

Newsletter of IGSTC  
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# About IGSTC

## Background

IGSTC is a flagship initiative of Government of India (DST) and Government of Germany (BMBF) to promote research partnership of industrial relevance on a PPP mode, connecting academia and industry from both countries for socio-economic benefits of both the countries (Germany: Land of ideas + India: Land of opportunities). An Agreement was signed in October 2007 at the ministerial level between India and Germany for the establishment of Indo-German Science and Technology Centre (IGSTC). IGSTC was inaugurated in December 2010 as an autonomous bilateral society in India with equal funding and governance by both Indian and German Governments. Currently both sides contribute up to 4 million Euros per year to fulfill this endeavor.

## Aims & Objectives

- Advance industrial research partnership with mutuality of interest and respect
- Create platform for cross fertilization of ideas
- Develop knowledge networks for industrial competitiveness
- Establish joint knowledge pools to address global challenges
- Serve as a nodal centre to promote technology partnership

**“The importance of Indo-German relations in the area of science and research is demonstrated by the fact that IGSTC, which promotes bilateral application oriented research projects, is India’s one of the three bilateral centres and Germany’s only bilateral research promotion centre worldwide”.**

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## Joint Committee Meeting (JCM)

The 11th meeting of the Joint Committee between India & Germany was held on 8th May 2017 in Berlin. The JCM was Co-Chaired by Prof. Ashutosh Sharma, Secretary, DST and Dr. George Schuette, State Secretary of Federal Ministry of Education and Research. The Joint Committee reviewed the ongoing S&T cooperation between India & Germany and recommended several new activities of collaboration.

Dr Lothar Mennicken (German Co-Chair, IGSTC), Dr Martin Goller (German Project Head, IGSTC) and Dr Roshan Paul (Director, IGSTC) were present at the meeting. Dr Paul gave a brief about the progress, activities and future plans of IGSTC at the Meeting. JCM was attended by various Indo-German presences, BMBF, DST, CSIR officials, etc.





## IGSTC at DST Meetings

Dr Arabinda Mitra, Indian Co-Chair, IGSTC attended the DST Review meeting in Bangalore on 8th May, 2017. Dr Mitra presented the activities of IGSTC to the esteemed gathering. Dr Mitra stressed the uniqueness of IGSTC's model. A Conclave of the Department of Science and Technology (DST), Govt. of India was held in Kolkata on May 2-3, 2017 at S. N. Bose National Centre for Basic Sciences. The Conclave was organized to brainstorm on the achievements of the ministry and also set the future directions for implementing S&T based interventions for meeting the challenges faced by the country. **Dr Harsh Vardhan**, Hon'ble Union Minister of Science & Technology and Earth Sciences graced the occasion.

## Joint Scientific Committee Meeting

The Joint Scientific Committee Meeting comprising of 4 Indian and 5 German experts in the fields of Water, Energy and Waste Management technologies met in Bangalore on 8-9 June, 2017 for reviewing the Call 2016 proposals in the 2nd stage. There were short presentations of each of the projects

by the consortiums followed by discussions. The Committee reviewed, scrutinized and made their evaluation on the projects. Finally, the following six projects were recommended for funding:

Sr. No	Project Title	Project Consortium
1	ECO-WET: Efficient coupling of - water and energy technologies for smart sustainable cities	IIT Gandhinagar, IIT Kanpur, GIFTCL, fortiss GmbH, Sonnen GmbH
2	MAKARA: Minimizing wastewater volume and treatment costs by utilizing ambient conditions	CSIR – NEERI, Mahindra Ltd., Helmholtz-Centre for Environmental Research, Vita 34 AG
3	SMART&WISE: Smart and reliable water and wastewater infrastructure systems for our future cities in India and Germany	IIT Madras, Tamil Nadu Water Investment Company Ltd., TU Kaiserslautern, Ingenieurbuero Scheer, tandler.com GmbH
4	IDC-Water: Integrated diagnostics of contaminants in water supply and management system	IISc Bangalore, Bigtec Labs Pvt. Ltd., Bundesanstalt für Materialforschung und -prüfung (BAM), sifin diagnostics GmbH
5	PYRaSOL: Smart Cities integrated energy supply, carbon sequestration and urban organic waste treatment through combined solar sludge drying and pyrolysis	CSIR-CLRI, Velankani Earth One Pvt. Ltd., Leibniz Universität Hannover, Biomacon GmbH
6	Bio-CuInGe: Biotechnology for the recovery germanium, indium and copper from industrial copper dust waste	IIT Delhi, Laksmi Life Sciences, Helmholtz Zentrum Dresden Rossendorf, G.E.O.S. Ingenieurgesellschaft GmbH



