IGSTC
INDO-GERMAN SCIENCE AND TECHNOLOGY CENTRE

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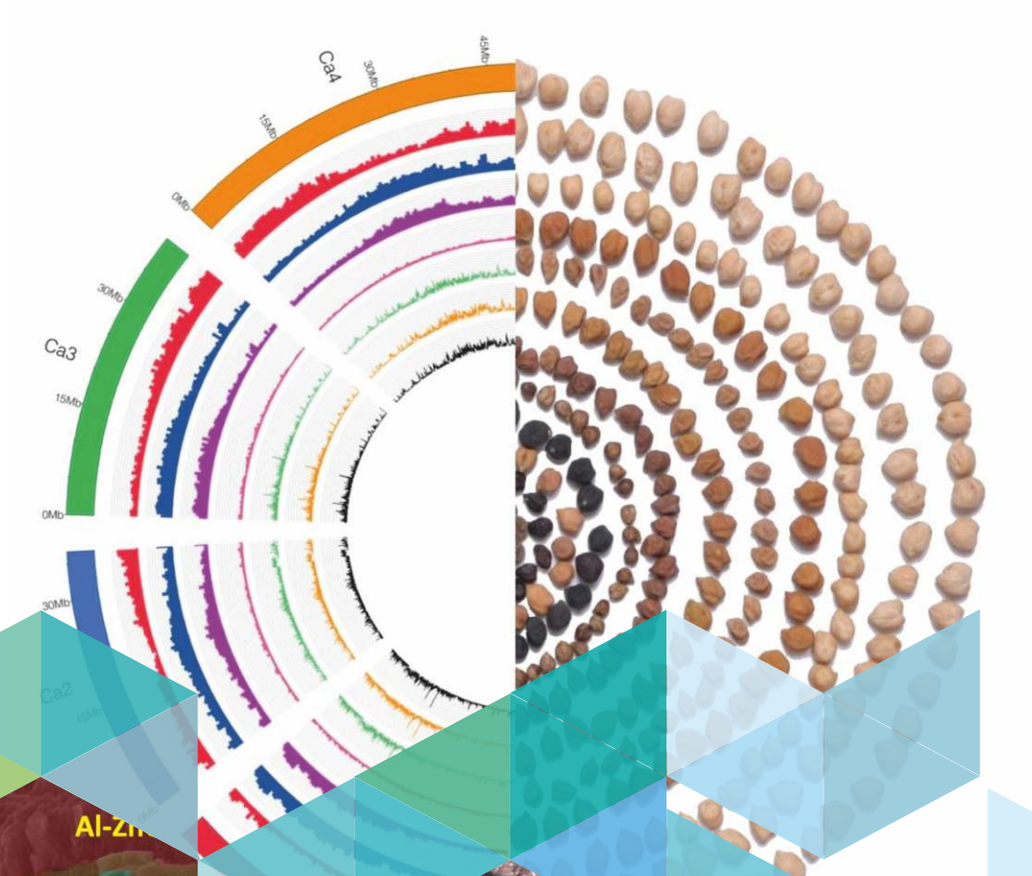
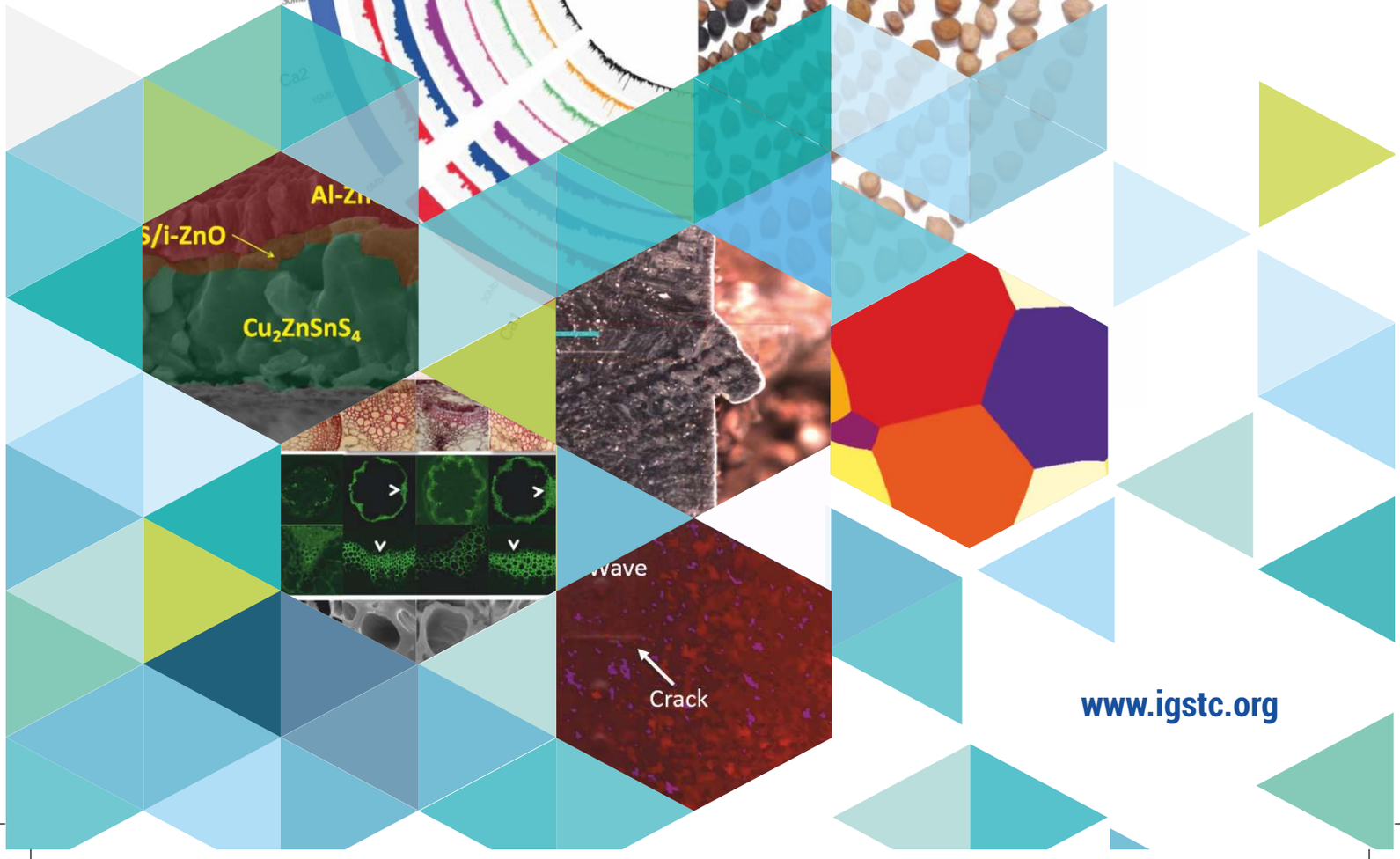
CATALYSING INDO-GERMAN STRATEGIC R&D PARTNERSHIP





