



NEWSLETTER

VOLUME 10 | ISSUE 2 | MAY – AUGUST 2026

BEACON

BILATERAL EXCELLENCE
FOR ADVANCING COOPERATION &
OPPORTUNITY NETWORK
(SUMMER EDITION)

About IGSTC

The Indo-German Science & Technology Centre (IGSTC), a joint initiative by the Department of Science & Technology (DST), Government of India and the Federal Ministry of Research, Technology and Space (BMFTR), Government of Germany was established to facilitate Indo-German R&D networking through substantive interactions among government,

academia/research system and industries, thus fostering innovation for overall economic and societal developments in both the countries. Through its various funding programmes, IGSTC intends to catalyse innovation centric R&D projects by synergising the strength of research/academic institutions and public/private industries from India and Germany.

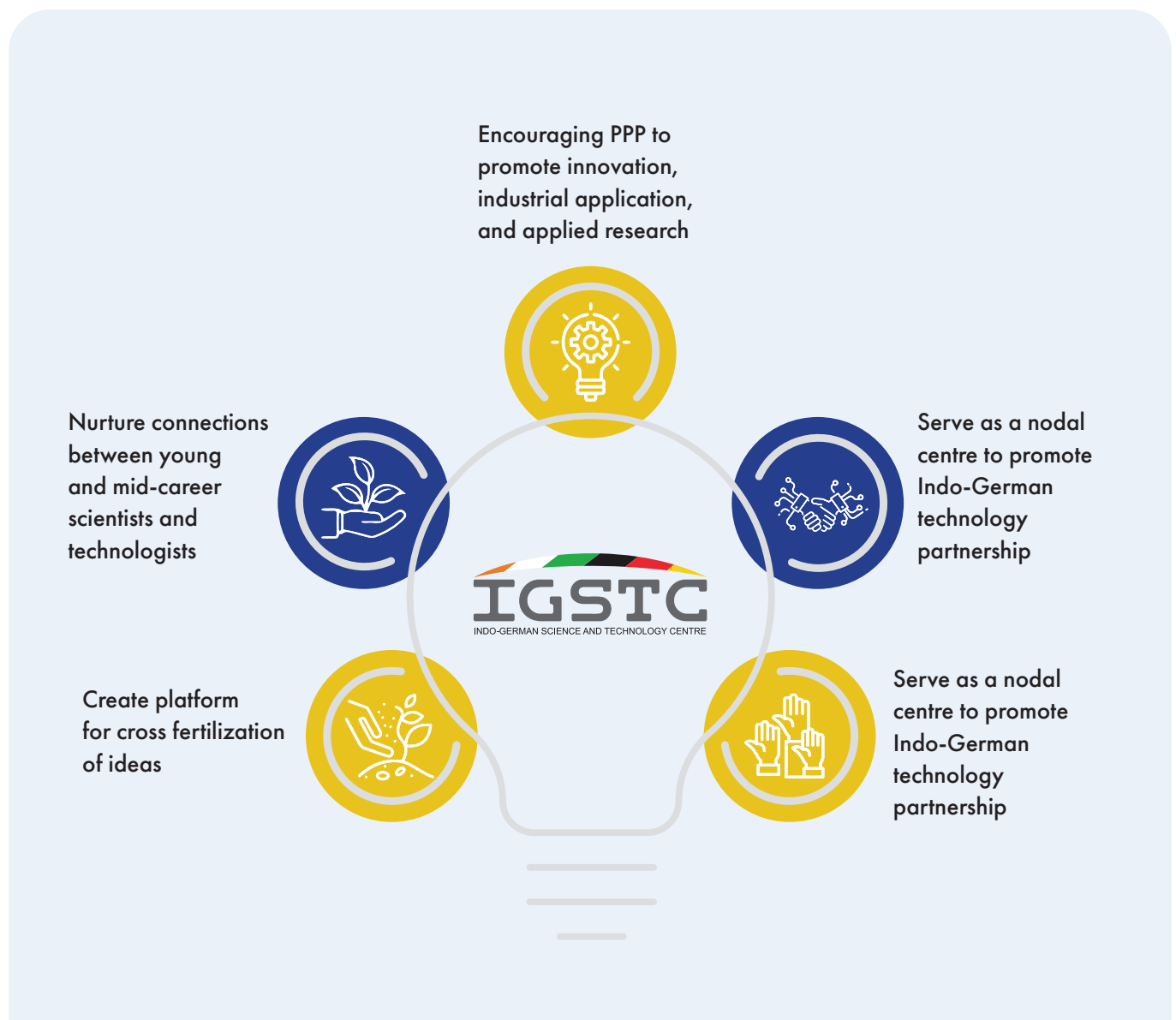


Table of Contents

04



Foreword

06



Events and Initiatives

19



2+2 Projects

24



Bilateral Workshops

27



Women Involvement in Science & Engineering Research (WISER)

31



Paired Early Career Fellowship in Applied Research (PECFAR)

38



Empowering Researchers: IGSTC Industrial Fellowship Program

46



Small Immediate Need Grants (SING)

Foreword



Prof Tata Narasinga Rao

Vice-Chancellor
Sri Venkateswara University

The strength of international scientific cooperation is measured not only by the knowledge it generates, but also by the cross-boundary partnerships it builds and the opportunities it creates for forthcoming generations. Bringing together researchers, innovators, industry leaders and policymakers from India and Germany, the Indo-German Science & Technology Centre (IGSTC) has spent more than a decade turning cross-border and cross-sector expertise into solutions for global challenges. As science and technology continue to shape economic growth, sustainability and societal well-being, such partnerships assume even greater significance. This edition of the newsletter offers a compelling reflection of how Indo-German cooperation is not only advancing knowledge but also creating pathways for innovation, capacity building

and technological excellence. The activities highlighted in these pages demonstrate the value of sustained engagement between institutions, researchers and industries, and redefine the role of international cooperation in converting scientific potential into meaningful outcomes for society. Information captured in this newsletter reflects IGSTC's continuing efforts to foster connections between research ingenuity, technological advancement and economic relevance across both nations.

The period covered in this issue, from May to August 2026, witnessed a wide range of activities that elucidate the breadth and dynamism of the bilateral partnership. From the deliberations of the 21st Governing Body and 14th Finance Committee meetings to strategic engagements across Germany's research and innovation landscape, IGSTC continued to facilitate meaningful dialogue and collaboration across emerging areas of science and technology. The interactions span some of the most pivotal fields of our time: artificial intelligence, semiconductor technologies, quantum science, advanced materials, life sciences and sustainability. Each holds immense potential to shape the economies and societies of the future. The engagement of IGSTC with leading research organisations, innovation networks, universities and industrial stakeholders reflects the growing depth of the Indo-German innovation ecosystem. These activities are not only expanding opportunities for collaborative research but are also helping identify future areas where scientific excellence can be aligned with technological needs and societal as well as industrial priorities.

A recurring theme across the stories featured in this newsletter is the growing emphasis on translating scientific excellence into real-world solutions.



Whether through collaborative R&D projects, industry-linked fellowships, Research & Innovation Dialogue Series, researcher mobility programmes or thematic workshops, IGSTC is increasingly fostering partnerships that bridge the gap between laboratory discoveries and societal applications. These efforts highlight not only scientific excellence but also a growing commitment to ensuring that research contributes meaningfully to industry, environmental sustainability and societal well-being. Equally important is the increasing engagement of industry alongside academia and research institutions, enabling scientific discoveries to move more effectively towards innovation, technology development and practical deployment. By connecting research with application, these initiatives play an important role in addressing contemporary challenges and enhancing innovation capabilities across India and Germany.

Underlying every successful collaboration are the researchers whose contributions continue to advance scientific excellence and deepen the foundation of Indo-German S&T cooperation. The experiences shared by awardees under programmes such as WISER, PECFAR, SING and the Industrial Fellowship Scheme demonstrate the transformative value of scientific exchange. By providing access to new facilities, complementary expertise and global networks, these programmes are empowering researchers with the knowledge, skill and expertise needed to handle complex problems from multidisciplinary perspectives. It is particularly encouraging to witness the growing participation of early-career scientists and women researchers who are bringing fresh ideas and new energy to the Indo-German research landscape. Their accomplishments reaffirm the importance of investing in talent, nurturing future leaders and creating opportunities for meaningful scientific exchange. Beyond research

outputs and publications, these programmes foster lasting professional relationships, strengthen institutional linkages, create networks of trust and offer valuable cultural experiences that leave a long-lasting impact even after completion of individual fellowships.

Having been associated with IGSTC for many years as Governing Body Member, I have had the privilege of witnessing its journey from a promising bilateral initiative to a most promising catalyst for Indo-German cooperation in science, technology and innovation. Throughout this journey, I have witnessed how IGSTC has enabled productive engagements among researchers, institutions and industry, nurturing collaborations that have grown in both scale and significance over time. These experiences have reinforced my belief that the strength of IGSTC lies not merely in the programmes it supports, but in its ability to attract people together around a common vision of scientific progress and shared prosperity. As we look to the future, I believe IGSTC is uniquely positioned to further strengthen the impact of translational research, create new pathways for industry-academia synergies, advance collaboration in emerging scientific frontiers, and inspire a new generation of researchers who will define the future trajectory of Indo-German partnership. As science becomes increasingly interconnected and multidisciplinary, IGSTC's continued focus on people, partnerships and innovation will remain central to shaping the next chapter of Indo-German cooperation.

*Advancing Science Beyond Borders
Through Collaboration, Innovation and
Shared Commitment to Solving Global
Challenges Together*

The background is a vibrant blue with a complex, abstract pattern of white and light blue lines. These lines flow and curve around a central, teardrop-shaped element that has a textured, layered appearance. The overall effect is one of dynamic movement and modern design.

EVENTS AND INITIATIVES



21st Governing Body Meeting

The 21st Governing Body (GB) meeting of IGSTC, held on 11th June 2026 at Hotel Taj Yeshwantpur, Bengaluru, marked an important milestone in strengthening IGSTC's role as a strategic platform for shaping and advancing India–Germany cooperation in science, technology and innovation. The meeting brought together Dr. Praveen Kumar S (DST & Indian Co-Chair), Ms Kathrin Meyer (BMFTR & German Co-Chair), Mrs Yatinder Prasad (Addl. Secretary & Financial Advisor, DST), Prof. Steffen Leonhardt (Chair of Medical Information Technology, RWTH Aachen University), Dr. Tata Narasinga Rao (Vice Chancellor, Sri Venkateswara University), Dr. Simon H Preker (First Secretary, Economic and Global Affairs/ Skilled Labour Migration, German Embassy New Delhi India), Dr. Michaela Wilhelm (Senior Scientist, University of Bremen), Mr. Wolf Muth (Country Director, KfW Development Bank) and Mr. Ankit Mehta (Co-founder & Chief Executive Officer, ideaForge), with Dr. Reneta Ch. Feldmann (Indian Desk Officer, BMFTR) and Dr. Arindam Bhattacharyya (Scientist F, International Cooperation Division, DST) as Member Secretaries. Representing IGSTC were Dr. Kusumita Arora (Director),

Mr. Hans Westphal (DLR-PT), Dr. Rupak Bhattacharya (Senior Scientific Officer), Mr. Inderjit Singh (Chief Administrative Officer), Ms Doerte Merk (DLR-PT), Mr. Pankaj Kothari (Account Officer), Mr. Saquib Shaikh (Scientific Officer), Ms Alexandra Stinner (DLR-PT) and Ms Isha Goel (Deputy Scientific Officer, IGSTC).

