



TO CATALYSE INDO-GERMAN
R&D PARTNERSHIPS

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.

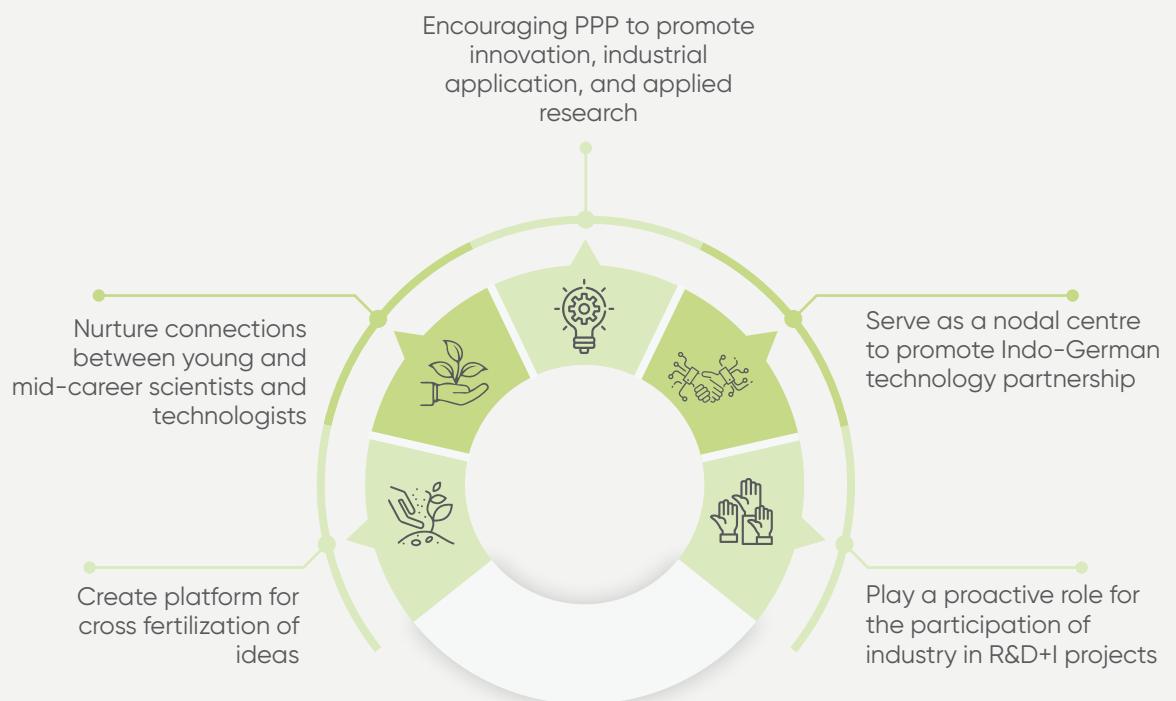


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2+2
Projects



INGERBDIAM

Development of Biodegradable Alloys and AM Processes for Soft Tissue Anchors (STAs)

In the INGERBDIAM project, Fe–Mn alloy ingots and powders were developed through Vacuum Induction Melting (VIM) and Inert Gas Atomization (IGA) techniques, respectively.

The 2+2 project titled “Development of Biodegradable (BD) Alloys and Additive Manufacturing (AM) Processes for Soft Tissue Anchors (STAs)” (INGERBDIAM), supported by the Indo-German Science & Technology Centre (IGSTC), is dedicated to developing next-generation biodegradable metallic implants as sustainable alternatives to conventional permanent implants, which often require secondary surgery for removal due to long-term complications. By integrating advancements in materials science, metallurgy, and additive manufacturing, the project seeks to design and fabricate biodegradable soft tissue anchors (STAs) for orthopedic, dental, and trauma-related medical applications.

The joint project involves the design and fabrication of

biodegradable Fe–Mn (iron–manganese) and Mg–Zn (magnesium–zinc) alloys, which are processed into powders and then fabricated into implant prototypes using Laser Powder Bed Fusion Additive Manufacturing (LPBF-AM). The Fe–Mn alloy ingots and powders were developed through Vacuum Induction Melting (VIM) and Inert Gas Atomization (IGA) techniques, respectively. Using these novel powders, the project team successfully fabricated STAs via LPBF-AM and achieved impressive mechanical and functional properties: Ultimate Tensile Strength (UTS) of 668 ± 15 megapascals (MPa), Yield Strength (YS) of 450 ± 5 MPa, Elongation (EL) greater than 30 ± 10 percent, corrosion degradation rate of 0.25 ± 0.02 millimetres per year (mm/y), and magnetic susceptibility of 2.2×10^7 cubic metres per kilogram (m^3/kg). The fabricated materials also demonstrated good



biocompatibility, confirming their suitability for biomedical use. The STA design, alloy composition, and fabrication process have been successfully patented by the project consortium. Over 200 STA prototypes have been produced using LPBF-AM, as shown in Figure 1, and further studies are underway on surface modification, pull-out strength testing, and in-vivo (animal model) performance evaluation.