www.igstc.org

A GLIMPSE OF IGSTC

Genesis

- Agreement signed in October 2007 at the ministerial level for the establishment of Indo-German Science & Technology Centre (IGSTC).
- IGSTC was inaugurated in December 2010 as an autonomous registered society in India with co-funding and governance by both Indian and German Governments.

Vision

"To facilitate Indo-German R&D networking through substantive interactions among Government, academia/research system and industry to foster innovation and industrial application for the overall economic and societal developments of both the countries."

Funding Resources

- Set up jointly by Government of India (DST) and Government of Germany (BMBF) with annual investment of 4 million Euros which got revised to 8 million Euros from 2017 onwards.
- Extramural programmes: from Government and other sources.

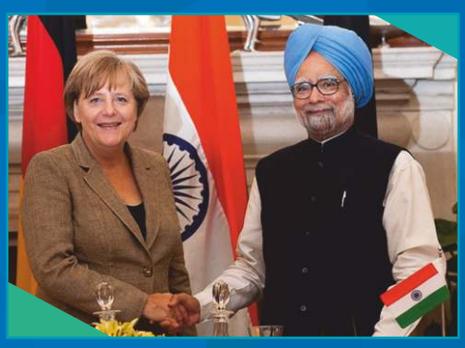
Programme Portfolio

- Bilateral research programme (2+2 Mode).
- Joint scientific workshops/brain storming.
- Flagship/strategic initiatives.
- Extramural programmes.

Mandate

- Facilitating and promoting Indo-German bilateral collaborations in applied science and technology through substantive interactions among Government, academia and industry.
- Nurturing contacts between young and mid-career scientists and technologists to develop a sense of mutual trust, partnership/leadership and entrepreneurship.
- Playing a proactive role in facilitating participation of industry in joint R&D+I projects.
- Encouraging public-private partnerships (PPP) to foster elements of innovation and industrial application and cultivating a culture of cooperation between science and industry.
- Preparation/compilation of state-of-the-art reports on topics of mutual interest with the involvement of highly qualified scientists and technologists.
- Serve as a nodal centre to promote Indo-German technology partnership.

MILESTONE EVENTS LEADING TO ESTABLISHMENT OF IGSTC



Joint Statement in Germany (April 2006)

"Both Sides will work towards setting up of an Indo-German Science, Research & Technology Centre."

"The new Indo-German Science & Technology Centre will make an important contribution towards strengthening collaboration between science and industry and accelerating the translation of research results into new products, processes and services. It will help us to jointly master the challenges of the future for the benefit of both our countries."

- Ms. Annette Schavan
Minister of Education and Research (October 2007)

"IGSTC will emerge as a new joint path for cogeneration of values to people of both countries through innovation led manufacturing."

- Dr. T Ramamsami
Secretary, DST (December 2010)

"It is for the first time that Germany has created such a centre together with another country. We have done so because we knew that India has excellent scientists and the best know how. For the first time, we have the chance to not only provide an impetus to new ideas and concepts, but also to produce them."

- Mr. Thomas Rachel
Parliamentary State Secretary, BMBF (December 2010)

IGSTC was inaugurated on
7th December 2010 at
Gurgaon

Joint Statement during the visit of Prime Minister to Germany (April 2015)

"Both sides declared their intent to promote closer R&D cooperation in science, technology and innovation, in particular through extending the tenure of the bi-national Indo-German Science & Technology Centre in India with appropriate resources. "

IGSTC ENTERS SECOND PHASE

A review of IGSTC was undertaken through an expert committee constituted by both the Governments which submitted its report in August 2013 with the following highlights:

- **Unique model of research partnership with great potential.**
- **Extension of IGSTC with expansion of scope.**

The Centre has entered into its second phase with the Joint Declaration signed on 5th October 2015 between India's Ministry of Science and Technology and the Federal Ministry of Education and Research of Germany granting it an extension to 2022 and beyond. It also provides for doubling of its bilateral funding to 8 million Euros per year. On 2nd February 2016, Indian Prime Minister who chaired the Cabinet Meeting was apprised of the signing of the Joint Declaration at ministerial level.

This enhanced funding will empower IGSTC to further strengthen and fortify research and technology collaboration of industrial relevance through cooperation between laboratories, academia and industries of both the countries.

Uniqueness of IGSTC

The importance of Indo-German relations in the area of science and research is demonstrated by the fact that the Indo-German Science & Technology Centre, which promotes bilateral application oriented research projects, is Germany's only bilateral research promotion centre worldwide and India's one of the three centres.

