



## DST UKIERI Project review workshop

UKIERI in partnership with DST is organising a series of assessment and review workshops to gauge the impact that the awarded partnerships are bringing. DST jointly with UKIERI has funded over 120 partnerships till date. 15 such institutional partnerships were invited to share research progress, highlight key achievements and share best practises around collaboration experience in a one day workshop on 23 February in New Delhi. Lead Project Investigators from Indian institutions joined face to face while some projects were also represented jointly with UK Lead Project Investigator joining over skype for their sessions. The highlighted sectors included **Energy, Engineering & Materials, Food & Water and Health & Disease.**

**Prof R K Sharma, Director- Department for Science and Technology** joined in to represent DST at the workshop. He reiterated that the impact assessors of these partnerships should include high quality joint publications, involvement of young researchers and two way exchange visits.



*Richard Everitt- Director Education, British Council and R K Sharma- Director International Division, DST addressing the review workshop participants*

**All the partnerships were reviewed on the following indicators:-**

- Achievements of goals against proposed objectives including two way exchange visits
- Scientific publications, Journals, Joint papers in national and international conferences and seminars
- Involvement of young researchers, community and other institutions
- Industry engagement, in-kind contributions and additional spin offs

### **Achievements of goals against proposed objectives including two way exchange visits**

Most of the partnerships had made considerable progress against the proposed objectives. A number of exchange visits have already been undertaken including both faculty and students.

For instance, partnership between **IIT Mandi and Loughborough University** are collaborating to create a smart multi-terminal DC micro-grid to enable the development of autonomous zero net energy building. This will facilitate India and UK transition to low-carbon sustainable electricity supply system for both urban and rural scenarios. A Nearly Zero-Energy Buildings (nZEB) is a building that has a very high energy performance.

The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. The partnership has organised a number of dissemination and outreach workshops across institutions and the case studies are already underway. An experimental model will be ready by April 2015.

Partnership between **Queen Mary University of London and Postgraduate Institute of Medical Education and Research (PGIMER)**

**Chandigarh** are working to identify novel gene mutations involved in pituitary adenoma formations, to perform functional characterization of this identified mutation and to establish a strong collaboration to facilitate early diagnosis and develop more effective therapeutics for pituitary adenoma. Pituitary adenoma results due abnormal proliferation of pituitary cells. It is a rare chronic neuroendocrine disorder with prevalence of approximately ~100 per million inhabitants according to recent studies. However, there has been a steep increase in the incidence of this disease. Through this collaboration, over 600 samples have already been collected and screened for the mutation. Both faculty and student exchange visits have been completed with 2 publications already published and 3 underway.



*Indian and UK teams at an outreach workshop in PGIMER*

Researchers from **IIT Kanpur and University of Nottingham** are collaborating to design multifunctional paramagnetic nanoparticles-loaded nano/micro polymer capsule for drug delivery and MRI applications. Polymer nano/microcapsules have attracted wide attention because the encapsulation of drug molecules into such systems can facilitate higher payloads, prolong the circulation time of the drugs, improve drug targeting and solubility, and provide controlled-release of the therapeutics into the blood stream or the targeted tumour tissues. This will be critical in cancer detection. The partnership has already progressed with research studies, MRI and Immunological studies in both institutions along with exchange visit of 1 Indian student to University of Nottingham.

The team from **IIT Delhi and Keele University** are undertaking research in the area of stem cell biology. Stem cells have tremendous potential in regenerative medicine applications due to their inherent differentiation capacities. The IIT Delhi faculty has been trained for stem cell culture work while the Keele University faculty has been trained for the microRNA works and analysis. The UK and India partners both have overlapping expertise in the area of hypoxia research and the exchange of



*Keele and IIT Delhi project teams at internal thematic research meeting*

knowledge in this area will develop into a best practise model. With 1 joint publication already published, the research outcomes have been regularly shared with international audience through talks supported by IMSET India, Indo Japan symposium etc.