Parallel efforts have been directed at developing Mg-Zn-Y (magnesium-zinc-yttrium) biodegradable alloys. These alloys were synthesized by Vacuum Induction Melting and then converted into powders through Inert Gas Atomization. The powders are currently being used to fabricate test coupons and tensile samples using LPBF-AM, with process optimization, microstructural characterization, and mechanical property evaluation in progress.

As part of the project's collaborative activities, a team from India comprising Dr. R. Vijay (Principal Investigator), Dr. B. V. Sarada (Co-Principal Investigator), and Dr. Kaliyan Hembram (Co-Principal Investigator) visited Charité University, Berlin from 11 to 14 May 2025. The Indian delegation was hosted by Prof. Dr. Frank Witte and Dr. Franziska Schmidt. The teams held detailed discussions on the project's progress, shared results, and formulated a joint plan for continued research beyond the current IGSTC funding phase. During the visit, the Indian researchers toured Charité's advanced biomedical laboratories and observed state-of-the-art facilities for in-flow corrosion testing, micro-computed

tomography (micro-CT), and mechanical pull-out strength measurement. Both institutions agreed to explore extended collaboration through institutional and national support channels to continue this promising research.

Adding to the project's academic visibility, Dr. Kaliyan Hembram presented a paper titled "Fe-Mn Based Biodegradable Alloys for Implants by Powder Bed Fusion Additive Manufacturing" at the BioMAT 2025 International Conference on Biomaterials held in Weimar, Germany (14 – 15 May 2025), where he also chaired a technical session.

The INGERBDIAM project exemplifies the strength of Indo-German cooperation in developing biodegradable, bioresorbable metallic implants through advanced additive manufacturing technologies. By bridging materials design, biomedical validation, and clinical translational research, the consortium is making significant progress toward next-generation implantable devices that promise improved patient outcomes and a reduced environmental footprint in medical technology.

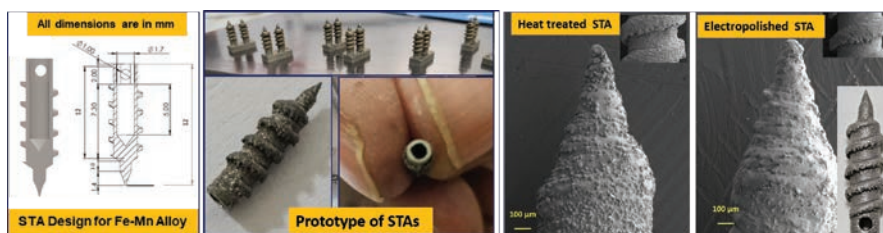


Fig. The design, prototypes of STAs made by LPBF-AM; SEM of heat-treated and electropolished STAs.



MAX-RAP

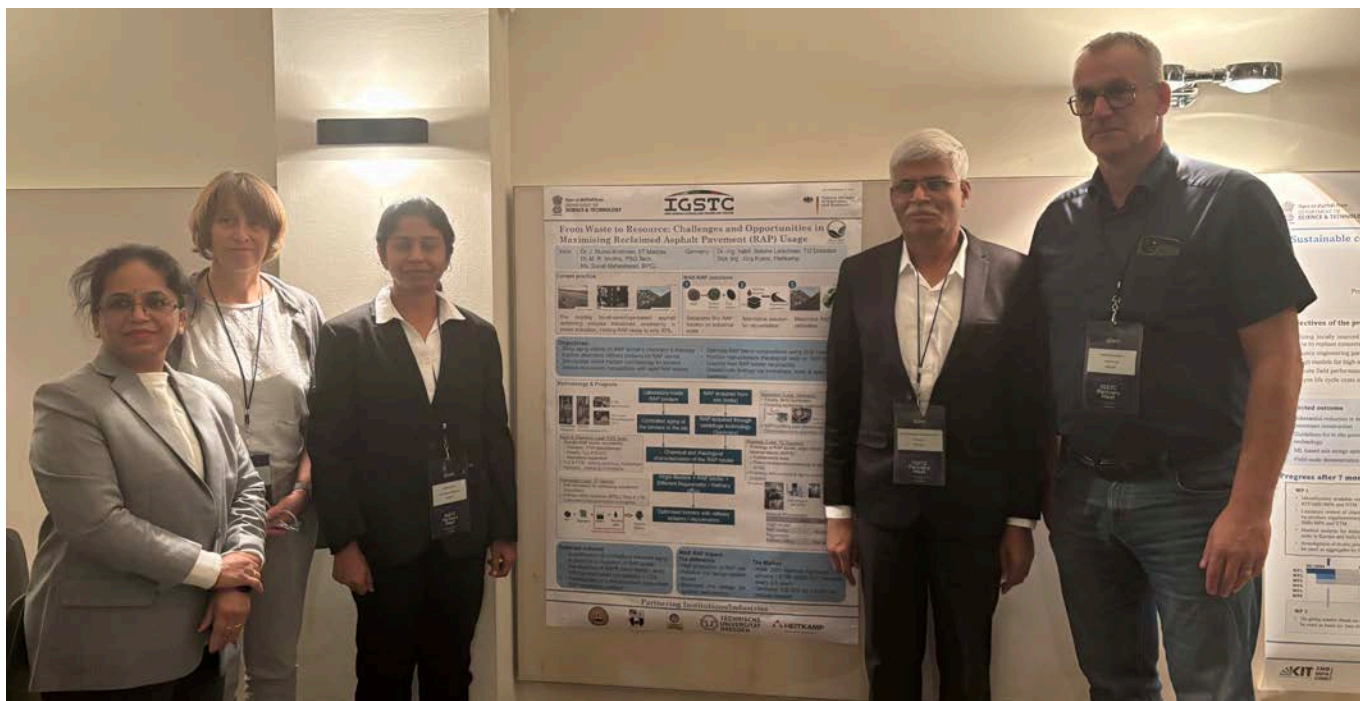
From waste to resource—challenges and opportunities in maximising reclaimed asphalt pavement usage