PRIORITY AREAS
(integrating national missions)

- **Advanced Manufacturing**
- **Embedded System & ICT**
- **Sustainable Energy/Environment**
- **Biotechnology/ Bioeconomy**
- **Biomedical Technology**
- **Water & Wastewater Technology**

PROGRAMME PORTFOLIO

Bilateral Research Programme (2+2 Mode)

Joint Scientific Workshops/ Brain Storming

Strategic/Flagship Initiatives

Extramural Programmes

Flagship Programme	Other Core Programme	Extramural Programme
2+2 PROJECTS	WORKSHOPS	DST-MPG

IGSTC Future Orientation

- Continue to play a major role in Indo-German research partnership on 2+2 Mode involving academia and industry with focus on the translation of research results for technological solutions by developing products/processes and services.
- A new model of open call for workshops on scientific areas of high relevance and great impact.
- To support Indo-German academia-industry R&D network to promote scientific networking.
- Unique industrial fellowships/internships to promote bilateral research.
- To get involved in new extramural programmes with governmental agencies and industry.

2+2 PROJECTS CALLS

IGSTC intends to catalyse innovation centric projects by synergising the strength of research/academic institutes and public/private industries from India and Germany. It is aimed at supporting joint R&D+I projects of industrial relevance by means of "2+2 Mode of Partnership" (R&D+I projects with the participation of at least one Indian and one German research institution as well as one Indian and one German industry partner).

Salient Features of 2+2 Partnership

- Project proposal is expected to produce insight and exploitable research results leading to new technologies, products and/or services.
- Industry partners are expected to contribute 50% of their eligible cost.
- The proposal will be evaluated by a Joint Scientific Committee consisting of experts from both India and Germany.
- Funding is provided in the form of non-repayable grants amounting up to ₹ 230 lakhs per project from Indian side and up to € 450000 from German side, for a period of up to three years.
- Academic/research partners receive 100% of the eligible cost.
- Projects are evaluated on the following points: (a) novel innovativeness (b) IPR sharing/protection (c) industrial relevance (d) scientific credential (e) relevance of partnership.

Partners

- Min. 4 & Max. 6
- India - 1 academic/research institute + 1 industry
- Germany - 1 academic/research institute + 1 industry

Duration

- 3 years
- Extendable up to 2 more years

Funding

- Indian side - ₹ 230 lakhs
- German side - € 450000

Thematic areas

- Energy
- Water
- Manufacturing
- Biotechnology
- ICT

OPEN CALL FOR WORKSHOPS

IGSTC supports proposals for organising Indo-German workshops on areas of mutual interest with an aim towards creating platforms for substantive interactions between scientists/researchers from academia and industry. The workshops have to take place in India or in Germany and to be designed around a specific research topic of mutual interest with a potential for generating follow up activities including joint projects. Training workshops are not falling under the scope of this programme.

IGSTC PROJECTS

Biotechnology/Bioeconomy

Biotechnological approaches to improve chickpea crop productivity for farming community and industry	• ICRISAT + Benchbio Ltd. - India • Goethe University + GenXPro GmbH - Germany • ₹ 341.6 lakhs / € 502300 • Identification of genes associated with drought tolerance in chickpea and complete genome sequencing of chickpea
Imparting stress resistance to crop plants by heterologous transfer of high altitude protection mechanisms	• IHBT + Krishidhan Research - India • IBG-2 + Deutsche Saatveredelung AG - Germany • ₹ 346.2 lakhs / € 509100 • Development of transgenic plants: model and crop plants for high altitude
Developing sustainable transgenic crop plants tolerant for drought or a combination of drought and heat stress by manipulating ABA signaling and ascorbate-glutathione pathways	• ICGEB + Nuziveedu Seeds - India • IPK + SUR GmbH - Germany • ₹ 392.6 lakhs / € 557400 • The combination and pyramiding of genes increasing tolerance against drought and heat stress in spring barley and maize

