh) delivered a talk on R&D Models under PPP mode in India. The agro-centric talk given by Mr. Rajinder Kaura (CMD, Bergen group of companies, Gurugram) educated the audience on setting up of PV TEC Labs and Technoparks on CSP and PV. He also, proposed a creative model to redistribute resources judiciously to revolutionize the industry.

The day proceeded with an interactive session on Partnership with Industry in Start-ups and Incubation which hosted visionaries like Mr. Sanjeev Bhavani (Founder, Mentorpreneur & Infotechniques Group), Ms. Shikha Arora (Founder/CTO at MAZ(India and USA)), Mr. Chandra Mohan (CMD, 21st Century Battery). They talked about 'Catch them young' whilst fostering the spirit of innovation among youth. Mr. Sudhendhu Bali described how research could be transformed into successful business ventures.

The final day witnessed its last technical session, on 'Role of Industries in skill development, soft skills & learning resources'. It was attended by a large gathering comprising students, members of the faculty and delegates from academia and industry.

Mr. Sofi Zahoor (Director HR, Quark India), began the day by mentioning the expectations one has from an Industry- Academia amalgamation. Mr. Sharad Sharma, Product Management Professional, advised the academia to lay stress on applied knowledge rather than sole theory while also encouraging the development of soft and interpersonal skills in students' personality.



**October 19, 2016:** Interaction on “University based Incubators in Supporting Student Startups for Clean Tech Entrepreneurship” Mr. Fred H. Walti II, President and CEO, Los Angeles Cleantech Incubator (LACI) USA has interacted with the scientist/ faculty and students from CRICK institutions on the topic “University based Incubators in Supporting

Student Startups for Clean Tech Entrepreneurship”. He shared the case study of LACI hosting Startups in different domain. Major focus is to have startups incorporating the clean technologies like battery operated cars, energy from the solid waste etc. LACI is open to collaborate with the university based incubator for mutual hosting of the startups. Prof. Arun Grover, Vice-Chancellor, Panjab University also interacted with the students to bring their startup ideas to forefront and discuss the challenges faced by them. He also mentioned that the first challenge for the students is to convince the parents about the startup rather than opting for campus placement. A Special Purpose Vehicle is formed by the Chandigarh Administration for the smart city implementation which brings lot of opportunities for the students to venture into the startup culture. CRICK institutions like PECUT, PGIMER, Panjab University, IMTECH etc. can be used as test bed for testing and pilot of such technologies. He motivated the students to use various platforms to learn about the best practices followed throughout the world. Role of angel investors and pitching up by the budding entrepreneurs is also an ingredient to the culture of start-ups. Prof. Renu Vig introduced the speaker and shared that Chandigarh Administration is also looking forward for the startups to come up and take on smart city challenges. Requirements to have a successful start-up include leadership skills, innovative idea, capital investment and a good business plan. Prof. S. Verma, Acting Director, PGIMER shared the challenges faced by the big medical institutes and motivated students to take these challenges as startup idea. Prof. SK Mehta proposed vote of thanks and emphasised that a lot of start-up opportunities are available for young minds in CRICK institutions. Around 150 students and faculty members from different CRICK institutions participated in the interaction.

**October 24-28, 2017:** Five day long tailored workshop by GIAN on the theme “Novel and Nanostructured Drug Delivery for Biomedical Applications” under the aegis of CRICK was organized at the SAIF/CIL Seminar Hall, PU. Prof. Mandip S. Sachdeva from College of Pharmacy, Florida A&M University delivered this course. Professor Bhupinder Singh Bhoop, Chairman, UIPS and Professor O P Katare, Director, RPC were the course coordinators. Total 46 participants attended this course.