# Projects Activities

## Network Meeting of LowCostEPS Project at TU Chemnitz

The 2<sup>nd</sup> network meeting of the Indo-German 2+2 project “Low-cost emergency power system based on printed smart supercaps (LowCostEPS)” was organized at the Chemnitz University of Technology on June 21st to 22nd 2017 with participants from industry and academia both from India and Germany.



*Participants in front of Gruenperga Paper Manufacturing Company (R. Chenna, T. Weissbach, U. Ender, Prof. Dr. A. Kumar, Prof. Dr. A. Hübler, N. Murali, Dr. T. Zillger)*

The network meeting started with a warm welcome from Prof. Dr. A. Hübler from TU Chemnitz to all the participants and a tour of the paper manufacturing facilities at Gruenperga GmbH. Mr. U. Ender, German Industry PI introduced paper fabrication technology and possibilities of paper tuning to reach optimal properties for the printed supercap within the project to the project partners from interdisciplinary research fields.



*U. Ender illustrates paper manufacturing to Prof. Dr. A. Kumar and Prof. Dr. A. Hübler*

Intense discussions about paper making technology and the supercap-project were continued till the next day. Mr. T. Weissbach from TU Chemnitz (pmTUC) gave an overview on actual printed sheet-to-sheet supercaps in the laboratory and the transfer of the technology to the roll-to-roll printing equipment. After the technology discussion Prof. Dr. A. Kumar from Indian Institute of Technology Bombay explained different technologies to prepare efficient materials for printed supercaps. In the third section of the meeting Mr. N. Murali from SLN Technologies in Bangalore briefed the state of the art in charging technologies and presented the project status at SLN.

In addition to the presentations on the updates, the next steps in the project especially the deliverables and milestones were discussed. The next network meeting date is scheduled for January 2018 in Mumbai.



## Project Monitoring Meeting

Project Monitoring Committee Meeting to review the progress of the IGSTC Call 2012 projects: “Advanced Manufacturing Process Monitoring using in-line Laser Thermography (AMPLAST)” and “Combined Process and Alloy Design of a micro-alloyed DP Forging Steel based on Integrative Computational Material Engineering (DP-Forge)” was held on 28th April 2017 at IIT Madras, Chennai.

**AMPLAST:** The project consortium is partnered by IIT Madras & Dhvani Solutions Pvt Ltd, Chennai (Indian side) and BAM, Berlin & InfraTec GmbH (German partners). The project expects to deliver new and improved NDE measurement methodologies capable of providing measurements of the state of the process and the product, under hostile manufacturing conditions, that would otherwise be impossible. The technique to be developed in this project involves the novel complementary utilization of laser based excitation and the spatially and temporally resolved detection of the transient thermal flux radiation from regions of interest and to consequently obtain key material and process related parameters that pertain to the state of the manufacturing process/product.

**DP-Forge:** The project consortium is partnered by IIT Madras & Tata Consultancy Services (Indian side) and RWTH Aachen & Simufact Engineering GmbH (German side). This project

aims the development of an energy efficient production of forged components (eg. gears) from micro-alloyed dual phase steel with reduced distortion. The material and production design will be realized by means of a generic Integrative Computational Materials Engineering (ICME) framework. The scientific approach is based on integrative numerical material and process simulation spanning over length scale from nanometer up to component scale of centimeters and taking into account all relevant process steps including hot forming, annealing and local final material properties in component in application. This project also intends to illustrate the emerging ICME paradigm that is giving a digital push to the materials engineering domain.