The project brings together leading Indian and German partners from academia and industry to develop innovative, science-driven approaches for improving recyclability, performance, and environmental impact in asphalt construction.

The IGSTC 2+2 project “MAX-RAP: From Waste to Resource: Challenges and Opportunities in Maximising Reclaimed Asphalt Pavement Usage”, supported by the Indo-German Science & Technology Centre (IGSTC), focuses on advancing sustainable pavement technologies by promoting the large-scale reuse of reclaimed asphalt materials. The project brings together leading Indian and German partners from academia and industry to develop innovative, science-driven approaches for improving recyclability, performance, and environmental impact in asphalt construction.

The first in-person meeting of the Indian consortium was held at the BPCL R&D Centre, Noida, where the project framework, methodology, and

task distribution were established. A key focus of this meeting was to explore the potential of refinery-derived rejuvenators as cost-effective and bitumen-compatible alternatives to commercial rejuvenating agents. Options for collecting low-viscosity refinery streams were discussed, and Dr. Stéphane Charmot (Ingevity, USA) shared insights on rejuvenator performance and binder regeneration. To strengthen collaborative understanding, the consortium visited BPCL R&D Centre again on 30–31 July 2025, where advanced analytical techniques such as Thin Layer Chromatography (TLC), asphaltene separation, and column chromatography were demonstrated, enhancing the team’s technical understanding of binder characterization and aging processes.



The consortium presented the project's progress at the IGSTC Partners' Meet in April 2025, followed by a site visit to the German partners. At TU Dresden, participants explored state-of-the-art testing facilities, including the renowned Köppke Laboratory, and interacted with key research teams. Prof. J. Murali Krishnan (IIT Madras) delivered an engaging lecture on India's advances in pavement materials research. Later, on 6 June 2025, the team from TU Dresden and Heitkamp, in collaboration with BHS Sonthofen, successfully carried out the first large-scale RAP separation trials, marking a significant milestone in the project.

The research work within the project focuses on multiple complementary areas. To

simulate the variability observed in field-aged RAP binders, controlled laboratory aging was performed using hot-air oven aging at IIT Madras and a modified Rolling Thin Film Oven (RTFO) protocol at TU Dresden, which differ in film thickness and oxygen exposure. Four field RAP binders were collected and analyzed to serve as benchmarks for comparison. The chemical composition of unaged and aged binders is being studied using TLC, Fourier Transform Infrared (FTIR) Spectroscopy, asphaltene separation, and column chromatography, enabling quantification of oxidation products and polarity-based fractionation of binder components. Since no standardized TLC method exists for bitumen, the project is working to develop a

consistent, reproducible protocol for industry and research applications.

A significant technological achievement of the project is the development of a dry centrifuge process for separating binder-coated materials from RAP aggregates, thereby simplifying RAP handling and improving recovery efficiency. Initial trials have shown that binder from coarse fractions migrates into fine fractions, allowing coarse materials to be reused as aggregates while only fines require additional processing. During the large-scale trials at BHS Sonthofen, approximately 20 tonnes of RAP were processed under varying speeds and material bed conditions. The results are being analyzed to optimize binder detachment,

particle morphology, and crushing parameters, with plans to assess the feasibility of deploying this technology in India. In parallel, the project is examining the pressure-dependent rheological behavior of bituminous binders, as conventional viscosity measurements at atmospheric pressure do not accurately represent in-service pavement conditions. A new high-pressure rheometer accessory procured through the project enables the evaluation of pressure-viscosity relationships, capturing the strong pressure dependence and shear-thinning behaviour observed in preliminary experiments.

Key outcomes achieved so far include the development of a dry centrifuge process for efficient RAP processing, establishment of pressure-dependent viscosity testing for bituminous binders, creation of standardized chemical analysis protocols using TLC, and identification of refinery streams as sustainable rejuvenator alternatives. The first results from the project have been compiled into two international conference papers, which will be presented at leading conferences in Italy and Slovenia in 2026.