The host faculty were quite please and satisfied on the deliberations and interactions which the participants had with international faculty, Professor Mandip Sachdeva. He covered a gamut of cutting-edge technologies in novel and nanostructured drug delivery, furnishing details in an illustrated and amusing manner. The technologies which he covered encompassed cascade impact in inhalational drug products, hot melts extrusion homogenizer, 3-D molecular printing, 3-D cultural techniques, skin and lung cancer models and laboratory demonstrations on preparation and characterization of diverse nanoparticulate drug delivery systems. The quality and quantum of after-talk discussions and the consequent learning outcomes therof, yielded a definitive testimony to the proficiency of the International faculty which he showed with the young and not-so-young faculty/ researcher participants. Prof. Mandip Sachdeva was quite erudite, eloquent, passionate, approachable and flexible, thus facilitating the process of disseminating the relevant knowledge and know-how. As gathered from the feedback of 46 participants, the interaction with international faculty was very informative, interactive, meaningful and fruitful. This helped in the enhanced comprehension of their subject matter and honing up of their skills. They felt themselves to be much better informed on vital vistas pertaining to drug delivery.



**November 02-04, 2016:** A meeting was arranged at the Vice Chancellor Committee Room (VCCR), Panjab University with Mr. Hardev Singh from the Haydn Green Institute for Innovation and Entrepreneurship, University of Nottingham. Prof. Arun K. Grover, Vice Chancellor, PU, Prof. A. K. Ganguli, Director INST, Prof. Manoj Arora, Director PEC, CRIKC Co-ordinators Prof. M. M. Gupta and Prof. S. K. Mehta along with several representatives of CRIKC institutions attended the meeting. Prof. A. K. Grover, briefly mentioned about the Innovation and Entrepreneurship activities happening at PU as well as at the Chandigarh region and Mr. Hardev Singh emphasized an unconditional support to such activities. Prof. Mehta presented an outline of the proposed CRIKC Atal Innovation Centre at PU. Prof. Manoj Arora also gave an overview of activities related to the Innovation and Entrepreneurship at PEC. Prof. Ganguli promised all the possible infrastructure support from INST to these activities. It was discussed to setup a board to prepare a vision document and to frame the guidelines for the endowment funds. Prof. Haedev Singh also delivered a lecture on the Startup Ecosystem in Europe: Lessons for India and Interacted with UBS students and faculty for upgrading existing entrepreneurship development courses at UBS and suggested new courses. On Nov. 03, a round table discussion at UIET, South Campus with the students was also arranged to discuss about startups at PU. Prof. Singh also delivered a lecture on Innovative Entrepreneurship and Business Sustainability at the seminar hall of UIAMS, South Campus, PU.

**November 07-08, 2016:** A joint event between the Universities of Birmingham and Nottingham and the institutions of CRIKC was organized as an attempt to allow our staff to see the facilities and expertise available in Chandigarh, whilst still positioning the event to enable us to flag up our collaboration to the high-level figures involved in the UK ministerial visit, which was organized in Delhi on 8th November. The objectives of the event was to discuss the potential for joint work in the area of sustainable cities and Infection and microbiology to build understanding between the participants around a deeper tripartite partnership and to engage with key stakeholders in India to support the collaboration.

**November 12, 2016:** DST-CPR organized an Industry-Academia Meet at CSIO to bridge a gap between industry and academia, in association with Central Scientific Instruments Organization (CSIO) and Chandigarh Region Innovation & Knowledge Cluster (CRIKC). This was a first of its kind industry-academia meet, christened as Medical Device Innovation Cluster (MDIC). Professor R. Tewari, coordinator, Centre for Policy Research and Convenor of MDIC informed the gathering that MDIC has been created for the promotion of innovative research in the area of medical devices by bringing industries (medical devices) and scientists of Chandigarh region on a single platform, and to provide assistance to Centre in framing proper guidelines for running the medical devices industry in India. Inaugurating the meet, Professor Arun K Grover, vice-chancellor, Panjab University, highlighted achievements of CRIKC and informed the gathering of creating many industry-academia interfaces on the lines of MDIC, in collaboration with CII, Chandigarh. Dr Dinesh Dua, chairman, CII Council, Chandigarh, endorsed views of Professor Grover and assured full support in making Chandigarh region as one of the leading centres of industry-academia interactions. Professor R K Sinha, director, CSIO, highlighted contribution of CSIO in developing innovative medical devices for society. Keynote speaker Dr G D Puri emphasized the need of MDIC and