Biomedical Technology

MIDARDI Microfluidic based detection of microbial communities and antibiotic responses in the management of diabetic foot ulcers	• Manipal University + Achira Labs - India • Fraunhofer ENAS + BiFlow Systems GmbH - Germany • ₹ 701.5 lakhs / € 1031600 • Assay development for species identification and antibiotic resistance testing based on gene and mutation detection
SIBAC Next generation dynamic Scheimpflug imaging and biomechanical analytics for in vivo quantification of corneal viscoelasticity	• Narayana Nethralaya Foundation + VIT University + Forus Health - India • University of Dresden + OCULUS Optikgeräte GmbH - Germany • ₹ 675.5 lakhs / € 993400 • First device with high definition imaging and location specific quantification of corneal biomechanical response
Sound4All Re-engineering high end audiometric devices for robust and affordable audiological testing	• IIT Delhi + AIIMS Delhi + ELKON Ltd. - India • TU Munich + PATH Medical GmbH - Germany • ₹ 713.3 lakhs / € 1049000 • To design new low cost versions of hearing equipments, which at the same time be easily usable by laymen

IGSTC PROJECTS

Biomedical Technology

NANOTRANS Chemoenzymatic synthesis and development of biodegradable, structurally persistent core-shell nano-architectures for drug delivery applications	• Delhi University + Piramal Life Sciences - India • Freie Universität Berlin + Nanopartica GmbH - Germany • ₹ 414.2 lakhs / € 609100 • To design and develop novel environmentally benign biocatalytic routes to synthesise nanomaterials based upon amphiphilic copolymers
NPORE Development, characterisation and validation of nanoparticles for the adsorption of hydrophobic uremic toxins in renal failure patients	• University of Hyderabad - India • RWTH Aachen + Helmholtz Zentrum Geesthacht - Germany • ₹ 657.7 lakhs / € 967206 • First PEI particles are characterised regarding their ability to adsorb hydrophobic uremic toxins

Water & Wastewater Technology

Fec-Online Online indication of pathogen like pollution in water by fecal pigment analysis	• IIT Madras + Spectro Analytical Labs - India • DVGW Technologiezentrum Wasser + Bbe Moldaenke - Germany • ₹ 674.5 lakhs / € 991900 • Understanding of the indicator function of fecal pigment against pathogen water pollution
WaterChip DNA Biochip for on-site water pathogen detection including viability and antibiotic resistance testing	• Ahmedabad University + ABC Genomics - India • Leibniz Institute (IPHT) + Food GmbH Jena - Germany • ₹ 663.2 lakhs / € 975200 • Integration of live vs. dead (viability) protocol on the chip field validation, deployment, support and feedback
CANDECT Cluster-composite nanofibre membranes for rapid, ultra trace detection of waterborne contaminants	• IIT Madras + Inno Nano Research - India • Karlsruhe Institute of Technology + Fader Umwelttechnik - Germany • ₹ 650.7 lakhs / € 956800 • To develop a working prototype of a visual arsenic sensor system based on atomically precise clusters incorporated in electrospun membranes
Multi-WAP Multiplexed, label free fibre optic biosensor array system for waterborne pathogen detection	• IIT Madras + Ubio Technologies - India • TU Braunschweig + Lionex GmbH - Germany • ₹ 683.9 lakhs / € 1005700 • A portable, optical absorbance based, ultra-sensitive water pathogens detection device, which can be adapted to other pathogen detection applications

IGSTC PROJECTS

Advanced Manufacturing

AMPLAST Advanced manufacturing process monitoring using in-line laser thermography	• IIT Madras + Dhvani Solutions - India • BAM Berlin + InfraTec GmbH - Germany • ₹ 754.6 lakhs / € 1109600 • Development of laser thermographic testing method for the detection of surface cracks at hostile environmental conditions as found in industrial steel production
DP-Forge Process and alloy design of a micro-alloyed DP forging steel by means of ICME	• IIT Madras + TCS - India • RWTH Aachen + Simufact Engineering GmbH - Germany • ₹ 661.4 lakhs / € 972600 • Development of an energy efficient production of forged components from microalloyed dual phase steel with reduced distortion
DNDHCSA Design and development of hollow crankshaft for automobiles	• CSIR - CMERI + Bharat Forge Ltd. - India • Fraunhofer - IWU + Seidel GmbH - Germany • ₹ 350.6 lakhs / € 515600 • Realization of prototypes - design/construction/testing of required tools/rigs, prototyping, optimisation loops for hollow crankshaft