### **Scientific publications, Journals, Joint papers in national and international conferences/seminars**

A number of partnerships have resulted in joint publications and papers in international conferences and seminars. The number of joint research papers presented by the participating institutions has increased manifold; showcasing the mutuality of benefit which is the focus for all supported DST UKIERI partnerships. UKIERI Secretariat will be collating the details of all joint publications, citations, papers and journals across all partnership for impact assessment.



Research Awardees at the review workshop

**IIT Delhi and University of Cambridge** are working on growth of nanocomposite oxide films with advanced properties and explore the potentiality of such nanostructures for novel applications. With 3 exchange visits already completed, the partnership has advanced in meeting its research objectives. 4 joint publications have been already been issued, 2 are in pipeline and 1 paper would be soon presented in conference. Presently two Ph.D. students from IIT and one Ph.D. student and one Post Doc. from University of Cambridge are involved in this project and are getting training/exposure to new techniques. It is expected that more new students from both sides will be exposed to this project.

The research teams of **Delhi Institute of Pharmaceutical Sciences and University of Manchester** are studying the safety and efficacy of various herbal drugs in experimental models of diabetic retinopathy. 2 PhD Students and 2 M. Pharm Students have been involved in the collaboration so far. The project will help in establishing a translational centre for evaluating the efficacy of various herbal drugs in ocular diseases. Once the project is completed, the facility will be utilized for carrying out research and development in the area by the students and faculty. 3 publications have already been issued from India and 1 joint publication is underway.

**IIT Delhi and Loughborough University** are collaborating to develop networked infrastructure for remote monitoring of patients. The partnership aims to bring to a commercial state a cost-effective solution for the remote health monitoring of patients in rural India. It is expected that this model will attract funding from charities and investment from industry. The collaboration has successfully involved 4 academic staff and 5 PhD students with 4 of them already completing their exchange visit to India. 3 joint publications have already been published and 2 are in the process of being published.

### **Involvement of young researchers, community and other institutions**

The partnerships have succeeded in involving young researchers from both institutions which will ensure the long term sustainability and knowledge transfer to continue between the institutions. This will go a long way in developing the new generation of researchers working on many more bilateral/multilateral partnerships.

The research team from **IIT Kanpur and University College London** are collaborating to develop novel nanocomposites together with exploration of nanomaterials in the area of tissue engineering and regenerative medicine. This unique and focused combination of expertise will allow researchers to develop the next generation of technologies for development of organs, which address pressing problems in health-care, specifically in development of medical implants using stem cells and stem cell therapy. 2 PhD students from India, 1 post doc researcher and 1 PhD student from UK have already been collaborating under the partnership with exchange visits already completed.



*India and UK team in University College London*

Researchers from **Institute of Genomics and Integrative Biology (IGIB) and University of Leicester** have been successfully collaborating to understand the gene regulation in the brain. This research aims to address a lacuna in understanding of the mechanism by which microRNAs regulate targets. The Indian group has already conducted workshops for school children to decipher the working of the brain. They use the brain hat, a printable paper cut out that makes a skull cap with the parts of the brain marked out. They experience the functioning of the brain by taking some memory tests and playing with phantom limbs using mirror box.

The research leads from **IIT Delhi and University College London** are collaborating to develop low cost and high performance visible light active novel nano-catalysts for photo electrochemical splitting of water for solar hydrogen production. The approach consists of by layer-by-layer deposition of material combinations and surface modifications for achieving the desired



*Skype Session with research investigator at University College London*

characteristics. Photovoltaic and solar thermal conversion of solar energy to electricity and heat, respectively, has been of immense research interest due to zero pollution capability and uniform global availability of solar energy. With an initial project planning meeting, the research activities have started with both faculty and staff exchange visits underway. The partnership is also looking at widening the research network and involving more institutions and students both sides for research and training. 1 joint publication is underway.

### **Industry engagement, in-kind contributions and additional spin offs**

One of the key findings of the review workshop has been the substantial leveraged funding that these partnerships have already garnered and continues to attract. Most partnerships have community, government agencies, industry and non-governmental support from both India and the UK and have been also successful in receiving considerable funding from other agencies like Indian Department of Science and Technology, Biotechnology, Earth Sciences, Research Councils UK etc.