elaborated on various medical devices developed in his laboratory at PGIMER in collaboration with industries. He apprised his endeavours to bring DST sponsored "Innovation Hub" in PGIMER. Dr Jatinder K Arora, executive director, Punjab State Council for Science & Technology, and Dr Anita Aggarwal, senior scientist at Department of Science & Technology, GoI, New Delhi, assured all possible help in establishing IA interfaces in Chandigarh region. The last session was on "Strengthening Industry-Academia Interface" in which prominent personalities like Professor Sarit K Das, director, IIT-Ropar; Dr Ashok Ganguli, director, Institute of Nano Science and Technology Mohali; Dr. R S Sangwan, Center of Innovative and Applied Bioprocessing Mohali, Dr Rakesh Tuli, former director, National Agri-Food Biotechnology Institute Mohali, Professor Arun K Grover and Professor R K Sinha laid down the road map for functioning of MDIC as well as creation of similar industry-academia clusters in areas of engineering and biological sciences.

**November 14-19, 2016:** A workshop entitled "Process safety and risk Engineering" was organized at Panjab University, Chandigarh under the umbrella of GIAN programme. Dr. Faisal Irshad Khan, Professor of Process Engineering and Vale Research Chair of Process Safety and Risk Engineering at Faculty of Engineering and Applied Science, Memorial University of Newfoundland, Canada delivered this course at SAIF/CIL PU, Chandigarh. He founded the Safety and Risk Engineering Group (SREG) at Memorial University of Newfoundland University. He is a recipient of many awards and author of 6 books more than 300 international journal publications and research reports. He is actively involved with multinational oil and gas companies on safety and asset integrity. He has held many workshops and training programmes on safety and risk management in different parts of the world. The primary objectives of the course are to introduce participants to fundamentals of process safety and risk engineering; Generating a detailed understanding of risk-based safety measure design. Detailed understanding of risk modeling and simulation strategies. To learn Process Safety Assessment tools including probabilistic risk modeling and Risk Minimization. Learning Engineering Safety Analysis, Safety Barriers Analysis, Layer of Protection Analysis and ALARP Analysis etc. The course will also cover Process safety performance indicator systems including the leading and lagging indicators. Providing practical problems and solutions through case studies and discuss more recent advancements in the field of process safety and design.

**December 12-17, 2016:** Panjab University Chandigarh under the aegis of CRIKC organized an international workshop entitled Advanced Lithium Batteries: Science and Technology. under GIAN-MHRD scheme. The primary objectives of the course were to expose participants to the fundamentals of energy storage and conversion. Building confidence and capability amongst the participants to the interdisciplinary approach involving chemistry, physics, electrochemistry, and engineering to describe the functions of advanced energy storage devices. Elucidating the physical, chemical and electrochemical properties of different candidate materials used in devices with emphasis of their design for optimized practice. Describing the experimental techniques specific to the development and optimization of materials for advanced energy device applications. Three eminent scientists from Canada and France delivered this course. Prof. Christian M. Julien is presently emeritus member at the University Pierre et Marie Curie, Paris (UPMC). He has 35 years of research experience in the field of solid state ionics and materials for energy storage, and lithium-ion battery technology. He has more than 500 articles and 31 books in his credit and has

organized several MRS and ECS symposia. Prof. Alain Mauger at present held a full professor position at the Institute of Mineralogy, Materials Physics and Cosmo chemistry (IMPMC), Paris working on materials science for Li-ion batteries. He contributed in the field of statistical physics, solid state and complex matter physics, before joining IMPMC in 2007. Prof. Ashok Viji is Maître-de-recherche at the Institut de recherche Hydro-Québec and, concurrently, invited Professor at the INRS of Université du Québec. He is an electrochemist and materials scientist who has published over 360 refereed papers and six books on different problems of electrochemical Materials Science including advanced Lithium Batteries.