The Monitoring was chaired by Prof K. Bhanu Sankara Rao, Ministry of Steel Chair Professor (Government of India), Mahatma Gandhi Institute of Technology, Hyderabad. As part of the monitoring, the Committee visited the laboratories of Prof K Balasubramaniam and Prof G Phani Kumar (Indian institutional partners) and had detailed discussion on the activities with the project teams. In addition, the PIs presented the work and progress for their projects during the last 24 months before the Monitoring Committee. The Committee was impressed with the progress of the projects and the outcomes / deliverables achieved in the project.



## IGSTC 2+2 Projects Partners Meet

IIT Madras hosts five 2+2 projects funded by IGSTC. The IGSTC team headed by Dr Roshan Paul along with Prof Rao had a meeting with all the Principal Investigators (PI) of projects funded by IGSTC. The meeting focused on the progress and deliverables of the projects. Dr Paul briefed on the vision of IGSTC, the current and upcoming programmes. There was an interactive session on administrative matters related to IGSTC's grants giving. PI's were highly appreciative of the IGSTC's support and working efficiency.



## IIT Madras Project Site Visits

The IGSTC team headed by Dr Paul visited the laboratories of Professors A.K.Mishra, T Pradeep and R Sai and was highly impressed with the cutting-edge research going on in the labs. Dr Paul was appreciative of the societal impacts these lab projects were making and encouraged the young researchers/students in the labs to work on breakthrough technologies.

IGSTC team also visited the IITM Research Park which is a unique platform to nurture entrepreneurship among students and also acts as an interface between academia and industry.



## Project Visits in Germany

Dr Paul and Dr Goller, German Project Head visited the project sites of “Integration of non-destructive evaluation based ultrasonic simulation (IN-DEUS)” & “Cluster-composite nanofibre membranes for rapid, ultra-trace detection of waterborne contaminants (CANDECT)” at University of Saarland & Karlsruhe Institute of Technology respectively.

Project PI's gave a brief on the projects and progress achieved so far. The team was satisfied with the project deliverables and milestones achieved in the projects.





**INDEUS:** Indian Institute of Science (IISc) Bangalore; Tech Mahindra; University of Saarland & IMA, Dresden represent the project consortium from India & Germany. The main objectives of INDEUS project are: a) establish a simulation platform in non-destructive evaluation (NDE) with an emphasis on SHM, 2) facilitate the understanding of physical parameters travelling through arbitrary structures, 3) identify an optimum transducer configuration for structures to become self-monitoring in the sense of SHM. The overall outcome from the project is the simulation platform and the demonstrated processes that will help to create SHM based concept of designing structures and develop necessary processes for realizing such concept in an actual hardware and further to meet the emerging application needs in the aerospace and infrastructure industries. Software tool developed by IISc is planned to be brought out for licensing and distribution among the partners and further enable industry transition through various types of simulation benchmarking efforts which are underway.

**CANDECT:** Indian Institute of Technology Madras, Inno Nano Research, Chennai (Indian partners) and Karlsruhe Institute of Technology, Fader Umwelttechnik (German partners) represent the project consortium. The objective of this project is to develop a working prototype of a visual arsenic sensor system based on atomically precise clusters incorporated in electrospun membranes (nanofibers spun onto porous membranes or clusters immobilized in porous membranes) which will be;

1. affordable, at an anticipated cost of \$0.1 per test, at the scale of large implementation;
2. readily adaptable into water treatment and supply technologies worldwide;
3. an immediate improvement to the certainly of the drinking water quality delivered.

## Visit to Indian Institute of Science, Bangalore

German members of the IGSTC Joint Scientific Committee along with IGSTC team visited IISc, Bangalore on 7th June, 2017. The delegation visited the Robert Bosch Center for Cyber-physical Systems, Centre of Nano Science and Water Resources Engineering Department.

Prof Bharadwaj Amrutur, Chairman, **Robert Bosch Centre for Cyber-Physical Systems** briefed the delegation about the activities of the Centre. He explained the kind of innovative projects taken up at the intersection of various fields of Science, Engineering & Technology. Prof Bharadwaj also gave the team a tour of the labs associated with the Centre.



Dr Raghav from **Centre for Nano Science and Engineering (CeNSE)** showed the facilities and infrastructure at CeNSE. CeNSE houses a state-of-the art national nanofabrication centre (NNfC) with 14000 square feet of class 100/1000 clean room. It also houses a comprehensive micro nano characterization facility (MNCf) to conduct virtually any type of electrical, optical, mechanical and material characterization. Both are national user facilities accessible to outside researchers for very reasonable charges. German Delegation was highly impressed with the innovations and research being carried out.