Embedded System & ICT

AUTOSAFE Architecture aware timing analysis and optimisation of safety critical automotive software	• IIT Kharagpur + TCS - India • TU Munich + Inchron GmbH - Germany • ₹ 385 lakhs / € 566200 • To develop methodology and tool flow for establishing timing convergence in automotive cyber-physical control
NDT DATA FUSION Visualization of automated multi-sensor NDT assessment of concrete structures	• CSIR - SERC + Lucid Software - India • BAM Berlin + SKP GmbH - Germany • ₹ 270.2 lakhs / € 397400 • To develop and implement automated scanner system for data collection using multi-sensor
IN-DEUS Integration of non-destructive evaluation based ultrasonic simulation	• IISc + Tech Mahindra - India • University of Saarland + IMA - Germany • ₹ 455.6 lakhs / € 670000 • To establish a simulation platform for NDE-SHM primarily for aircraft industry application

IGSTC PROJECTS

Sustainable Energy/Environment

REMSOLAR Reduction of earth metals in chalkopyrite based solar cells	• IIT Kanpur + Thermax - India • University of Halle + Manz CIGS Tech - Germany • ₹ 321.1 lakhs / € 472200 • Model process for copper indium gallium selenide (CIGS) growth with reduced layer thickness and preserved or improved photovoltaic properties
SeNaMeB Design of selective nanoporous membrane bio reactor for efficient production of bio-butanol from lignocellulosic sugars	• Institute of Chemical Technology + Privi Biotechnology - India • Fraunhofer IWU + Acatech GmbH - Germany • ₹ 759.4 lakhs / € 1116800 • Development of a novel membrane bioreactor for the efficient synthesis of bio-butanol from lignocellulose containing raw materials
RESERVES Resource and energy reliability by co-digestion of veg-market and slaughterhouse waste	• CSIR - CLRI + Ramky Enviro - India • Leibniz University + Lehmann GmbH - Germany • ₹ 689.1 lakhs / € 1013400 • Demonstration of the feasibility of recovery of bioenergy from slaughterhouse waste, fruit and vegetable market waste and other organic wastes
LowCostEPS Low cost emergency power system based on printed smart supercaps	• IIT Bombay + SLN Technologies - India • TU Chemnitz + Grünperga Papier GmbH - Germany • ₹ 341.7 lakhs / € 502500 • Development of paper based roll-to-roll printable supercap stack for low and medium power EPS systems with printable highly conductive porous carbon based electrodes and electrolytes on printable current collector material
METNETWORK Nanostructured hybrid transparent network electrodes for large area visibly transparent solar cells	• CeNS + Tata Steel - India • University of Bayreuth + Papierfabrik Louisenthal - Germany • ₹ 660.8 lakhs / € 971800 • To synthesise the metal network TCE on flexible substrates such as PET or PEN or paper
Compact linear fresnel reflector technology (CLFR) for solar thermal power generation and process heat	• IIT Bombay + Thermax - India • Fraunhofer ISE + Schott Solar - Germany • ₹ 455.6 lakhs / € 670100 • Design and development of all the critical components like primary mirror system, secondary concentrator, receiver mounting, tracking system, heat exchangers, evaporators, etc.
FLEXIPRIDE Flexible printed integrated disposable electronics	• IIT Kanpur - India • TU Chemnitz + Chromasens GmbH - Germany • ₹ 384.7 Lakhs / € 560800 • First ever oscillating EC-display with simple astable multivibrator and conventional electronics components