The deliberations reviewed the breadth, progress and impact of IGSTC's programme portfolio, including 2 + 2 projects, Workshops, WISER and various networking fellowships, while providing strategic direction for deepening industry-oriented research, strengthening institutional linkages and translating bilateral scientific partnerships into technology development, innovation and tangible outcomes for both countries. On this occasion, the GB proudly released the IGSTC Newsletter (Spring Edition), highlighting the latest developments and achievements of IGSTC.

The meeting reaffirmed IGSTC's strategic role in transforming Indo-German scientific partnerships into innovation, technology and meaningful impact.





14th Finance Committee Meeting

The 14th Finance Committee (FC) Meeting of IGSTC, held on 9th June 2026 at Hotel Taj Yeshwantpur, Bengaluru, brought together the India–Germany financial leadership of IGSTC to review key financial matters and strengthen the financial framework supporting the Centre’s growing portfolio of bilateral S&T programmes. The meeting was chaired by Ms. Yatinder Prasad, Additional Secretary & Financial Advisor, DST, and Dr. Renata Feldmann, BMFTR, and was graced by the presence of Dr. Simon H Preker, First Secretary, Economic and Global Affairs/ Skilled Labour Migration, German Embassy New Delhi India, and Dr. Arindam Bhattacharyya, Scientist F and Desk Officer (Germany), ICD, DST. Convened by Dr. Kusumita Arora, Director, IGSTC, the meeting was attended by Mr. Hans Westphal (DLR-PT), Mr. Inderjit Singh, Chief Administrative Officer, IGSTC,

Ms. Alexandra Stinner, Manager Finance (DLR-PT) and Mr. Pankaj Kothari, Account Officer, IGSTC. The Committee reviewed the Centre’s financial progress and key financial matters, with discussions centred on strengthening financial systems and resource management to support IGSTC’s evolving programme portfolio and maximise the outcomes of ongoing bilateral cooperation in science, technology and innovation.

Strengthened financial governance and resource stewardship to support IGSTC’s expanding portfolio of Indo-German science and innovation programmes.





Strategic Engagements across Dresden's Research and Innovation Ecosystem

Recent engagement of Dr Kusumita Arora, Director, IGSTC at Dresden offered a glimpse into Dresden's Innovation Ecosystem. Beginning at ScaDS.AI, the visit offered insights into Dresden's research and innovation landscape, with discussions centred on high-performance computing and applied AI for industry. At CeTI and LaunchHub42, the conversation turned to tactile internet, quantum communication, next-generation connectivity and deep-tech entrepreneurship. Meetings with Silicon Saxony and SAX-QT highlighted the networks linking research institutions with Europe's semiconductor and quantum-technology sectors.





The journey then moved from chips to cells. At TU Dresden, discussions with Prof. Thomas Mikolajick and the ForLab initiative focused on nanoelectronics, advanced materials and skills for the microelectronics sector. At the Center for Molecular and Cellular Bioengineering (CMCB), interactions with research group leaders covered cell therapies, regenerative medicine, bioeconomy and translational life sciences.

An interaction with Prof. Karl Leo, a renowned scientist for his work on organic semiconductor electronics and OLED technologies, added another dimension: how advances in materials science can move from the laboratory towards industrial applications.

The striking feature was not any single technology, but the proximity of different capabilities, providing a closer look at potential intersections where complementary strengths in India and Germany could translate into new innovations and partnerships.



At the Center for Molecular and Cellular Bioengineering (CMCB), interactions with research group leaders covered cell therapies, regenerative medicine, bioeconomy and translational life sciences.





IGSTC Contributes to National Dialogue on Geological Carbon Storage and CCUS

Geological Carbon Storage (GCS) is emerging as an important component of efforts to reduce carbon emissions, raising questions not only about storage potential and technology, but also about regulation, infrastructure and economic viability. These issues were deliberated at the centre of a High-Level Expert Roundtable on “Geological Carbon Storage (GCS): Advancing R&D Policy and India’s CCUS Mission”, held on 12th August 2026 at INSA, New Delhi, organised by INSA in collaboration with NITI Aayog, with support from IGSTC and in partnership with CSIR-NGRI.

The roundtable brought together policymakers, scientists, technology experts, industry representatives

and international experts from Norway, UK and Australia. Dr. Kusumita Arora, Director, IGSTC, delivered the welcome remarks, highlighting the importance of international collaboration, translational R&D and technology-driven partnerships in addressing decarbonisation challenges.

The discussions addressed the practical building blocks needed for a GCS ecosystem in India, including assessment of geological storage capacity, dedicated testbeds, a National Carbon Storage Atlas, R&D and technology development, pilot-scale demonstrations, data sharing, policy and regulatory frameworks, industry participation and economic viability.





The programme featured five expert talks and two panel discussions. Perspectives from Prof. Abhay Karandikar, Prof. Shekhar Mande, Prof. Umesh V. Waghmare, Dr. Ranjit Rath, Dr. Virendra M. Tiwari and Prof. Vivek Kumar Singh highlighted different dimensions of the challenge, from strengthening R&D and site characterisation to industry readiness, data sharing, deployment costs and field demonstrations.

For IGSTC, the roundtable provided a platform to contribute to a national discussion where scientific

capability, international expertise, policy and industrial requirements intersect; an important foundation for advancing research and technology pathways for GCS and CCUS in India.

The roundtable brought together policymakers, scientists, technology experts, industry representatives and international experts from Norway, the UK and Australia.





IGSTC–Chandigarh University Explore Indo-German Research Opportunities

Dr. Kusumita Arora, Director, IGSTC, engaged with the leadership, faculty, researchers and students of Chandigarh University on opportunities for Indo-German research and innovation collaboration through IGSTC programmes.

The engagement connected the university's research community with IGSTC's mechanisms for developing collaborative research with German partners. It included visits to research laboratories, where student innovation projects were showcased.



The engagement connected the university's research community with IGSTC's mechanisms for developing collaborative research with German partners.



Interaction to Strengthen Indo-German Cooperation in Quantum Science

IGSTC hosted Prof. Tanusri Saha-Dasgupta, Director, S. N. Bose National Centre for Basic Sciences (SNBNCBS), and Prof. Kasturi Saha, IIT Bombay, for a meeting with Dr. Kusumita Arora, Director, IGSTC, focusing on Indo-German collaboration in quantum science and technology.

The discussion followed the IGSTC-supported workshop “Quantum Sensing with Quantum Materials: Present and Future”, held at IFW Dresden from 30th June to 4th July 2026 to discuss quantum materials, quantum sensing, researcher mobility and future joint research. The meeting at IGSTC was focused specifically on follow-up activities and potential areas for collaboration, building on the momentum of the Dresden workshop.

The meeting at IGSTC focused specifically on follow-up activities and potential areas for collaboration, building on the momentum of the Dresden workshop.



IGSTC Research & Innovation Dialogue Series Connects Scientific Advances with Industrial Applications

The IGSTC Research & Innovation Dialogue Series brought together experts from India and Germany for virtual discussions. The May to August 2026 sessions spanned developments in data science, AI, analytical technologies and advanced imaging to address challenges across industrial, biomedical and materials research.

On 21st May 2026 the 2nd session in series was delivered by Prof. Stephan A. Schunk, Vice President and Executive Expert at BASF SE and hte GmbH and Honorary Professor at Leipzig University, on “Turning Data into Catalysts and Processes: Redefining Innovation in the Chemical and Refining Industry.” The session focused on digitalisation in catalysis and materials science; how data-centric approaches can

accelerate catalyst development, improve scale-up confidence and support the translation of new catalytic processes towards industrial applications.

On 31st July 2026, Prof. Basant Kumar Thakur, Professor of Experimental Molecular and Cellular Hepatology at the University of Duisburg-Essen, held the 3rd session in series on “Extracellular Vesicles (EVs) as Functional Biomarkers for Early Cancer Detection and Precision Medicine.” The session examined the potential of EVs to carry proteins, RNA, DNA and lipids and reflect characteristics of their cells of origin; used for early, minimally invasive diagnosis through liquid biopsies and their potential contribution to personalised medicine.

IGSTC
INDO-GERMAN SCIENCE AND TECHNOLOGY CENTRE

RESEARCH & INNOVATION DIALOGUE SERIES

**Turning Data into Catalysts and Processes:
Redefining Innovation in the
Chemical and Refining Industry**

DATE
21st May 2026

TIME
2:30 PM IST
(11.00 AM CET)

MODE
VIRTUAL EVENT

SPEAKER
Prof. Dr. Stephan A. Schunk
Vice President and Executive Expert
BASF SE and hte GmbH
Honorary Professor
Leipzig University

ABSTRACT
This talk explores how data-centric approaches and high-throughput experimentation (HTE) are transforming industrial catalysis.
Learn how HTE accelerates catalyst discovery, reduces development time, and improves scale-up confidence to drive real impact in chemical and refining processes.
The lecture introduces Digital Catalysis, where data, modeling, and AI enable smarter catalyst design and optimization.

KEY TAKEAWAYS
How HTE platforms enable faster, more reliable catalyst and process development
Real-world impact: scaling novel catalytic processes to industrial relevance
Digital Catalysis: the convergence of data, modeling, and AI for next-gen innovation
Shaping the future of a more sustainable chemical and refining industry

REGISTER HERE
<https://forms.cloud.microsoft/IGstc/UHhY>

Scan the QR code to register

info@igstc.org | www.igstc.org | @INDOIGSTC | IGSTC.IndoGerman | company/igstc

IGSTC
INDO-GERMAN SCIENCE AND TECHNOLOGY CENTRE

RESEARCH & INNOVATION DIALOGUE SERIES
Bridging Ideas. Advancing Impact.

INVITES YOU TO A TALK ON

Extracellular Vesicles as Functional Biomarkers for Early Cancer Detection and Precision Medicine

SPEAKER
Prof. Dr. Basant Kumar Thakur
Department of Gastroenterology, Hepatology and Transplant Medicine, Medical Faculty
University of Duisburg-Essen

DATE
31st July 2026

TIME
2:30 PM IST
(11.00 AM CET)

VIRTUAL SESSION VIA MICROSOFT TEAMS

ABOUT THE TALK
Extracellular vesicles (EVs) are emerging as powerful non-invasive biomarkers for early cancer detection, diagnosis, and treatment response monitoring. This talk will explore how EVs can be harnessed for precision medicine, highlighting recent advances in isolation, characterization, and clinical translation.