The MAX-RAP project has successfully laid the groundwork for a transformative Indo-German

partnership in sustainable road construction. By integrating advanced chemical analysis, innovative material separation technologies, and binder rheology research, the consortium is setting new benchmarks for circular economy practices in the infrastructure sector. The collaboration continues to inspire new directions for eco-efficient, durable, and cost-effective asphalt recycling, strengthening the shared vision of environmentally responsible engineering between India and Germany.



ECOPAVE

Sustainable concrete pavements using high volumes of construction, demolition, and industrial wastes as constituent replacements

The project aims to establish the environmental and economic benefits of waste-based concrete mixes using comprehensive life-cycle and cost analyses.

The 2+2 project "ECOPAVE: Sustainable Concrete Pavements Using High Volumes of Construction, Demolition, and Industrial Wastes as Constituent Replacements", supported by the Indo-German Science & Technology Centre (IGSTC), aims to develop sustainable concrete pavement technologies by incorporating high proportions of recycled and industrial waste materials into rigid pavement construction. The project brings together a strong consortium of academic and industrial partners – IIT Madras (India), Karlsruhe Institute of Technology (KIT) (Germany), UltraTech Cements Ltd. (India), and HyperCon GmbH (Germany) – combining expertise in material processing, concrete technology, and life-cycle performance assessment.

The project is led by Prof. Manu Santhanam and Dr. Surender Singh from IIT Madras, Prof. Frank Dehn and Dr. Ravi Patel from KIT, with industrial partners Mr. Devendra Pandey (UltraTech) and Mr. Peter Knoblich (HyperCon GmbH). The overarching objectives are to develop technologies that enhance the engineering performance of recycled materials, create predictive models for high-waste concrete mixes, and demonstrate the feasibility of using such materials in field pavements through large-scale trials. The project also aims to establish the environmental and economic benefits of waste-based concrete mixes using comprehensive life-cycle and cost analyses.

In the initial phase recycled concrete aggregate (RCA) was sourced and analyzed for contamination and quality.



The findings revealed that completely pure RCA is nearly impossible to achieve, as most sources include contaminants such as bricks. However, laboratory studies confirmed that brick contents of up to 10% do not significantly affect the quality of paving concrete. The adhered mortar (AM) content was identified as a critical factor influencing performance, with AM levels exceeding 20% leading to reduced concrete quality. In parallel, low-grade limestone provided by UltraTech Cements was successfully activated by reducing its particle size from 70 to 10 microns, significantly improving its reactivity. Locally available Class F fly ash was characterized for its physical and chemical properties, confirming its suitability as a supplementary cementitious

material (SCM). Additionally, at KIT, reactivity tests on Recycled Concrete Fines (RCF) and Recycled Waste Fines (RWF) are being conducted, including trials using HyperCon milling technology to optimize particle size and binder packing density. Furthermore, experiments at IIT Madras revealed that precise control of moisture during mixing plays a pivotal role in enhancing the performance of recycled aggregate concrete. Preliminary findings indicated that ternary binder systems—incorporating multiple waste-derived supplementary cementitious materials (SCMs)—can significantly increase waste utilization while preserving desired mechanical properties. A shared experimental database has been established among IIT Madras,

UltraTech, and KIT, forming the foundation for developing machine learning-driven mix design and performance prediction models in the next phase. At KIT, several preliminary AI models for predicting strength, durability, and setting characteristics have already demonstrated promising outcomes.

Throughout the reporting period, the project also emphasized networking and collaborative activities to foster strong academic and industrial linkages. The teams actively participated in national and international workshops, conferences, and technical symposia on sustainable construction and pavement technologies. Interactions with material suppliers, including the Perungudi C&D waste plant,



and collaboration with construction agencies ensured that research findings are aligned with field-level applications. Discussions between UltraTech Cements and HyperCon GmbH are underway regarding the transfer of advanced milling technology for use in the field demonstration road, which will be constructed at the end of the project based on ECOPAVE's research outcomes.

Collaborative engagement between the Indian and German partners has been further strengthened through multiple exchanges. Earlier the

IIT Madras team visited KIT, Germany, to explore its world-class laboratory infrastructure and share experiences on advanced waste characterization and concrete processing techniques. During this period, eight virtual meetings were held between IITM and KIT teams to synchronize testing protocols, data analysis approaches, and to plan joint experiments. Doctoral and postdoctoral researchers from both countries also held separate sessions to draft a state-of-the-art review article on the use of waste materials in sustainable concrete pavements.

With its strong interdisciplinary foundation and effective collaboration between academia and industry, ECOPAVE is paving the way for large-scale implementation of sustainable pavement solutions. The project's outcomes are expected to transform waste materials into valuable construction resources, reducing the environmental footprint of concrete infrastructure while advancing India's and Germany's shared commitment to sustainable development.



MuScAI

Multiplexing Scanning LIBS for High Throughput Aluminium Scrap Identification

The team has developed an ultra-sharp edge filtering technique in optical fibers for Brillouin suppression, for which an Indian patent has been filed, and a related journal article is under preparation.