Prof Mohan Kumar, **Department of Civil Engineering** presented the tour of Water Resources Engineering Department. The research work and Lab setup was explained by the students in a lucid manner.

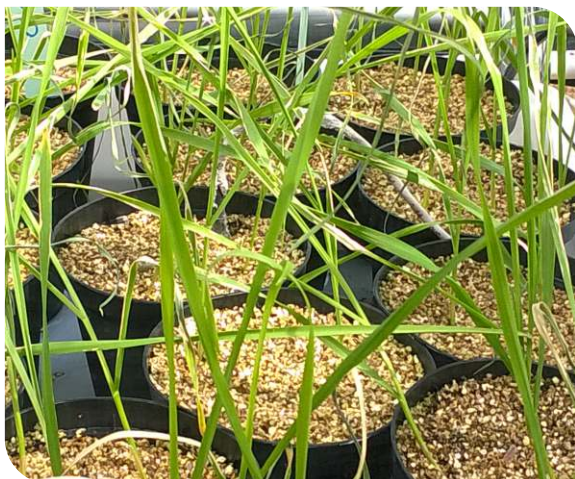
# MPG-India Fellows

## DST-MPG Mobility Grant



**Dr Richa Rai**  
Banaras Hindu University  
Varanasi

“Max Planck - India Mobility Grant” was awarded to Dr. Richa Rai, Banaras Hindu University, Varanasi on 9th June 2014 to undertake research on “Application of metabolite, transcript and flux measurements to investigate the effect of elevated ozone and carbon dioxide on yield and pest protection of C3 and C4 crops” at Max-Planck-Institute for Chemical Ecology, Jena, Germany. The project deals with investigating impact of elevated CO<sub>2</sub> on wheat and aphids interaction with objectives to assess changes in defence response (SA/JA mediated) against aphid, Variations in secondary metabolites (involved in defence) due to change in C: N ratio under elevated CO<sub>2</sub> and to check growth and feeding behaviour of aphids under elevated CO<sub>2</sub>. Treatment consist of ambient CO<sub>2</sub> (ACO<sub>2</sub>), elevated CO<sub>2</sub> (ECO<sub>2</sub>), ambient CO<sub>2</sub>+ aphids (ACO<sub>2</sub>+aphids) and elevated CO<sub>2</sub>+aphids (ECO<sub>2</sub>+aphids). Wheat plants at three leaf stages were put in chambers receiving 350 ppm and 700 ppm. After 15 days, 10 aphids per plant were placed in the chambers. At 7 and 15 days after exposure plants were harvested to estimate of phytohormones content, secondary metabolites like polyphenolics and benzoxazinoids, amino acid contents and non-structural carbohydrates. Results will help the team to understand how extra carbon was trade- off between aphids and wheat and also defence response between aphids and wheat. This was Dr Rai’s fourth and last visit to MPG, Jena availing Max Planck - India Mobility Grant.



**Dr Areejit Samal**  
Institute of Mathematical Sciences  
Chennai

“Max Planck - India Mobility Grant” was awarded to Dr Areejit Samal, Institute of Mathematical Sciences, Chennai to undertake research on “Complex Networks and Systems Biology” at Max-Planck-Institute for Mathematics in the Sciences, Leipzig, Germany. Dr Samal has already made three visits (October 2015, June 2016 and June 2017) to the Max Planck Institute of Mathematics in the Sciences, Leipzig, Germany to consolidate his collaboration with the group of Prof. Jürgen Jost under this scheme. Together, both have introduced a new edge-based measure, Forman-Ricci curvature, for the geometrical characterization of complex networks. Forman-Ricci curvature is inspired from Riemannian and polyhedral geometry, and the measure quantifies the extent to which network spreads out at the ends of its edges. Its mathematical formula elegantly incorporates weights of both nodes and edges which makes it suitable for analysis of weighted and large networks. They have found that statistics of Forman-Ricci curvature capture global network properties better than more traditional node-based measures in both model and real-world networks. Moreover, both model and real networks are vulnerable to targeted deletion of nodes with highly negative Forman curvature.

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