ENGAGE with leading experts
DISCOVER cutting-edge research
COLLABORATE for greater impact

OPEN TO RESEARCHERS, ACADEMICIANS, INDUSTRY PROFESSIONALS & STUDENTS

SCAN TO REGISTER



The series also featured Prof. Christian Eggeling, Professor of Superresolution Microscopy at Friedrich Schiller University Jena and Director of its Institute of Applied Optics and Biophysics, in the 4th session on 20th August 2026 titled “Super-Resolution Microscopy for Resolving Membrane Dynamics and Three-Dimensional Organization.” He focused on advanced fluorescence-based approaches for studying molecular organisation and dynamics in living cells, including STED-FCS, spectral imaging, fluorescence correlation spectroscopy and MINFLUX single-molecule tracking.

The 24th August 2026 session addressed the sustainability of advanced energy technologies. Prof. Jens Riedel, Head of the Instrumental Analytics Division at BAM – Federal Institute for Materials Research and Testing and Professor of Spectrochemical Analytics at Brandenburg University of Technology (BTU) Cottbus-Senftenberg, spoke on “Battery Material Recycling: State-of-the-art, Scope, and

Autonomous Analytics.” He shed light on technologies for recovering valuable and critical materials from batteries, alongside analytical approaches for monitoring recycling processes, using Raman spectroscopy, LIBS and autonomous analytics for real-time process monitoring and material recovery.

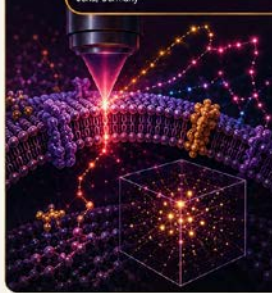
The series brought together senior scientists and experts from leading academic, research and industrial institutions in India and Germany. Their diverse expertise enabled the series to connect fundamental research, advanced analytical methodologies and industrially relevant applications across emerging areas of science and technology.

The May to August 2026 sessions spanned developments in data science, AI, analytical technologies and advanced imaging to address challenges across industrial, biomedical and materials research.

**RESEARCH & INNOVATION
DIALOGUE SERIES**
— BRIDGING MINDS. ADVANCING DISCOVERY. —

TITLE OF THE TALK
**Super-Resolution Microscopy
for Resolving Membrane
Dynamics and Three-Dimensional
Organization**


Christian Eggeling
Professor of Super-Resolution Microscopy,
Institute of Applied Optics and Biophysics,
Friedrich-Schiller-University &
Leibniz Institute of Photonic Technology e.V.,
Jena, Germany



ABSTRACT
Molecular interactions underpin cellular signaling and are strongly influenced by the spatial organization, three-dimensional architecture, and dynamics of biological membranes. However, directly observing these processes in living cells remains challenging because conventional far-field microscopy is fundamentally limited in its spatial, temporal, and functional resolution. Here, we present recent advances in super-resolution microscopy, combining STED-FCS, spectral imaging, fluorescence correlation spectroscopy, and in particular MINFLUX single-molecule tracking to probe membrane dynamics together with the three-dimensional organization and topology of cellular membranes in living cells. We illustrate how these complementary approaches provide new insights into membrane organization, nanoscale lipid heterogeneity, the functional relevance of lipid nanodomains, and membrane remodeling during processes such as pathogen invasion and endocytosis, while also highlighting the current capabilities and remaining limitations of super-resolution microscopy.

KEYWORDS
BEYOND THE DIFFRACTION LIMIT | MEMBRANE DYNAMICS | 3D ORGANIZATION & TOPOLOGY | IN LIVING CELLS

DATE 20th August 2026
TIME (IST) 2:30 PM IST (11:00 AM CET)
VENUE Virtual Session via Microsoft Teams
SCAN TO REGISTER
Registration is free but mandatory.

info.igstc@igstc.org | www.igstc.org | @INDOIGSTC | IGSTC IndoGerman | [linkedin.com/company/igstc](https://www.linkedin.com/company/igstc)

**RESEARCH & INNOVATION
DIALOGUE SERIES**
— BRIDGING MINDS. ADVANCING DISCOVERY. —

TITLE OF THE TALK
**Battery Material Recycling:
State-of-the-art, Scope,
and Autonomous Analytics**


PROF. DR. JENS RIEDEL
Head of Division "Instrumental Analytics"
BAM Bundesanstalt für Materialforschung-
und -prüfung
Professor for Spectrochemical Analytics
Brandenburgische Technische Universität
(BTU) Cottbus-Senftenberg



ABSTRACT
Lithium-ion batteries are now indispensable in modern life, while recovering their critical and valuable raw materials in a resource-efficient manner is our responsibility. At BAM, we combine safety and materials expertise with advanced analytics to drive sustainable battery materials and recycling.
In the HERES project (BAM & BTU), we develop technologies across the entire recycling value chain to establish closed material loops and reduce dependence on critical raw materials.
This talk presents state-of-the-art recycling technologies and autonomous analytics for real-time monitoring of critical material streams. By unifying Raman spectroscopy and LIBS in a single instrumental setup with UV diode-pumped lasers and spatial heterodyne spectrometers, we achieve millisecond-scale, simultaneous insights.
Results across the battery lifecycle—from pristine materials and cycled cells to end-of-life black mass—demonstrate the power of this approach for a sustainable battery future.

KEYWORDS
SUSTAINABLE MATERIAL RECOVERY | ADVANCED RECYCLING TECHNOLOGIES | AUTONOMOUS ANALYTICS | REAL-TIME PROCESS MONITORING

DATE 24th August 2026
TIME (IST) 2:30 PM IST (11:00 AM CET)
VENUE Virtual Session via Microsoft Teams
SCAN TO REGISTER
Registration is free but mandatory.

info.igstc@igstc.org | www.igstc.org | @INDOIGSTC | IGSTC IndoGerman | [linkedin.com/company/igstc](https://www.linkedin.com/company/igstc)

IGSTC–iPEARL Global Science Colloquium Explores Diverse Frontiers in Infection Biology

The IGSTC–iPEARL Global Science Colloquium: Frontiers in Infection Biology continued its virtual scientific exchange from May to August 2026 with four sessions bringing together research perspectives spanning molecular glycobiology, tuberculosis vaccine development, intracellular pathogen signalling, and membrane-protein biophysics. The colloquium, jointly presented by the Indo-German Science & Technology Centre (IGSTC) and iPEARL, BITS Pilani, provides a platform for engagement with scientific developments across infection biology and related life-science disciplines.

4th session on 12th May 2026, featured Prof. Peter H. Seeberger, Director, Biomolecular Systems, Max Planck Institute of Colloids and Interfaces, Germany. His lecture, “Automated Glycan Assembly

Enables Molecular Glycobiology as the Basis for the Development of Vaccines, Medicines and Diagnostics,” focused on automated approaches to glycan assembly and their relevance to molecular glycobiology and biomedical applications including carbohydrate-based vaccine development.

5th session on 5th June 2026, featured Prof. Stefan H. E. Kaufmann, Founding Director of the Max Planck Institute for Infection Biology. His lecture, “Novel Intervention Measures against Tuberculosis: Vaccines and Prognostic Host Signatures,” examined approaches to tuberculosis intervention through the journey of tuberculosis vaccine development and the role of clinical trials in translating scientific discoveries into public-health interventions.

IGSTC-iPEARL
Global Science Colloquium
FRONTIERS IN INFECTION BIOLOGY

Exclusive Session on:
Automated Glycan Assembly Enables Molecular Glycobiology as the basis for the Development of Vaccines, Medicines and Diagnostics

12 May 2026
(12:30 pm – 2:00 pm IST)
(09:00 am – 10:30 am CET)
(03:00 pm – 04:30 pm CST)

Prof. Peter Seeberger
Max-Planck Institute of Colloids and Interfaces, Berlin, Germany

Register Here
<https://forms.cloud.microsoft/r/9zjbFJFKEa>

QR code for registration

Logos: iPEARL, IGSTC, and the Indian and German flags.

IGSTC-iPEARL
Global Science Colloquium
FRONTIERS IN INFECTION BIOLOGY

Exclusive Session on:
Novel Intervention Measures against Tuberculosis: Vaccines and Prognostic Host Signatures

05 June 2026
(2:00 pm – 3:30 pm IST)
(10:30 am – 12:00 pm CEST)

Prof. Stefan HE Kaufmann
Max-Planck Institute for Infection Biology, Berlin, Germany

Register Here
<https://forms.cloud.microsoft/r/9zjbFJFKEa>

QR code for registration

Logos: iPEARL, IGSTC, and the Indian and German flags.

6th session on 15th July 2026, featured Prof. Nishith Gupta, Professor, Department of Biological Sciences, BITS Pilani, Hyderabad Campus. His lecture, "Optogenetics in Infection: Illuminating Cyclic Nucleotides Signaling in an Intracellular Pathogen," explored the application of optogenetics to investigate cyclic nucleotide signalling in intracellular parasite-host interactions.

7th session on 27th August 2026, featured Prof. Mahalakshmi Radhakrishnan, Professor of Biological Sciences, Krea University. Her lecture, " β -Barrel Outer Membrane Proteins: Linking Folding, Stability, & Function with Therapeutics," examined the interplay between protein folding, stability and function, with particular focus on β -barrel outer membrane proteins and their therapeutic potential. Including the folding, function, energetics and engineering of mitochondrial

and bacterial outer membrane proteins, as well as the development of peptidomimetics and targeted protein inhibitors for therapeutic applications.

Together, the four sessions illustrated the breadth of contemporary infection-biology research. By bringing researchers working across these interconnected areas into a common scientific forum, the colloquium continued to support dialogues across disciplines and research systems in India, Germany and the wider international scientific community.

The colloquium, jointly presented by the Indo-German Science & Technology Centre (IGSTC) and iPEARL, BITS Pilani, provides a platform for engagement with scientific developments across infection biology and related life-science disciplines.