The IGSTC 2+2 project "MuScAI: Multiplexing Scanning LIBS for High Throughput Aluminium Scrap Identification", aims to revolutionize aluminium scrap sorting and recycling through the development of a high-speed, multiplexed Laser-Induced Breakdown Spectroscopy (LIBS) system. This collaboration brings together expertise from IIT Delhi (Prof. Deepak Jain), CMR Green Technologies Ltd. (Mr. Ankur Singh), Fraunhofer Institute for Laser Technology ILT (Dr. Cord Fricke-Begemann), and Laser Analytical Systems & Automation GmbH (LSA) (Dr. Joachim Makowe).

The project seeks to develop a scalable, industrial-grade LIBS-based sorting system capable of identifying and classifying aluminium alloys in real time, ensuring higher

material recovery and sustainability in the metal recycling industry. Over the last one year, a significant foundational progress was achieved across multiple verticals. A successful proof-of-concept trial validated the economic and technical feasibility of the system, supported by comprehensive on-site material analysis at CMR's recycling facility.

At IIT Delhi, the laser source development reached an important milestone with the completion of a four-stage Master Oscillator Power Amplifier (MOPA) design targeting milli-joule class laser outputs. Most components have been procured, and an agreement has been signed with Fraunhofer IOF for the fabrication of bend-compensated fibers. The team has also developed an ultra-sharp edge filtering technique in optical fibers for



Brillouin suppression, for which an Indian patent has been filed, and a related journal article is under preparation. In addition, at CMR Green Technologies, large-scale material flow analyses were conducted across processing plants handling approximately 30,000 MT/month of aluminium scrap. Results showed that 81% of shredded scrap lies in the 30–120 mm particle size range, which aligns with MuScAl's peak sorting performance. Rotary sieving and sample fractionation produced reference samples for calibration and validation. These reference materials will guide subsequent LIBS-based alloy identification trials at Fraunhofer ILT.

The Fraunhofer ILT team made substantial progress on the multiplexed LIBS hardware, successfully integrating a fiber laser source with multiple 3D scanning heads capable of

analyzing moving scrap on conveyor belts. Pulse energy and repetition rate optimization achieved conditions suitable for rapid multi-point excitation, and beam steering mechanisms were refined to minimize blind spots. The multi-channel plasma emission capture system demonstrated kHz-rate spectral acquisition, enabling real-time elemental classification for aluminium alloys. The supporting software platform for data synchronization and sorting algorithm interface has also been enhanced for operational reliability. Meanwhile, LSA GmbH finalized the optical design of the high-speed spectrometer system, identifying spectral lines for key alloying elements such as magnesium, silicon, copper, manganese, and zinc. The design is modular and scalable, supporting an initial three-scanner configuration with the option to expand to

ten or more. Early experiments confirmed the feasibility of the design, with optimization ongoing for signal stability and detection efficiency.

Collaborative synergy between the partners remained strong throughout this period. Regular monthly consortium meetings were held to discuss progress and integration strategies. The project teams from IIT Delhi and Fraunhofer ILT participated in the IGSTC Networking Meeting in Bremen, Germany, followed by a two-day technical visit to Fraunhofer ILT. These interactions featured laboratory demonstrations of the multi-scanner LIBS prototypes, technical discussions on system synchronization, and industrial visits to LSA facilities specializing in automated sorting and optical spectroscopy systems.

With the initial spectrometer design completed, hardware integration underway, and validated reference data from CMR, the MuScAl project has successfully established its foundation for the next phase of testing and optimization. The consortium's combined expertise is driving the development of an industrial-grade, high-throughput LIBS sorting platform, poised to make aluminium recycling more efficient, economical, and environmentally sustainable.