**February 08, 2017:** A meeting of CRIKC institutes representatives with Jason Feehily and Sam Woolley University of Nottingham on Wednesday, February 8, 2017 to explore research collaborations in the area of science and medicine. Professor Arun Kumar Grover, Chairman CRIKC & Vice Chancellor Panjab University (PU) outlined that knowledge CRIKC represents a Cluster of Chandigarh Region Institutions to Promote & Sustain Excellence in Research. He highlighted the activities of several incubation centres among the CRIKC institutes where collaborations with UoN can be explored. Total 29 members of CRIKC institutes attended the meeting and highlighted the niche activities of their institute. Dr. Jason Feehily, Director Knowledge Exchange Asia, UoN mentioned about the key areas where an immediate collaboration will be possible such as work in the area of dementia and medical devices. He also mentioned about a joint medical courses between China and UK. Dr. Jason and Dr. Sam Woolley gave an overview of the activities at Nottingham and highlighted the upcoming funding opportunities. The delegation also visited SAIF/CIL on the campus and other CRIKC institutes.



**February 26, 2017:** CRIKC Annual General Body Meeting to inaugurate the Video Conferencing Room held at Panjab University on February 26, 2017 in the Presence of Prof. Arun Kumar Grover, Vice Chancellor, Panjab University & Chairman, CRIKC.





**March 27, 2017:** 2<sup>nd</sup> Har Gobind Khorana Lecture by Padma Shri Prof. G. S. Khush Fellow Royal Society held at IISER, Mohali on March 27, 2017. Over 600 science students and teachers from Punjab and adjoining states turned up to listen Padma Shri Prof GS Khush, Fellow Royal Society and world renowned plant breeder and geneticist, at the second INST-PSCST Har Gobind Khorana Lecture at the Indian Institute of Science Education and Research, here today. While speaking on 'Food Security Challenges in India and Opportunities', Prof Khush highlighted the agriculture and food related issues being faced by country, especially Punjab. Earlier, Dr Jatinder Kaur Arora, executive director of the Punjab State Council for Science and Technology, said: "Har Gobind Khorana Lecture is an initiative taken up jointly by the PSCST and the Institute of Nano Science and Technology (INST) as a tribute to Professor Har Gobind Khorana, the Nobel Laureate of Punjab." Arun Grover, Vice-Chancellor of Panjab University, appreciated the efforts put in by the PSCST and the INST to nurture the budding scientists of the region. Dr Ashok Ganguli, Director, INST, informed that under this series, a Nobel Laureate or an eminent scientist of similar stature is being invited every year to deliver the lecture.

**April 07, 2017:** Department of Applied Science & Academic Cell jointly organized a one day Workshop on "Promoting Innovative Research through CRIKC under the aegis of Golden Jubilee celebration year of NITTTR, Chandigarh. Dr. Arun Grover, Vice-Chancellor, Panjab University, Chandigarh addressed the gathering on this occasion and a special lecture about nanostructures, surface defects and magnetic materials was delivered by Dr. Sunil Arora from Centre for Nanoscience & Nanotechnology, Panjab University. Faculty members from CRIKC member institutions, Panjab University, CCET, CSIRCSIO, faculty members and Ph.D Scholars of the institute participated in the workshop.

**May 09, 2017:** An interaction with CRIKC members of Katherine Ryan, Second Sec. Political/Foreign Policy was held on 9th May at 12.15 pm in the Auditorium of PEC University, Chandigarh. A meeting of CRIKC society was held at Auditorium of

PEC University, Chandigarh on May 09, 2017 at 12.00 AM between CRIKC members and Katherine Ryan from UK . Vice-President CRIKC, Prof. Manoj Arora, Director PEC inaugurated the meeting with a welcome address. Mrs Katherine Ryan, Second Sec. Political/Foreign was representing from UK high commission along with Mrs Madhu. Prof. S. K. Mehta Director SAIF/CIL and CRIKC Coordinators presented a brief introduction about generation of CRIKC, its working framework and future course of action. Prof. Arora highlighted about the board overview of the smart city projects and its implementation is working parallel through the support of CRIKC institutes and Chandigarh administration. He also highlighted several aspects of future city incubation centre to be set up and the various supports from UK institutes can play for a major role for this. Prof. Arora, in his concluding remarks brought several suggestions how to improve the best collaborating models to enhance the research related activities between CRIKC and UK institutes. Several other members also add few more ideas to strengthen the corporation via student exchange and pre-Phd course sharing. All the valuable suggestions were noted to act in the coming years by Madhu. The meeting was ended with a cup of tea.