IGSTC-iPEARL
Global Science Colloquium
FRONTIERS IN INFECTION BIOLOGY

Exclusive Session on:
Optogenetics in Infection: Illuminating Cyclic Nucleotides Signaling in an Intracellular Pathogen

15 July 2026
(2:00 pm – 3:30 pm IST)
(10:30 am – 12:00 pm CEST)
(04:30 pm – 06:00 pm CST)

Prof. Nishith Gupta
Birla Institute of Technology & Science - Pilani, Hyderabad, India

Register Here
<https://forms.cloud.microsoft/r/9zibFJfKEa>

QR code for registration

Logos: iPEARL, IGSTC, Indian and German flags

IGSTC-iPEARL
Global Science Colloquium
FRONTIERS IN INFECTION BIOLOGY

Exclusive Session on:
 β -Barrel Outer Membrane Proteins: Linking Folding, Stability, & Function with Therapeutics

27 August 2026
(2:00 pm – 3:30 pm IST)
(10:30 am – 12:00 pm CEST)
(04:30 pm – 06:00 pm CST)

Prof. Radhakrishnan Mahalakshmi
KREA University, Sri City, India

Register Here
<https://forms.cloud.microsoft/r/9zibFJfKEa>

QR code for registration

Logos: iPEARL, IGSTC, Indian and German flags

The background is a vibrant blue with a complex, abstract pattern. It features numerous thin, white, curved lines that sweep across the frame, creating a sense of motion and depth. A prominent, larger, teardrop-shaped element is positioned in the lower center, composed of many fine, overlapping lines that radiate from a point. The overall effect is one of dynamic energy and futuristic design.

2+2 PROJECTS



As part of the IGSTC-supported 2+2 collaborative project BETTERyRec (Integrated Bio & Hydrometallurgical techniques for the recovery of metals from battery waste and recycling wastewater), a delegation from CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT), Bhubaneswar, visited key academic and industrial partner institutions in Germany to advance joint research activities on battery waste recycling and critical metal recovery. The visit brought together researchers from both countries for technical discussions, project review activities and laboratory interactions aimed at strengthening scientific cooperation and aligning ongoing research efforts. The Indian delegation comprised Dr. Mamata Mohapatra, Dr. V. Aishvarya and Er. R. Sathish, who engaged with project partners across Dresden, Freiberg and Aachen through scientific exchanges, technical presentations and facility visits.

The programme commenced at Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, where the delegation met Dr. Katrin Pollmann and her biotechnology research team at the Helmholtz Institute Freiberg for Resource Technology (HIF). The discussions offered insights into biotechnology-based approaches for resource recovery and highlighted the institute's research capabilities in this domain. At HIF, Freiberg, the team interacted with Dr. Martin Rudolph

and researchers working in mineral processing and extractive metallurgy, followed by visits to laboratory and pilot-scale facilities. A tour of the institute's recently established e-waste processing facility showcased advanced technologies for secondary resource beneficiation and valuable metal recovery. Technical presentations from Indian and German researchers provided a platform for detailed exchanges on battery recycling, process metallurgy and resource recovery. Presentations by Dr. Mamata Mohapatra and Dr. V. Aishvarya on chemical and biochemical approaches to battery waste recycling generated productive discussions and helped identify key challenges. The visit also included a dedicated review meeting to assess progress achieved under the BETTERyRec project.



The delegation subsequently visited MEAB Chemie Technik in Aachen, where discussions with Managing Director Dr. Carsten Dittrich and his engineering team focused on industrial applications of continuous solvent extraction technologies for processing complex leach solutions obtained from secondary resources. The programme concluded at RWTH Aachen University with technical deliberations with Prof. Srecko Stopic on ongoing hydro- and pyrometallurgical process

developments and prospects for future collaboration. During the visit, the CSIR-IMMT team also showcased its research infrastructure, capabilities in extractive hydro-bio-metallurgy, activities under the Critical Minerals Mission Centre, and ongoing work in lithium-ion battery recycling, further reinforcing the Indo-German partnership in sustainable critical mineral recovery and battery recycling technologies.

The visit brought together researchers from both countries for technical discussions, review the project activities and laboratory interactions aimed at strengthening scientific cooperation and aligning ongoing research efforts.



FEATURE

On 20th July 2026, IGSTC convened an inspiring Interaction Evening in New Delhi, bringing together a distinguished community of researchers, innovators, industry leaders and policymakers committed to advancing S&T cooperation between India and Germany. More than a networking event, this gathering reflected the depth, diversity and enduring relevance of the Indo-German partnership in research, technology and innovation through shared thoughts, scientific excellence and a collective commitment to addressing emerging global challenges. In his address, Dr. Philipp Ackermann, Ambassador of Germany to India and Bhutan, described IGSTC as a cornerstone of Indo-German scientific cooperation and pointed to the remarkable success of the IGSTC WISER programme. He expressed particular satisfaction at witnessing an increasing number of women researchers strengthening bilateral scientific ties, underscoring how the programme has become an important platform for nurturing talent and expanding the reach of Indo-German collaboration. Adding further distinction to the evening was the participation of eminent leaders from the science, technology and industry ecosystem including Dr. Praveen Kumar Somasundaram, Head of the International Cooperation Division, DST and Co-Chair of the IGSTC Governing Body, and Mr. R. Madhan, Former Director of IGSTC, Dr. Arabinda Mitra, Advisor at the Foundation for Innovation and Technology Transfer, IIT Delhi, and former Scientific Secretary to the Office of the PSA Government of India and Mr. Dhananjay Singh, Managing Director, Merck Life Science India.

The most engaging moments of the evening came from the researchers themselves. Awardees from IGSTC's flagship programmes, including 2+2 Collaborative R&D Projects, WISER, PECFAR and

Industrial Fellowships, shared personal accounts of their scientific journeys and collaborative experiences within the Indo-German research landscape. From sustainable agriculture and clean energy to advanced manufacturing and digital technologies, their stories showed how joint research efforts are translating into tangible scientific and technological outcomes.

The occasion also witnessed the release of the IGSTC Annual Report 2025-26, showcasing another year of achievements in collaborative research, researcher mobility, industry engagement and innovation-led initiatives.

The evening also celebrated a new generation of researchers whose achievements reflect the growing vibrancy, excellence and future promise towards Indo-German scientific partnership. In a particularly meaningful moment, IGSTC expressed its appreciation to Dr. Philipp Ackermann for his steadfast support in advancing scientific and technological engagement between India and Germany. As the dialogue continued into the networking session, the event highlighted that the true value of international cooperation is found not only in scientific achievements, but also in the partnerships it fosters, the opportunities it unlocks and the ambitions it inspires.

From sustainable agriculture and clean energy to advanced manufacturing and digital technologies, the stories showed how joint research efforts are translating into tangible scientific and technological outcomes.



The background is a vibrant blue with abstract, flowing white and light blue lines that create a sense of movement and energy. A central, teardrop-shaped element is prominent, surrounded by radiating lines. The overall aesthetic is modern and technological.

BILATERAL WORKSHOPS

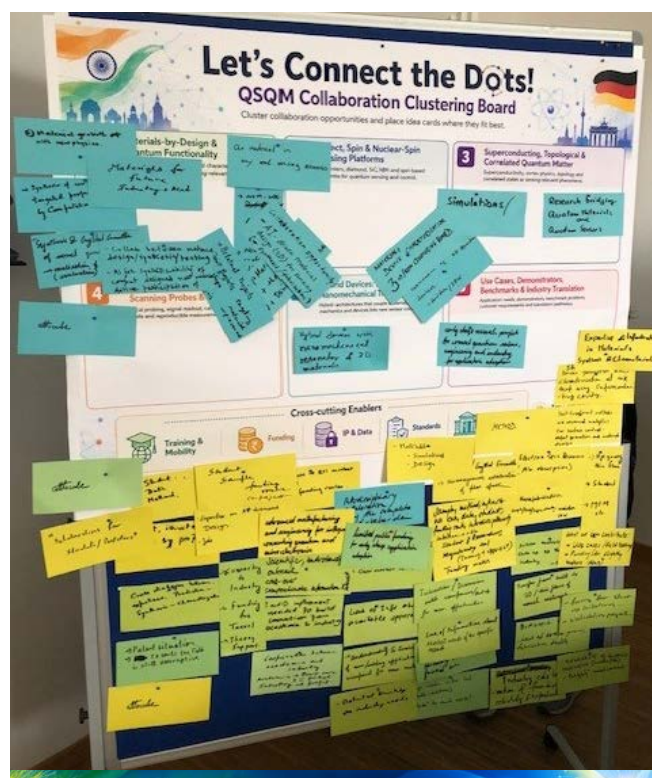


Quantum Sensing: Shaping the Future through Indo-German Research Cooperation

The Indo-German workshop on “Quantum Sensing with Quantum Materials: Present and Future” brought together leading scientists, early-career researchers, and industry experts from India and Germany at Leibniz Institute for Solid State and Materials Research (IFW) Dresden, Germany, from 29th June to 3rd July 2026. Organized under the support of IGSTC, the event provided a focused platform to discuss how advances in quantum materials can drive the development of next-generation quantum sensing technologies.

Over four days, participants explored emerging directions at the intersection of materials science, condensed matter physics, and quantum technologies. Scientific discussions covered AI-assisted design of quantum materials, superconductivity, topological quantum states, spin-based sensing, nanomechanical systems, and advanced imaging platforms. Several presentations highlighted how novel material architectures and quantum phenomena can improve the sensitivity, precision, and scalability of future sensing devices. The workshop also showcased a range of cutting-edge developments, including Prediction of new materials with desired functionality using AI/ML, Topological nodal i-wave

superconductivity in PtBi₂, Using frustrated magnets for efficient cooldown to mK temperature, Novel Diamond NV-based microscope and scanning NV for quantum sensing applications, Alternative sensing applications: Entangled assisted sensing, spin-based quantum sensing, sensing using noise, Planar scanning probe microscopy, Photon counter based on all 2D hybrids.