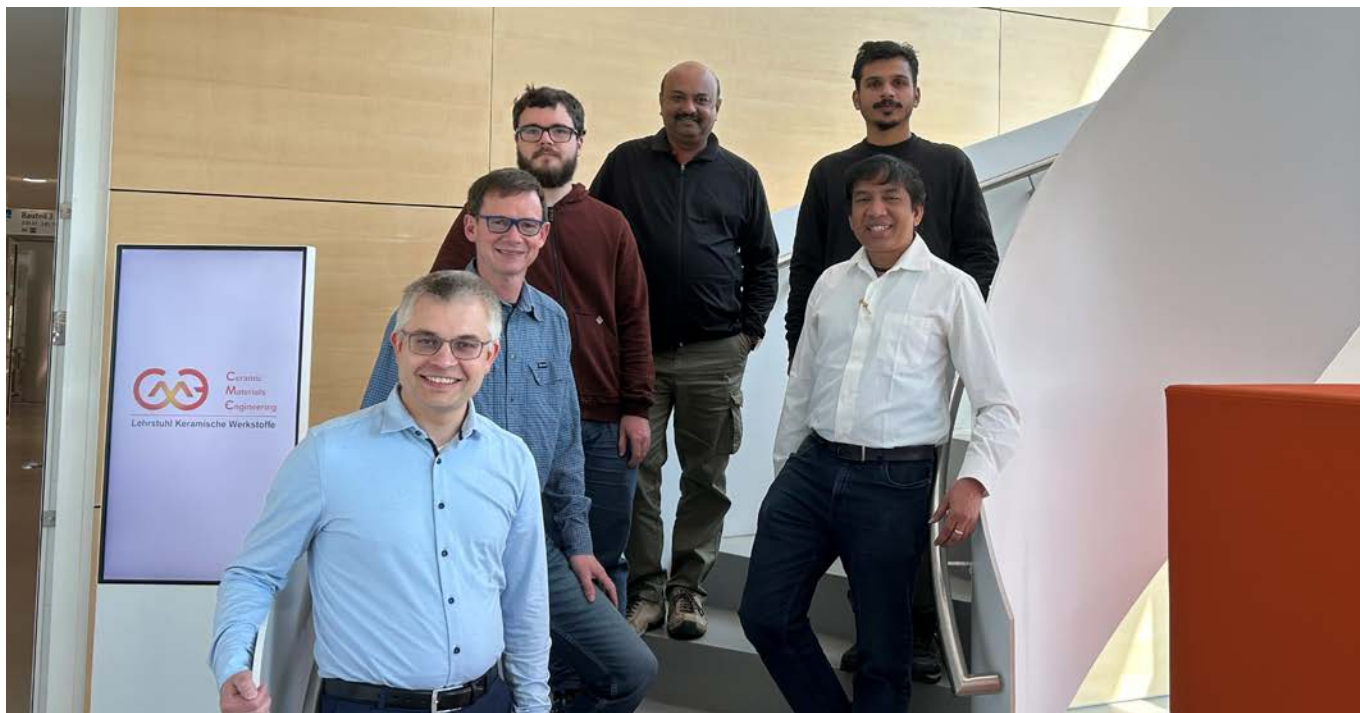
TRANSFORM

Transforming Industrial Silicon Carbide and Silicon Nitride Ceramics Waste into Products towards Material & Environmental Sustainability

The project focuses on high-value non-oxide ceramics such as silicon nitride (Si_3N_4) and silicon carbide (SiC) – materials that play a critical role in advanced industrial applications but are extremely difficult and costly to recycle.

The IGSTC 2+2 project "TRANSFORM" is a cutting-edge international research initiative supported by the Indo-German Science & Technology Centre (IGSTC) that aims to revolutionize the development of sustainable technical ceramic materials through innovative recycling of industrial waste. The project focuses on high-value non-oxide ceramics such as silicon nitride (Si_3N_4) and silicon carbide (SiC) – materials that play a critical role in advanced industrial applications but are extremely difficult and costly to recycle. By developing new recycling and reprocessing methods, the project seeks to reduce environmental impact, lower production costs, and create novel opportunities for advanced ceramic applications across sectors such as energy, mobility, and precision engineering.

The kick-off meeting for the TRANSFORM project was held on April 2025 at the Chair of Ceramic Materials Engineering, University of Bayreuth, Germany. The meeting brought together partners from both India and Germany – the Indian Institute of Technology (IIT) Madras and Carborundum Universal Limited (CUMI) from India, and the University of Bayreuth and QSIL Ingenieurkeramik GmbH from Germany. The discussions were led by Prof. Dr. Günter Motz, who guided the partners through the project roadmap, emphasizing the scientific objectives, industrial relevance, and collaborative strategies essential for the successful execution of the project. Each partner introduced their institutional expertise, outlined planned contributions, and shared early results, leading to engaging exchanges on research directions and implementation pathways.



The meeting also provided a platform to align the project's technical goals and identify synergies between the participating teams. Following the formal discussions, the participants toured the state-of-the-art ceramic processing and characterization laboratories at the University of Bayreuth, which are equipped with advanced facilities to support the project's R&D activities in materials synthesis, shaping, and testing.

In the initial phase of the project, reclaimed ceramic waste powders were

successfully modified with preceramic polymers to improve their thermal and mechanical properties, enabling their use in additive manufacturing and warm-pressing techniques. The first batch of test samples has already been produced and is undergoing further processing at the partner institutions for performance validation and prototype development. Among the prototypes being explored are watch casings designed for the luxury watch segment, highlighting the potential of recycled ceramics in premium industrial applications.

By leveraging complementary expertise in material design, process optimization, and industrial production, TRANSFORM is not only pioneering sustainable solutions for ceramic recycling but also reinforcing scientific and economic cooperation between India and Germany. The project exemplifies a circular economy approach, transforming industrial waste into high-performance ceramic products while fostering innovation and long-term collaboration in advanced materials research.



BIOMOPAC

Biobased Functional Molded Fiber Packaging (MFP) from Regional Agricultural Residues

The project exemplifies the spirit of Indo-German collaboration—bridging material science, process engineering, and sustainability analysis to create bio-based, recyclable, and economically viable packaging solutions.

Supported by the Indo-German Science & Technology Centre (IGSTC), the 2+2 project titled "BIOMOPAC: Biobased Functional Molded Fiber Packaging (MFP) from Regional Agricultural Residues" stands as a landmark initiative promoting sustainability in food-safe, recyclable molded fiber packaging. Over its first year, the project has achieved notable progress in merging academic excellence with industrial innovation across India and Germany, reinforcing the global movement toward circularity and environmentally responsible packaging technologies.