Researchers from **Thapar University and Heriot Watt University** are undertaking research to identify natural biopolymers (i.e. green) polymers for waterborne pathogen monitoring and treatment applications. The World Health Organisation has reported that microbial contamination of water is the primary concern in both developing and developed countries. This project will concentrate on developing an improved understanding of the interactions of these pathogens with a variety of polymer materials. Polymers can be applied for both the flocculation and the filtration of waterborne pathogens, in both treatment and monitoring applications. Improved approaches for both the removal and detection of these pathogens are required in order to reduce the risk of disease outbreaks thus safeguarding public health and negating the significant economic costs of outbreaks.



Indian PI on exchange visit to Heriot Watt University

The project has till date extracted 19 microbial polymers, purified and characterized shared with UK partner for high throughput screens, initiated fabrication of a biopolymer microarray and screened several arrays with pathogens. The team has already delivered a talk on Novel Biopolymer Applications at University of Edinburgh and published a chapter “Polymers for Use in the Monitoring and Treatment of Waterborne Protozoa” in the book titled “Biomaterial Applications”. The collaboration has already got support from Scottish Water which is the UK’s largest water company and a world leader in the water and waste water industry; and with Aquavalens consortium that has brought together SMEs, Industries, Universities and Research Institutes with the mission of protecting the health of European Citizens from contaminated drinking water and water used in food processing.

The teams from **Queen Mary University of London and Central Electronics Engineering Research Institute (CEERI) Pilani** are collaborating to explore the possibility of developing an integrated microfluidic platform for health monitoring and diagnostic applications. Microfluidic systems can be designed to obtain and process measurements from small volumes of complex fluids with efficiency and speed, and without the need for an expert operator; this unique set of capabilities is precisely

what is needed to create portable point-of-care (POC) medical diagnostic systems. The partnership has already got industry engagement from UK for support towards cardiothoracic surgery for decentralised laboratory testing and there is a planned joint academic-industrial workshop in coming months. The institutions have also contacted Indian SMEs to develop simplified diagnostics.

**Indian Agricultural Research Institute and University of Hertfordshire**

are undertaking research on plant-parasitic nematodes which are an important constraint on plant productivity as they disrupt the water and nutrient relations of the root system. The project is aimed at understanding the initial infection process of bacterial endospore attachment to the nematode cuticle, and then exploits this knowledge to develop novel environmentally sustainable control strategies for plant-parasitic nematodes. 1 joint publication has already been published and BBSRC case studentship involving Syngenta has been awarded to University of Hertfordshire for further research. 5 Indian PhD students are expected to visit UK for research screening and further trials.



Indian PI in IARI research lab

The team from **AIIMS Delhi and University of Oxford** are working together to develop treatment for knee osteoarthritis which is common in the Indian population. The patients' social and cultural needs necessitate the use of a surgical option which will allow them to squat and sit cross legged. Unicompartamental knee replacement (UKR) is one such option. However, at present this treatment



R K Sharma, Director- DST with review workshop participants

option is rarely used in India. The surgery involves removal of only the damaged (arthritic) parts of the knee rather than the entire knee joint. The partnership has already resulted in a large number of surgery workshops conducted in AIIMS which has been funded by industry support. 1000 patients are expected to be recruited for trials and surgery. IIT Delhi has already joined in for partnering on this collaboration. The partnership is also benefitting the UK institutions and hospitals by providing an insight into the anatomical differences and pattern of osteoarthritis in Indian patients. The United Kingdom also has a large Asian population of subcontinent origin. The results of this study would also help British surgeons manage

better the knee arthritis in these patients.

The overall feedback that emerged from this workshop has been extremely positive with most partnerships achieving the set out project objectives. The institutions strongly communicated the contribution of funding and support from both DST and UKIERI in furthering these key thematic

research partnerships and bringing the research community of India and the UK together for strengthened collaboration. The workshop also highlighted some issues that need urgent review and confirmation which are being taken by both DST and UKIERI.