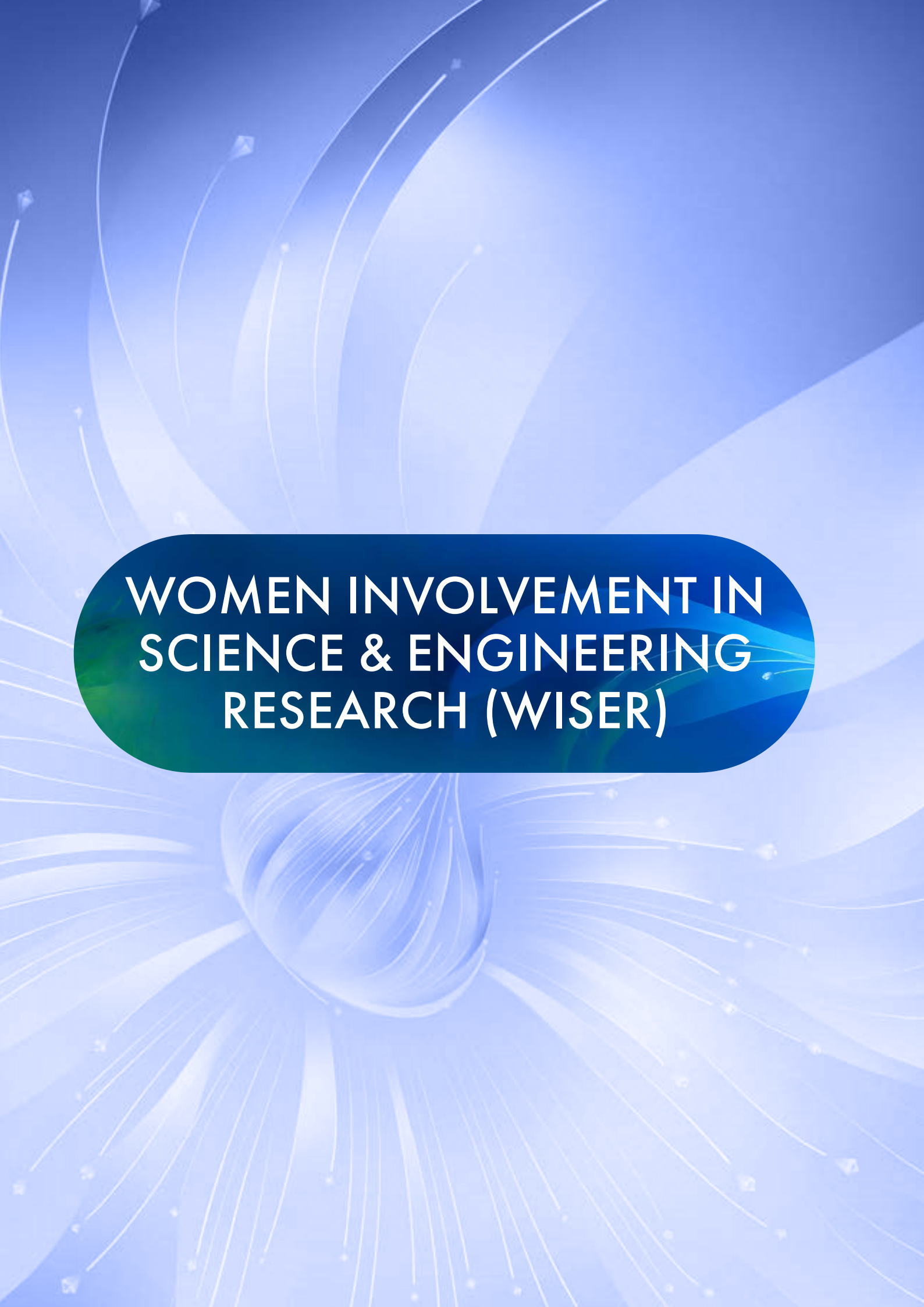
These advances illustrated the rapidly expanding landscape of quantum sensing and its potential applications across science, industry, and technology.

A key feature of the workshop was its emphasis on translating scientific excellence into collaborative research and innovation. Dedicated discussions examined opportunities for joint infrastructure, researcher mobility, data-sharing frameworks, prototype development, Pilot scale demonstration for selected use cases, joint exploration of patent landscape, market study and valorization, and stronger engagement with industry. Participants identified several priority areas for future Indo-German cooperation, including materials-to-sensor development pipelines, quantum device integration, reproducible measurement platforms, and application-driven technology validation.

The meeting concluded with a forward-looking dialogue on building sustained partnerships that can accelerate progress from fundamental discoveries to practical quantum technologies. The workshop underscored the complementary strengths of India and Germany and reinforced the importance of international collaboration in advancing the global quantum technology ecosystem.

Dedicated discussions examined opportunities for joint infrastructure, researcher mobility, data-sharing frameworks, prototype development, Pilot place demonstration for selected use cases, joint exploration of patent landscape, market study and valorization, and stronger engagement with industry.





WOMEN INVOLVEMENT IN SCIENCE & ENGINEERING RESEARCH (WISER)



Patient-derived brain tumour models studied with human blood–brain barrier to better understand and evaluate cancer therapies

Treating brain tumours is particularly challenging because the blood–brain barrier (BBB) restricts the movement of therapeutic molecules into the brain. The WISER collaboration between Dr. Ann-Christin Hau, University Hospital Frankfurt, and Prof. Kavi Devraj, BITS Pilani, Hyderabad, is addressing this challenge by bringing together patient-derived brain tumour organoids with microfluidic and multicellular BBB models. The project is ongoing, with the latest mobility visit held from 29th June to 21st July 2026.

A major outcome of the visit was the successful transfer of patient-derived brain tumour organoid technology to BITS Pilani. Tumour tissue from four patients was collected through newly established clinical collaborations and processed using protocols transferred from Goethe University Frankfurt. Two of the four samples successfully developed into patient-derived brain tumour organoid cultures, establishing the first stage of a locally implemented translational workflow.



At the same time, the teams advanced the microfluidic BBB component by evaluating chip designs, biomaterials and cell-seeding strategies for multicellular cultures involving endothelial cells, pericytes and astrocytes. The collaboration also enabled reciprocal technology transfer, with expertise in brain tumour organoids exchanged for training in primary brain endothelial cell isolation and BBB biology.

Beyond the experiments, the collaboration has established clinical, institutional and training networks, including partnerships with three Hyderabad hospitals, reciprocal student exchange and plans for an institutional MoU and future DFG–DST research training consortium.

The WISER collaboration between Dr. Ann-Christin Hau, University Hospital Frankfurt, and Prof. Kavi Devraj, BITS Pilani, Hyderabad, is addressing this challenge by bringing together patient-derived brain tumour organoids with microfluidic and multicellular BBB models.



Understanding seed development without fertilisation to unlock new routes for crop improvement

Seeds normally begin developing after fertilisation, but in some plants, hormonal signals can trigger aspects of seed development independently. Dr. Rita Sharma, Scientist E at NABI, is investigating the role of long non-coding RNAs (lncRNAs) in this process in Arabidopsis, in collaboration with Dr. Duarte Dionísio Figueiredo at the Max Planck Institute of Molecular Plant Physiology, Potsdam. The WISER project is examining how these regulatory molecules interact with phytohormone signalling to control autonomous seed development.

Her June 2026 research visit helped move the project from identifying candidate genes and baseline observations towards testing their underlying molecular mechanisms. Working with the host team, Dr. Sharma conducted pollination experiments to identify the early stages of seed development critical for evaluating transgenic plants. She also worked with researchers at the institute to optimise tissue-clearing methods for high-resolution microscopy and CUT&Tag for epigenome profiling, establishing approaches needed for the next phase of molecular analysis.



The collaboration also expanded beyond the immediate project. Discussions with Dr. Alisdair Fernie opened avenues for future work in crop biofortification, while a visit to Fraunhofer IME, Aachen, initiated discussions on combining laser-based transfection with the license-free OpenCRISPR-1 nuclease for future genome-engineering applications.

The WISER project is examining how these regulatory molecules interact with phytohormone signalling to control autonomous seed development.



The background is a vibrant blue with abstract, flowing white and light blue lines that create a sense of motion and depth. A large, stylized teardrop shape is positioned in the lower center, with lines radiating from it. The overall aesthetic is modern and technological.

PAIRED EARLY CAREER FELLOWSHIP IN APPLIED RESEARCH (PECFAR)



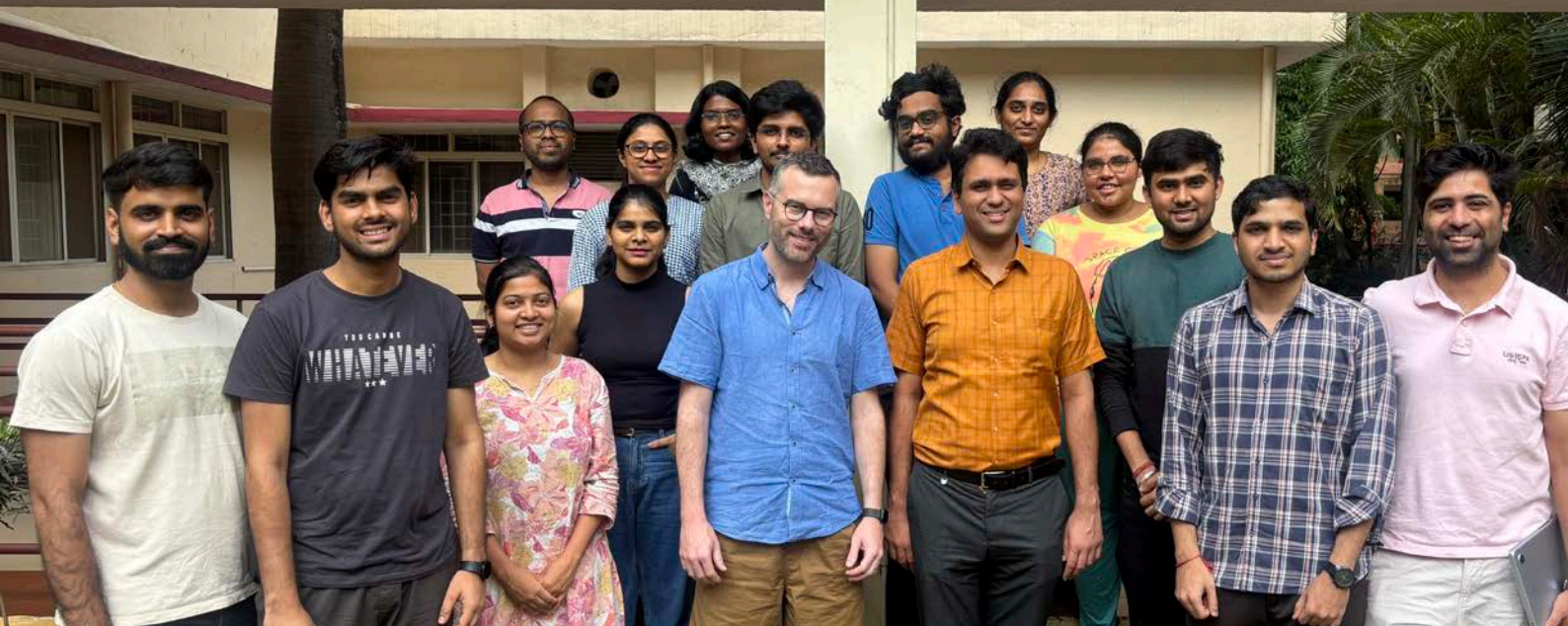
Computational Design Make High-Entropy Alloys Easier to 3D Print

High-entropy alloys contain several elements in carefully controlled proportions, offering the potential for high strength and thermal stability but making their design and manufacture challenging. Under PECFAR, Dr. Jan Wegner and Prof. Rahul M R combined computational modelling with additive manufacturing to identify promising alloy compositions and test them through in-situ alloying. Thermodynamic predictions were used to guide the formation of intermetallic phases, while high-speed pyrometry, microscopy and XRD helped connect processing conditions with the resulting material structure. The work demonstrated three- to five-component alloys with tunable intermetallic phase fractions and increased hardness. Published results received the Best Paper Award at RapidTech 2026.