The BIOMOPAC project addresses a critical environmental challenge—reducing reliance on virgin fibers and fossil-based barrier additives—by creating biobased, compostable alternatives for conventional single-use packaging. The project introduces an innovative method that utilizes regional

agricultural residues as the primary fiber source and as feedstock for biogenic barrier materials. Through specialized treatments, highly fibrillated fibers are engineered to provide resistance against water, grease, and oxygen, essential properties for food-contact applications. This integrated approach ensures high recyclability, aligns with circular economy principles, and significantly reduces the environmental footprint, as demonstrated through life cycle assessments (LCA).

At the academic level, researchers at IIT Roorkee and TU Dresden have been working to optimize regional agro-residues such as wheat straw, barley straw, rapeseed stalks, sugar beet pulp, bagasse, and palm leaves for pulp production. Two key pulping methods—Chemi-Thermomechanical Pulping (CTMP) and Kraft pulping—were employed to achieve higher yields with lower water and chemical consumption. The teams successfully produced flat molded plates and molded fiber tableware from these residues,



demonstrating their potential as viable raw materials for food-safe molded fiber products. Parallel efforts at TU Dresden and Bionatic GmbH & Co. KG have focused on developing environmental assessment methodologies and conducting LCAs using Ecoinvent datasets, ensuring consistency and scientific rigor in evaluating the sustainability of feedstocks and processes.

The project's industry-academia collaboration reached a major milestone during the machine trials held from July 19–23, 2025, at Parason Machinery India Pvt. Ltd. Various pulp formulations developed in the labs were tested on Parason's prototype machine, successfully producing molded tableware comparable to current commercial products. These trials confirmed the scalability of lab-developed pulp formulations and marked a critical step in translating research innovation into industrial practice. As part of its self-contribution to the project, Parason Machinery committed to developing a

fully automatic lab-scale pulp molding machine for IIT Roorkee, which will support future R&D and training efforts.

Meanwhile, Bionatic GmbH & Co. KG continues to advance the project's sustainability assessment by refining process flow diagrams and integrating the BIOMOPAC process chain for industrial-scale evaluation.

Notable achievements in the project till date includes:

- Identification of a sustainable feedstock portfolio combining regional agricultural residues from India and Germany.
- Successful demonstration of molded fiber packaging (MFP) with market-comparable quality using agro-waste such as wheat straw, bagasse, and palm leaves.
- Development of biogenic, lignin-based barrier coatings to replace PFAS materials and a method for enhancing bagasse pulp quality—both of which are being prepared for patent filing.

- Alignment with the United Nations Sustainable Development Goals (SDGs) and India's national missions such as Swachh Bharat and Atmanirbhar Bharat, reinforcing the project's global and national relevance.

Networking and collaborative activities have also been instrumental in advancing the project's goals. Partners from both countries collaborated on pulping and prototype trials, while workshops on Material Flow Cost Accounting (MFCA) and Life Cycle Assessment (LCA) were organized and moderated by TU Dresden/IAK to standardize methodologies and share process flow diagrams for lab- and industry-scale operations. Looking ahead, the partners are planning the next consortium meeting in November 2025, followed by a German delegation visit to India in early 2026.

The BIOMOPAC project exemplifies the spirit of Indo-German collaboration—bridging material science, process engineering, and sustainability analysis to create bio-based, recyclable, and economically viable packaging solutions. With a strong foundation established through joint research, industrial validation, and environmental benchmarking, the project is poised to deliver transformative outcomes for sustainable packaging technologies, contributing to a cleaner, circular, and resource-efficient future.

The background is a dark green gradient. A large white circle is centered, containing the text. To the left, green circuit-like lines with glowing nodes extend towards the circle. Below the circle, a low-poly orange shape, resembling a stylized mountain or rock formation, is visible. The overall aesthetic is futuristic and technological.

Bilateral Workshops



InDeVet

Indo-German Veterinary Partnership: Fostering Innovation in AI-Powered Diagnostics, One Health and Animal Welfare at Leipzig

The event brought together 38 eminent experts and leaders from academia, research, and industry across both countries, representing a diverse confluence of stakeholders.

The Indo-German-Vet-Net (InDeVet) Workshop, supported by the Indo-German Science & Technology Centre (IGSTC), was held in Leipzig, Germany. The workshop aimed to foster collaboration between Indian and German institutions in the field of veterinary science, with a particular focus on leveraging Artificial Intelligence (AI) for animal health.

The event brought together 38 eminent experts and leaders from academia, research, and industry across both countries, representing a diverse confluence of stakeholders. Indian participants included representatives from the National Academy of Veterinary Sciences (India), West Bengal University of Animal and Fishery Sciences (WBUAFS), Indian Veterinary Research Institute (IVRI), National Dairy Research Institute (NDRI), National Institute of Animal Nutrition

and Physiology (NIANP), Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Bihar Animal Sciences University (BASU), Gujarat Biotechnology Research Centre (GBRC), and the CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB). German participation included experts from Leipzig University, Freie Universität Berlin, University of Veterinary Medicine Hannover (TiHo), and the Friedrich-Loeffler-Institute, along with industry representatives from Xpedite Diagnostics GmbH. Participants from the University of Saskatchewan, Canada, also joined as an international partner, underscoring the workshop's global outlook.