**May 10, 2017:** A CRIKC Meeting was held at Indian School of Business, Mohali on May 10, 2017 and discussed several points to best utilize and strengthen the CRIKC platform. A need of a mobile APP for CRIKC which can give updates to the activities/events happening in CRICK institutes was discussed and Dr. Manoj K Arora, Director PEC, took this challenge and decided to make this through students' project. It was also discussed to promote a brand of CRIKC through a dedicated team of professionals from within the CRIKC institutes. ISB offered help for the entrepreneurship activities through session on market validation, scaling up, etc. A startup weekend among the CRIKC institutes was proposed. Prof. Grover mentioned that there should be an elective on Lab to Market. The elective should be part of the curriculum in Panjab University. It was discussed that there should be a dedicated effort on making student engagement among the CRIKC institutes more vibrant, more avenues for informal student interaction among the CRIKC institutes should be explored, a list of technologies to offer for commercialization should be available on the CRIKC website, a tech transfer officer for the CRICK institutes should be appointed, a new IPR being established in the state science council can be used as an IPR cell for CRIKC institutes as suggested by Dr. Arora, list of facilities and assets of the CRIKC institutes should be made available on the CRIKC website.

**May 11, 2017:** CRIKC and High Energy Material Society of India (HEMSI) in association with TBRL celebrated 19<sup>th</sup> National Technology Day at TBRL Ranges, Ramgarh. Prof. A. K. Grover Vice Chancellor, Punjab University & Chairman CRIKC Chandigarh graced this occasion as a Chief Guest. In his Key Note address, Professor Grover lauded the role of TBRL scientists in developing the strategic technologies which are important for the security of the nation. He stressed the need of initiating association among scientists from research laboratories for furtherance of science and technology for mutual benefits. Dr. Manjit Singh Director TBRL welcomed all the head of CRIKC institution and highlighted

the importance of National Technology Day that reminds us of our constant strive to achieve self-reliance in critical technologies, to encourage innovations and to nurture technology flow for product realization.

In his Technology Day Oration, Dr Anil Koul, Director IMTECH lauded the role of CRIKC platform in Chandigarh and expressed his desire to see CRIKC equivalent to global Knowledge Clusters. He further stressed the needs of innovation towards national priority area. This year Technology Day awardee Shri Ashok Rampal, Sc. 'F' gave a talk on "Dynamic Testing of Armament and Aerospace Systems" using RTRS facility. During this occasion Dr Manoj Kumar Arora, Director PEC University of Technology, Dr N Sathyamurthy, Director IISER, Dr AK Ganguli, Director INST Mohali, Dr TR Sharma, Director NABI Mohali and more than 50 Professors and Teachers from Punjab University graced the occasion at TBRL Ranges Ramgarh. More than 400 scientists and technical staff of TBRL were also present during this celebrations.

During this occasion Dr Manoj Kumar Arora, Director PEC University of Technology, Dr N Sathyamurthy, Director IISER, Dr AK Ganguli, Director INST Mohali, Dr TR Sharma, Director NABI Mohali and more than 50 Professors and Teachers from Punjab University graced the occasion at TBRL Ranges Ramgarh. More than 400 scientists and technical staff of TBRL were also present during this celebrations.







**June 08, 2018: CRIKC meeting was held at Indian School of Business, Mohali on June 08, 2017** A special meeting of member institutes of Chandigarh Region Innovation and Knowledge Cluster (CRIKC) was held today at Indian School of Business, Mohali. Professor Rajender Srivastava, Dean, ISB (Mohali and Hyderabad) hosted the meeting, especially to focus on leveraging the immense technical knowledgebase at educational and research institutes in the region, and diverse potential of corporate sector around the Tricity. Through CRIKC, these were waiting to be transformed into an entrepreneurial ecosystem. Professor Arun Grover, Chairman CRIKC and Vice Chancellor, Panjab University chaired the meeting. The meeting was attended by directors of IMTECH, NIPER, CIAB, and representatives from different CRIKC institutions. Prof. Grover recalled the important goals set in the previous meeting at ISB on May 10, 2017. The members deliberated on the capabilities available in the region, and recommended the following.