The reciprocal visits also extended the collaboration beyond the laboratory. Dr. Rahul visited TU Dortmund, TU Munich and BMW AG, while Dr. Wegner visited IIT Madras and NIT Calicut, where he delivered seminars and discussed advanced additively manufactured materials with researchers. Future work includes process optimisation, Ni-based superalloy studies, joint publications, an IGSTC 2+2 proposal and a DFG proposal.

Prof. Rahul MR combined computational modelling with additive manufacturing to identify promising alloy compositions and test them through in-situ alloying.





Nanoconfinement Changes How Catalysts Convert CO₂

Dr. Ananth Govind Rajan of IISc Bengaluru and Prof. Alexander Schlaich of Hamburg University of Technology explored how nanoconfinement changes the local reaction environment during electrochemical CO₂ reduction (CO₂RR). Prof. Schlaich's March-April 2026 visit to IISc and Dr. Rajan's June 2026 stay in Hamburg advanced a multiscale simulation strategy combining grand-canonical constant-potential simulations with first principles (ab initio) calculations. The approach uses constant-potential simulations to model metal-ion adsorption on catalyst surfaces and surface-ion concentrations, which feed into calculations of CO-protonation activation barriers, a key step in CO₂RR. The researchers established a working protocol, identified target catalyst-ion systems for the first joint calculations, and planned simulation-

code and surface-concentration-data exchange, aiming for a joint manuscript in 2027.

The fellowship also expanded scientific networks, with Dr. Rajan visiting institutions in Stuttgart and Berlin, including CMWS-DESY, for discussions on 2D materials, CO₂RR microkinetics, machine learning and nanoconfined interfaces, while Prof. Schlaich visited IIT Bombay, IIT Madras and JNCASR to explore molecular simulations, confined electrochemical systems and catalysis.

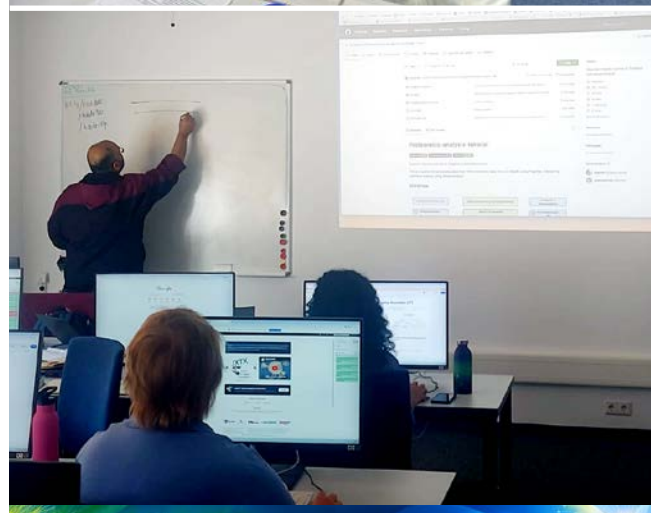
The approach uses constant-potential simulations to model metal-ion adsorption on catalyst surfaces and surface-ion concentrations



Multomics Reveal How Microbes Produce Valuable Siderophores

Siderophores are molecules microbes make to “grab” iron, and Dr. Ishaan Gupta's research is trying to understand the molecular machinery behind this process so that it can potentially be harnessed for biotechnology and metal recovery. During his May-July 2026 PECFAR fellowship, Dr. Gupta of IIT Delhi worked at HZDR Dresden on multiomics approaches to understand the molecular basis of siderophore production and microbial bioremediation. Dr. Gupta developed transcriptomic and proteomic pipelines and applied them to a *Streptomyces* strain to investigate links between siderophore production and bacterial morphology, and to *Sphingobium quisquiliarum* to study the molecular mechanisms underlying graphene oxide biodegradation. Discussions also covered AntiSMASH-based genome mining to identify biosynthetic gene clusters associated with siderophore production. At the hands-on Practical Multiomics and Data Analysis workshop he trained HZDR researchers in these approaches.

During his May-July 2026 PECFAR fellowship, Dr. Ishaan Gupta of IIT Delhi worked at HZDR Dresden on multiomics approaches to understand the molecular basis of siderophore production and microbial bioremediation.



CENTRE FOR MICRO NANO MANUFACTURING & METROLOGY



Fiber-Optic Interferometry Enable Precise Measurements in Confined Spaces

During her visit to India in May 2026, Caroline Girmen of Fraunhofer IPT, Aachen, contributed to the Indo-German collaboration on fiber-optic metrology and low-coherence interferometry for high-resolution cavity analysis. The work focused on developing optical fiber tips and compact interferometric approaches for precise, non-contact distance measurement in confined environments, including boreholes, fuel-injection nozzles and medical devices. A key technical contribution from Fraunhofer IPT was its expertise in fiber-tip fabrication and GRIN (graded-index) fiber processing, complementing CMTI's optical-metrology capabilities. Caroline's scientific exchanges included CMTI's Micro Nano Manufacturing and Metrology Lab and IIT Delhi's SeNSE Lab, supporting discussions on advanced photonic sensing and future applications. The collaboration subsequently produced a jointly developed IGSTC 2+2 proposal for medical applications.

A key technical contribution from Fraunhofer IPT was its expertise in fiber-tip fabrication and GRIN (graded-index) fiber processing, complementing CMTI's optical-metrology capabilities.





Can Real-Time Process Data Make Metal 3D Printing Smarter?

During her May–June 2026 PECFAR fellowship, Dr. Anusha Epparla of CMTI, Bengaluru, worked at Fraunhofer IAPT, Hamburg, on data-driven metal additive manufacturing. The research focused on process modelling, in-situ monitoring and intelligent process control, including analysis of thermal behaviour, residual-stress evolution and microstructural development during printing. Advanced sensing techniques such as Optical Coherence Tomography (OCT), pyrometry and laser scanning were explored

to enable real-time process characterisation, defect prediction and quality assurance. The work also included fabrication and characterisation of H13 steel components, with adaptive strategies such as heat-input regulation, interlayer cooling and melt-pool monitoring. Visits to TU Hamburg, KIT, DESY and Fraunhofer CML further expanded collaboration in AI-enabled manufacturing, synchrotron characterisation, digital twins and Industry 4.0.



The research focused on process modelling, in-situ monitoring and intelligent process control, including analysis of thermal behaviour, residual-stress evolution and microstructural development during printing.



How Can Power Converters Be Better Protected from Faults?

During his May–July 2026 PECFAR visit, Dr. Dharavath Kishan of NITK Surathkal conducted collaborative research at the Energy Lab, Karlsruhe Institute of Technology (KIT) with a focus on power-electronic converter systems. A key scientific direction of the collaboration is the development of a coordinated DC-link capacitor fault-interruption strategy, designed to improve the protection and reliability of power converters during capacitor faults. The research stay also enabled exchange of experimental methodologies and laboratory

practices in power electronics. Dr. Kishan visited the Luxembourg Institute of Science and Technology, TU Darmstadt, University of Stuttgart and Eindhoven University of Technology, broadening discussions on power electronics, electrical engineering and energy systems. At PCIM Europe 2026, he explored developments in power semiconductors, electric drives and energy-conversion systems. The collaborative research resulted in a conference paper accepted for PEMC 2026.



The research stay also enabled exchange of experimental methodologies and laboratory practices in power electronics.

The background is a vibrant blue with abstract, flowing white and light blue lines that create a sense of motion and energy. A large, stylized teardrop shape is positioned in the lower center, with lines radiating from it. The overall aesthetic is modern and technological.

EMPOWERING RESEARCHERS: IGSTC INDUSTRIAL FELLOWSHIP PROGRAM

Sustainable Wearable electronics: From research to application

Dr. Gargi Konwar, an awardee of the IGSTC Industrial Fellowship Programme (PDIF-2025), pursued postdoctoral research at the Fraunhofer Institute for Manufacturing Engineering and Automation (Fraunhofer IPA), Stuttgart, Germany. Working in the Application Technology of Functional Materials group under the mentorship of Dr. Carsten Glanz, she is exploring sustainable approaches to printed electronics with a focus on environmentally responsible material systems. Building on her doctoral research at the Indian Institute of Technology Jodhpur, Dr. Konwar has been developing aqueous carbon-based conductive inks for flexible and wearable electronic devices. Her work addresses a key challenge in the field: replacing conventional toxic additives with bio-derived binders and surfactants while retaining the electrical and mechanical properties needed for device fabrication. These inks have been successfully evaluated for flexible conductive electrodes and humidity-sensing applications, demonstrating how sustainable materials can be combined with scalable printing technologies to create functional electronic systems.

Beyond laboratory research, the fellowship has provided valuable exposure to the international innovation ecosystem.



Dr. Konwar participated in LOPEC 2026 in Munich, gaining first-hand insights into emerging industrial trends in printed and flexible electronics, and attended the INFRACHIP Research Acceleration Programme in Greece, which fostered exchanges on microelectronics and advanced materials. Dr. Konwar presented her work, "Green Electrodes: Aqueous Biopolymer and Carbon-based Conductive Inks for Flexible Electronics," at 33rd International Workshop on Active-Matrix Flatpanel Displays and Devices (AM-FPD 2026), engaging with researchers from across the world. Through these experiences, the fellowship has strengthened her understanding of how scientific discoveries can be translated into practical industrial solutions while reinforcing the role of sustainability in future electronic technologies.

Building on her doctoral research at the Indian Institute of Technology Jodhpur, Dr. Konwar has been developing aqueous carbon-based conductive inks for flexible and wearable electronic devices.



Intelligent Aviation through Edge AI

As part of the IGSTC Postdoctoral Industrial Fellowship (PDIF-2025), Dr. Garima Nain conducted research at Airbus Central Research and Technology (Space and Defence), Germany, under the guidance of Dr. Paulo Mendes. Having completed her doctoral studies at Atal Bihari Vajpayee Indian Institute of Information Technology and Management (ABV-IIITM), Gwalior in 2025, she worked at the intersection of artificial intelligence, edge computing, and intelligent industrial systems. Her research at Airbus addressed a pressing challenge in modern aviation: how distributed AI systems can continuously learn from operational data without compromising privacy or relying on centralized data transfer. To address this, she developed Federated Continual Learning (FCL) frameworks that allow individual edge devices to update their knowledge locally while contributing to a shared global intelligence network. The work has particular relevance for next-generation aviation systems, where adaptation, reliability, and secure data handling are increasingly important.

Alongside her research activities, Dr. Nain has continued to contribute to the scientific community through publications on edge computing, smart manufacturing, and continual learning systems.

Under the fellowship she published two papers titled "Decoding the future of edge computing in smart manufacturing: an Industry 5.0 perspective" in The International Journal of Advanced Manufacturing Technology and "Balancing Retention and Adaptability: A Comparative Study of Continual Learning Methods in Smart Manufacturing", in Advanced Network Technologies and Intelligent Computing (ANTIC) 2025 in the series of Communications in Computer and Information Science.