SUCCESS STORIES

- About 150 joint publications in SCI cited journals and international conferences from the IGSTC funded projects.
- Till date funded 31 projects in "2+2 Mode" to top research institutions of India and Germany (IISc, IITs, TUs, institutes of national importance, etc.) with well reputed Indian and German industries.
- Till date funded/organised 17 workshops on thematic areas of energy, water and wastewater technologies, advanced manufacturing, environmental technologies, medical technology including diagnostics.
- IGSTC funded projects have produced about 50 PhDs and networked more than 250 scientists and technologists from India and Germany.
- A first ever demonstration unit of 250 kWh solar-thermal hybrid for power and process heat using CLFR (Compact Linear Fresnel Reflector) technology commissioned at Heavy Water plant in Manuguru, AP. (IIT Bombay + Thermax + Fraunhofer ISE + Schott Solar)
- Decoded molecular mechanism of Caragana jubata to thrive in the high altitude cold desert of Himalayas and transgenic plants with strains of high altitude plants developed. This was featured by German Broadcasting (Deutsche Welle) as one of the 20 technologically innovative projects having prospect to change the lives in the near future. (CSIR-IHBT + Krishidhan + Jülich Research Centre + DSV AG)
- First time the complete genome sequence of chickpea (Cicer arietinum) carried out to provide a resource for trait improvement. (chickpea accounts for 45% of total pulses in India). (ICRISAT + Bench Bio + Goethe University + GenXPro)
- Flexible printed integrated disposable electronics project combined the different printed electronic elements into a single functioning device. Optimised the paper printed solar cell to achieve higher efficiencies and to improve the lifetime of the cells. In the Hannover Fair - inaugurated by the Indian Prime Minister in April 2015 - this project was represented with a “Solar Tree” using flexible/printable electronics technology. (IIT Kanpur + Anil Printers + Chemnitz University of Technology + Chromasens)
- Developed sustainable transgenic crop plants tolerant for drought or a combination of drought and heat stress by manipulating ABA signaling and ascorbate-glutathione pathways. Combination and pyramiding of genes increased tolerance against drought and heat stress in spring barley and maize. (ICGEB + Nuziveedu Seeds + IPK + Saaten Union Biotech)
- A new class of dendronized multiamphiphilic polymers and the self assembly to nano transporters for drug delivery have been synthesised. (Delhi University + Piramal Life Sciences + Freie University Berlin + Nanopartica GmbH)
- Safety critical automotive software developed. This project developed and integrated tool chains into an advanced tool flow for integrated design and validation of control algorithms and their implementation and research on some of the most challenging design automation problems in futuristic automotive control. (IIT Kharagpur + TCS + TU Munich + INCHRON GmbH)
- Developed automated scanner system for multi-sensor data collection and software tool for visualisation of structural changes and deterioration processes of concrete structures at laboratory scale. (CSIR-SERC + Lucid Software + BAM Berlin + SKP GmbH)
- Development, characterisation and validation of adsorbant particles for the removal of hydrophobic uremic toxins from plasma of chronic renal failure patients. (University of Hyderabad + RWTH Aachen + Helmholtz Zentrum Geesthacht + EXcorLab)
- Developed new innovative lightweight hollow crankshaft design having better strength and stiffness characteristics. (Bharat Forge + CMERI + Fraunhofer IWU + Seidel Werkzeugbau)
- Developed a simulation platform in ultrasonic Nondestructive Evaluation (NDE) - designed structures and developed necessary processes in aerospace and infrastructure health monitoring. (IISc + Tech Mahindra + Saarland University + IMA Dresden)
- Development of affordable audiological testing device for children. (IIT Delhi + AIIMS + ELKON + TU Munich + Path Medical GmbH)
- Development of a new type of forged steel. (IIT Madras + TCS + RWTH Aachen + Simufact Engineering)

Indo-German Science & Technology Centre

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