- i) ISB will initiate an expository course on “Lab to market” for faculty and students at the CRIKC institutes, and devise strategies to engage them more closely with corporate sector at different stages in research, designing and product development.
- ii) Local industry will be specially invited to learn about their expectations, identify the matching areas of interest and give experiential learning to the faculty and students for addressing industrial problems and for entrepreneurship development.
- iii) Four sectors were prioritized for partnerships with industry in translational education and research. These are IT, engineering products, life science, health, food & agriculture.
- iv) Models known from the Silicon Valley and University of Texas at Austin could be adopted to attempt to transform the ecosystem in Chandigarh region. Showcasing and business idea competitions are good tools to successfully engage students, faculty, corporate sector and venture capitalists to develop Start Up and Scale Up projects.
- v) Web sites of Centre for Policy Research at PU and CRIKC shall be augmented to give single point information on the calendar of events in progress and plans through the coming month, available expertise, technologies, knowhow and facilities available at the CRIKC member institutes.

Prof. Srivastava emphasized that in the present phase of rapidly changing technologies, even three years was a rather long period in corporate sector planning. Hence, the Chandigarh region must accelerate leveraging the synergy at its disposal through the CRIKC institutes. Professor Grover expressed his satisfaction at the new dimensions that were getting unfolded with closer participation of ISB along with other member institutes of CRIKC. A number of Task Forces will be set up and corporate sector brought into fold to functionalize various decisions taken at the meeting. The next meeting will be hosted by Director, IMTECH, Dr. Anil Koul, in July 2017.



**June 26 to July 01, 2017:** Panjab University under the aegis of CRIKC organised an international workshop on "Transition Metals in Organic Synthesis" under GIAN-MHRD scheme. Dr. Deepak Salunke, Assistant Professor of Chemistry, Panjab University, Chandigarh was the course coordinator. Total 46 participants attended this course.

Prof. Bates received his PhD at Imperial College, London with Professor Steven Ley, using organoiron complexes for organic synthesis. After a postdoctoral stint at Colorado State University with Professor L. S. Hegedus working on chromium carbenes, he moved to the University of North Texas as an Assistant Professor. That is where he first taught transition metal chemistry. He is currently an Associate Professor of Chemistry at Nanyang Technological University in Singapore. His principle research interest is in the use of transition metals in organic synthesis, and stereocontrol in natural product synthesis. He has worked on applications of palladium, ruthenium, gold, silver, rhodium and platinum among other metals. His book Organic Synthesis using Transition Metals (2<sup>nd</sup> Ed.) was published by Wiley in April 2012. He has also contributed chapters to Comprehensive Organometallic Chemistry (Elsevier) and Hydroformylation for Organic Synthesis (Springer). With his

extensive experience in the field of organometallic chemistry, he provided a detailed course content which was printed and was made available to all the participants. The content was very useful for the participants as well as host faculty to improve teaching skills. He is also active in exploring how to use online methods to enhance teaching, both in lecture courses and laboratory courses, as well as through a MOOC. This opportunity was utilized and we arranged a special lecture on "Use of Technology in Chemical Education"

Few faculty from the University and few from affiliated colleges attended the course. The faculty mentioned that they had an excellent experience of attending this lecture series. All admired the time management of Prof. Bates lectures who very precisely followed the time schedule of his lectures. The course material was explained in a brilliant way which kept every one very focused throughout the course. The last day of the lectures series where he shared his teaching methodology was very interesting and the way he conduct tutorials with his students was very impressive. Ms. Pooja Nain from Post Graduate Govt. College for Girls, Sector 11, Chandigarh mentioned that her experience with Prof. Bates was very encouraging. He definitely motivated her towards research. He is an excellent teacher with full of knowledge and understand how to influence his students. His sense of humour was very inspiring and she wish to become like him some day. Mr. Aditya Bhardwaj, DAV College, Sector 10, Chandigarh mentioned that Prof. Bates is an erudite personality. Along with his expertise in subject, his method of delivering the knowledge inspired him. His general talk on pupil-teacher interaction had shown the seed for future teachers among us and will certainly be fruitful. He is very honoured to be his student and very grateful to him.