Her fellowship has provided access to an industrial research environment where academic ideas can be evaluated against real-world technological requirements. The experience has strengthened her expertise in distributed AI, large-scale edge intelligence, and adaptive learning systems, while fostering collaborations with researchers from diverse disciplines and nationalities. Beyond the laboratory, exposure to Germany's research and innovation ecosystem has offered valuable insights into international scientific cooperation and technology development. Together, these experiences have broadened her perspective on the future of AI-driven industrial systems and reinforced the importance of global partnerships in translating advanced research into practical technological solutions.

Dr. Nain has continued to contribute to the scientific community through publications on edge computing, smart manufacturing, and continual learning systems.





Advancing Metal 3D Printing through Surface Engineering

Dr. Jibin Boban, an IGSTC Industrial Post-Doctoral Fellow-2025, completed his fellowship at the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (Fraunhofer-IFAM), Bremen, Germany, under the mentorship of Dr. Ralph Wilken. Building upon his doctoral research at Indian Institute of Technology (IIT) Palakkad and subsequent work in precision manufacturing, Dr. Boban focused on one of the key technological challenges facing metal additive manufacturing: improving the surface quality and long-term reliability of printed components. His research examined electrochemical polishing of laser powder bed fused aluminium-silicon alloys using environmentally preferable sodium-based electrolytes. The study sought to understand how surface treatment could reduce defects commonly associated with additively manufactured parts and improve their fatigue performance, a critical requirement for aerospace and other high-performance engineering applications.

Through detailed investigations of material removal behavior, surface texture evolution and process optimization, the work generated valuable insights into achieving high-quality electropolished surfaces while minimizing pitting and other surface irregularities. The fellowship also provided Dr. Boban with extensive exposure to Germany's applied research

ecosystem, advanced laboratory practices and industry-oriented innovation culture. Interactions with manufacturing experts, participation in scientific events and visits to leading research facilities broadened his understanding of emerging trends in advanced manufacturing technologies. The experience strengthened his expertise in surface engineering, materials characterization and additive manufacturing, while reinforcing the importance of international collaboration in translating research outcomes into industrially relevant solutions. His work contributes to ongoing efforts to improve the scalability, performance and industrial adoption of metal 3D-printing technologies across engineering sectors. Beyond his research activities, Dr. Boban gained valuable exposure to Germany's cultural landscape, where engagements with diverse communities and traditions broadened his global outlook and highlighted the value of international exchange in science and technology.

Interactions with manufacturing experts, participation in scientific events and visits to leading research facilities broadened his understanding of emerging trends in advanced manufacturing technologies.

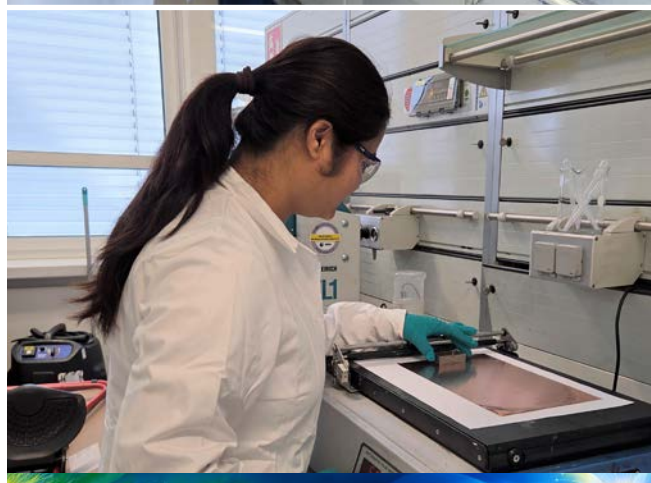
Turning Battery and Solar Waste into Next-Generation Energy Materials

As an IGSTC Post-Doctoral Industrial Fellow, Dr. Priyanka Mukherjee completed her fellowship at Fraunhofer IWKS, Hanau, Germany, where she worked on advancing circular approaches for critical energy materials. Building on her doctoral research at CSIR-IMMT and NIT Durgapur, she investigated methods to recover and upgrade valuable materials from two rapidly growing waste streams: spent lithium-ion batteries and end-of-life photovoltaic modules. Her work focused on extracting graphite from used battery anodes and recovering silicon from discarded solar panels for reuse in next-generation lithium-ion batteries. A major aspect of the research involved restoring structural defects that typically develop in recycled graphite, thereby improving its suitability for high-performance energy-storage applications. In parallel, she developed environmentally friendly hydrometallurgical processes for recovering high-purity silicon while minimizing the use of hazardous chemicals.

The fellowship provided Dr. Mukherjee with access to one of Europe's leading centres for materials recycling and resource recovery, enabling her to work closely with experts in energy materials and circular economy technologies. Her research successfully demonstrated graphite and silicon recovery at purity levels of 98-99%, with encouraging electrochemical performance in battery systems. She shared these findings at international forums, including AABC Europe 2026 and the Battery Recycling Expo in Frankfurt, fostering exchanges with researchers and industry stakeholders working on sustainable battery technologies. By combining battery recycling, photovoltaic waste valorisation and advanced materials engineering, her work highlighted practical pathways for reducing dependence on primary raw materials and strengthening the sustainability of future

energy-storage systems. Beyond the laboratory, her experience of Germany's culture, landscapes and strong commitment to environment further reinforced the importance of sustainability in everyday life.

A major aspect of the research involved restoring structural defects that typically develop in recycled graphite, thereby improving its suitability for high-performance energy-storage applications.





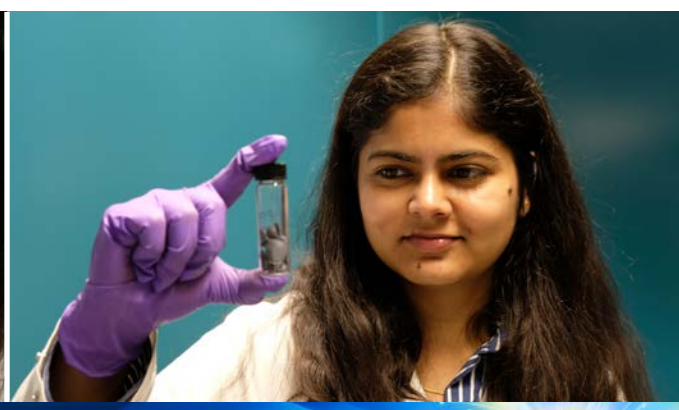
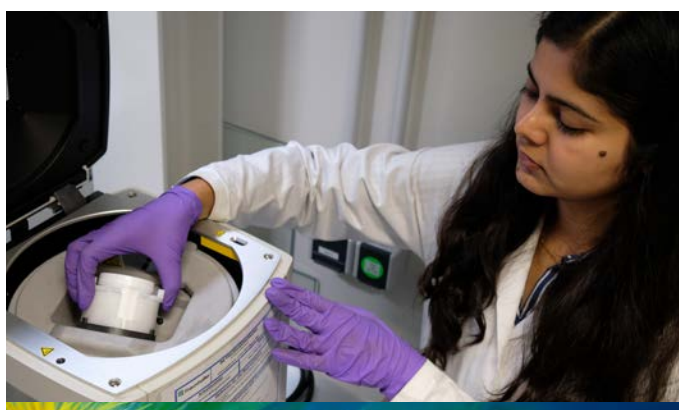
Advancing Solid-State Battery Cathode Manufacturing

The transition to all-solid-state batteries is widely seen as a major step toward safer, higher-energy storage systems. During her IGSTC Post-Doctoral Industrial Fellowship at the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM) and the Fraunhofer Center for Energy Storage and Systems (ZESS), Germany, Shrishti Sharma explored strategies that could help to address the challenges of large-scale cathode composite manufacturing. Following her doctoral work at BITS Pilani, she focused on dry-processing technologies for battery cathodes, an approach that eliminates the need for solvents and energy-intensive drying stages commonly used in conventional electrode production. The research addressed an important industrial need: developing battery manufacturing routes that are not only efficient and scalable but also environmentally sustainable.

Working with cathode composites based on layered oxide materials and sulfide solid electrolytes, Dr. Sharma investigated how powder characteristics, mixing behaviour and electrode architecture influence

battery performance. Her study revealed that even small variations in porosity and distribution in cathode constituents can significantly affect lithium-ion mobility and long-term cell stability. The findings provided practical insights into designing dense, well-connected cathodes capable of supporting high-performance all-solid-state batteries. Conducted within one of Europe's leading applied research environments, the fellowship also offered valuable exposure to industrial battery development and international collaboration. The work contributes to ongoing efforts to make solid-state batteries a commercially viable technology with improved ionic conductivity, rate capability, robust interfaces, and stable long-term cycling in ASSB cathodes.

Working with cathode composites based on layered oxide materials and sulfide solid electrolytes, Dr. Sharma investigated how powder characteristics, mixing behaviour and electrode architecture influence battery performance.



Multi-modal characterization of next-generation acoustic metamaterials

As an IGSTC Post-Doctoral Industrial Fellow, Dr. Yash Gopal Mittal carried out research at the Fraunhofer Institute for Non-Destructive Testing (IZFP), Saarbrücken, Germany, where he explored advanced material systems designed to control low-frequency noise and vibration. Building on his doctoral work at IIT Bombay in additive manufacturing and robotics, he turned his attention to vibro-acoustic metamaterials, an emerging class of engineered structures capable of manipulating sound and vibration in ways that conventional materials cannot. His research focused on developing lightweight, programmable plate-type metamaterials that combine metallic resonators with responsive polymer layers. By carefully tailoring the geometry and material composition, the study sought to achieve targeted vibration attenuation without the additional weight and bulk typically required by traditional damping solutions. The work brought together analytical modelling, numerical simulations and experimental validation to better understand how these structures respond under dynamic loading conditions.

The research resulted in a new analytical framework for predicting the frequency response of vibro-acoustic metamaterials, with experimental studies confirming the model's effectiveness. Beyond its scientific significance, the work has potential applications in urban infrastructure, and industrial environments where



low-frequency noise remains a persistent challenge. During the fellowship, Dr. Mittal also expanded international research networks through collaborations involving institutions in Germany, France and the United States, contributing to researcher exchange activities and new multidisciplinary initiatives in advanced manufacturing and robotics. Exposure to Germany's collaborative research culture further enriched the experience, offering valuable insights into mentorship, scientific communication and industry-oriented innovation. The fellowship strengthened his expertise in advanced materials and engineering design while supporting the broader goal of translating fundamental research into practical technologies for society.



The work brought together analytical modelling, numerical simulations and experimental validation to better understand how these structures respond under dynamic loading conditions.

The background is a vibrant blue with abstract, flowing white lines that create a sense of movement and depth. A large, stylized teardrop shape is positioned in the lower center, with lines radiating from it. The overall aesthetic is modern and dynamic.

SMALL IMMEDIATE NEED GRANTS (SING)



Cotton seed protein: A new frontier of sustainable nutrition

Dr. Manoj Kumar from ICAR-Central Institute for Research on Cotton Technology (ICAR-CIRCOT), Mumbai, undertook a research visit to Prof. Tuba Esatbeyoğlu's laboratory at the Institute for Food and One Health (FOH), Leibniz University Hannover, Germany, under the IGSTC SING Award, to investigate the safety and nutritional potential of cottonseed protein isolate (CSPI) for human consumption. The collaborative study addressed a critical scientific challenge in developing sustainable plant-based protein sources by generating preliminary evidence on the biological safety and functional quality of CSPI.

The project focused on two key objectives: evaluating the in-vitro safety profile of CSPI and assessing its functional properties relevant to food applications. A standardized protocol was employed for the extraction and purification of cottonseed protein isolate from cottonseed meal, followed by comprehensive toxicological assessment using mammalian cell culture models. During the research stay at Leibniz University Hannover, Dr. Kumar received advanced training in mammalian cell culture techniques and cytotoxicity evaluation methodologies. Cytotoxicity studies were conducted using CaCo-2 human intestinal epithelial cells, while complementary investigations were performed later at ICAR-CIRCOT using NIH 3T3 mouse fibroblast cells. The results demonstrated that

CSPI exhibited no significant cytotoxic effects across the tested concentration range, with cell viability remaining comparable to untreated controls. These findings provide important preliminary evidence supporting the biological safety of cottonseed protein isolate and indicate a lesser likelihood of adverse cellular responses. In addition to safety evaluation, the study examined the nutritional functionality of CSPI through in-vitro protein digestibility analysis. The purified protein isolate exhibited substantially higher digestibility (85.71%) compared to cottonseed meal (71.39%), highlighting the effectiveness of the isolation process in improving protein accessibility and nutritional quality. Enhanced digestibility suggests improved bioavailability of amino acids, indicating the increasing potential applicability of CSPI as a high-value ingredient in future food formulations.

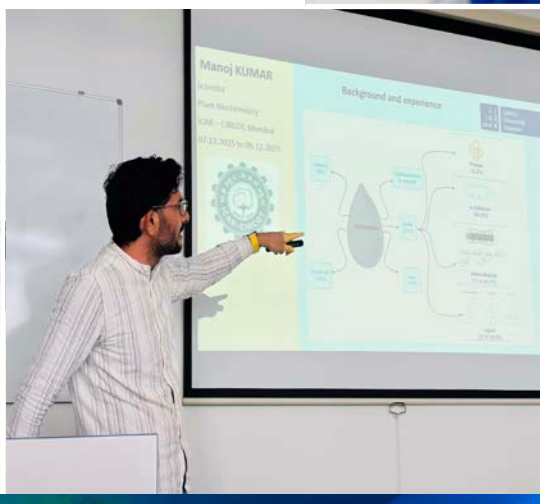
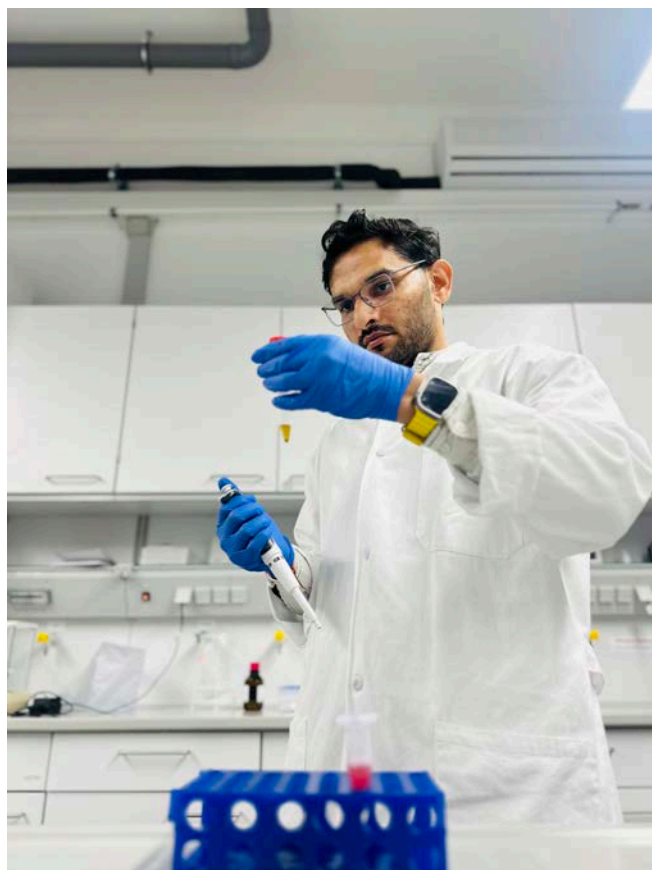




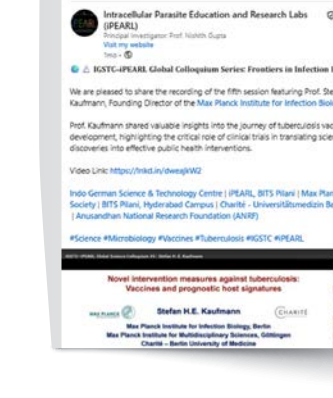
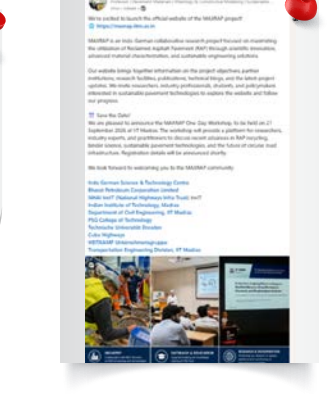
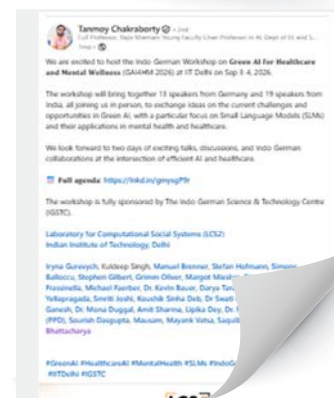
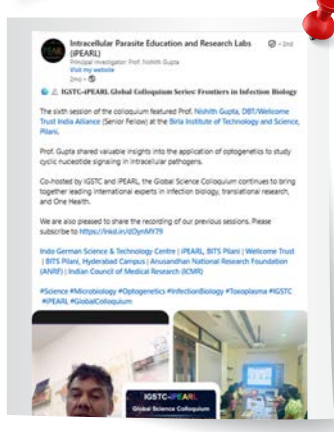
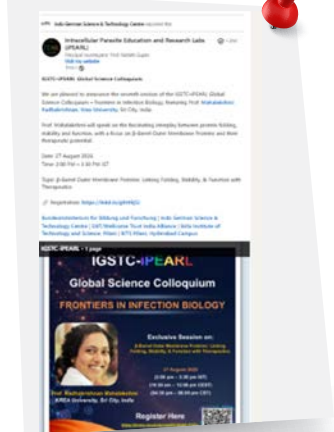
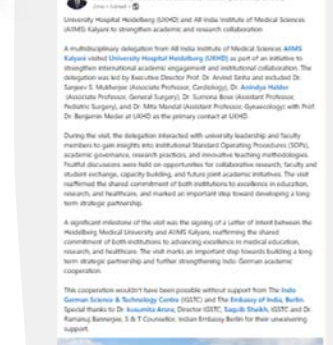
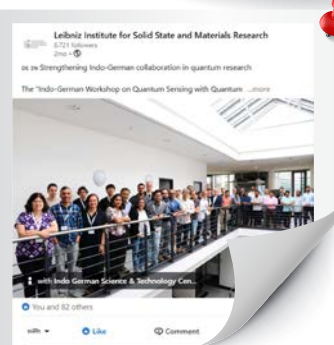
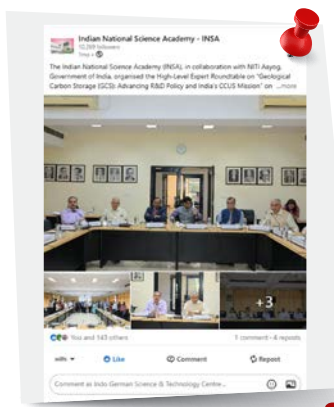
Beyond the scientific outcomes, the award strengthened institutional linkages between ICAR-CIRCOT and Leibniz University Hannover through knowledge exchange, transfer of advanced analytical methodologies, and capacity building in food safety research.

The results establish a strong foundation for future Indo-German collaborations on plant-based proteins, including in-vivo safety studies, development of functional food products, and preparation of data required for regulatory evaluation of cottonseed-derived food ingredients.

The collaborative study addressed a critical scientific challenge in developing sustainable plant-based protein sources by generating preliminary evidence on the biological safety and functional quality of CSPI.



IGSTC Unplugged: Echoes Across the Digital Sphere



A NEW DIGITAL GATEWAY FOR **INDO-GERMAN INNOVATION**

Explore • Connect • Collaborate

LAUNCH OF THE NEW IGSTC WEBSITE

Officially inaugurated by
DR. JASPER WIECK

German Ambassador to India and Bhutan



Partnerships



Collaborative R&D



Industry Engagement



Research Exchange



Sustainable Solutions



Future Technologies



Discover Opportunities | Build Partnerships | Create Impact

Visit the new IGSTC website
www.igstc.in

One platform. Countless opportunities for Indo-German collaboration.



BEACON

**BILATERAL EXCELLENCE
FOR ADVANCING COOPERATION &
OPPORTUNITY NETWORK**

(Summer Edition)

**Newsletter of the
Indo-German Science & Technology Centre**

Volume 10 | Issue 2 | May-August 2026

.....

PUBLISHED BY
Indo-German Science & Technology Centre (IGSTC)

COMPILED & EDITED BY

Dr Rupak Bhattacharya
.....

Ms Isha Goel
.....

Dr Kusumita Arora

**CONNECTING INDIA AND GERMANY THROUGH
SCIENCE, TECHNOLOGY AND INNOVATION**

Indo-German Science & Technology Centre

IGSTC Secretariat – India

Indo-German Science & Technology Centre

Ground Floor, Block – II Technology Bhavan, New Mehrauli Road, New Delhi – 110016

Phone: +91-011-26543500

German Project Office

German Aerospace Center (DLR-PT)

Project Management Agency, Heinrich-Konen-Str. 1, Bonn- 53227

Phone: +49-228 38211473



 IGSTC.IndoGerman



 company/indo-german-science-tech-centre



 @INDOGSTC



 www.igstc.in

 info.igstc@igstc.org