The workshop served as an important platform to establish strategic frameworks for long-term cooperation between Indian and German institutions. Key outcomes included the formation of a steering committee with decision-making



representatives from each partnering organisation and the appointment of institute focal points to ensure coordination and communication. The participants also agreed to initiate a monthly seminar series on the second Wednesday of each month, featuring presentations by Indian and German researchers to promote continuous scientific exchange, capacity building, and integration with postgraduate programs.

A major highlight of the workshop was the launch of plans for the creation of joint databases to strengthen research collaboration included a publication database coordinated by Leipzig University to highlight Indo-German research outputs and an AI Animal Health Database, jointly led by Prof. Inderjit Singh (BASU) and Prof. Robert Klopffleisch (Freie Universität Berlin), aimed at centralizing data and fostering innovation in veterinary applications of AI. The group also resolved to pursue joint research projects through IGSTC's 2+2 and Paired Fellowship programs, as well as

funding under EU and DST-DFG Indo-German Research Training Groups (IRTG) schemes.

The participants identified several focus areas for future collaboration, including AI for pandemic preparedness in animals, digital tools for veterinary diagnostics, data standardization and sharing, and innovation incubation for young researchers. The establishment of an InDeVet Incubation Centre, to be led by Dr. Palanisamy Selvaraj (TANUVAS), Dr. Ram Saran Sethi (GADVASU), and Dr. Ahmed Abd El Wahed (Leipzig University) was proposed to promote start-up culture and applied innovation in veterinary sciences. It was also decided that the National

Academy of Veterinary Sciences (India) would organize the next InDeVet meeting in New Delhi, continuing the momentum of this collaboration.

The workshop concluded with a shared commitment to advancing Indo-German cooperation through joint publications, student and staff exchanges, capacity-building programs, and interdisciplinary projects. By integrating AI, data science, and One Health principles, the InDeVet Workshop marked a significant milestone in promoting cross-border research partnerships and driving innovation in veterinary science and animal health for a sustainable and resilient future.





Unconventional Perspectives on Flood Risk

Opportunities and Motivating Narratives (UPFLOO) at GFZ Helmholtz Centre for Geosciences, Potsdam

The three-day workshop addressed a wide range of themes including the impacts of climate change on extreme flood events, compound flooding, early-warning systems, and the socio-economic and mental-health dimensions of disasters.

The Indo-German bilateral workshop titled "Unconventional Perspectives on Flood Risk: Opportunities and Motivating Narratives (UPFLOO)", supported by the Indo-German Science & Technology Centre (IGSTC), was held from 5–7 May 2025 at the GFZ Helmholtz Centre for Geosciences, Potsdam, Germany. Jointly coordinated by Prof. Dr. A. K. Keshari from the Indian Institute of Technology Delhi and Prof. Dr. Bruno Merz from GFZ Potsdam, the workshop convened over 30 experts from India and Germany to explore innovative approaches to flood risk assessment, management, and communication under changing climatic conditions.

The three-day workshop addressed a wide range of themes including the impacts

of climate change on extreme flood events, compound flooding, early-warning systems, and the socio-economic and mental-health dimensions of disasters. Sessions were focused on both scientific advancements and policy implications, bringing together hydrologists, engineers, social scientists, and policy researchers. Highlights included discussions on AI-driven risk modelling, forensic flood event analysis, climate-informed flood frequency approaches, and the integration of remote sensing with GeoAI and decision science to devise climate-resilient pathways

On the first day, participants examined success stories in flood risk management and identified unexplored research areas through breakout group discussions.



- Leveraging complementary expertise—with India's strengths in community-based response and groundwater management, and Germany's advances in socio-economic damage modelling and insurance-based mitigation.

The workshop concluded with a strong commitment to continuing bilateral cooperation through joint projects, comparative studies, and capacity-building initiatives. Participants proposed mapping institutional frameworks in both countries, developing joint funding proposals under IGSTC's collaborative programs, and fostering cross-sector partnerships for climate-resilient flood management.

By combining scientific innovation, social understanding, and creative communication, the UPFLOO Workshop marked a significant step forward in Indo-German engagement on disaster resilience—promoting interdisciplinary and inclusive perspectives to tackle the growing challenges of flood risk in a changing climate.



The second day emphasized technological innovations, such as data-driven flood forecasting, machine-learning-based severity mapping, and integrated hydrologic-hydraulic modelling for deltaic regions. The day concluded with an interactive session on "Flood Risk Science and Art," showcasing the artistic project Uncertain Homelands by Prof. Nora Bibel, which bridged scientific and humanistic perspectives on disaster resilience. The final day explored participatory risk communication, mental-health impacts of floods, and new interdisciplinary frameworks linking physical and social sciences.

Key academic highlights included Prof. Thorsten Wagener's stress-testing framework for global river systems and Prof. Annegret Thieken's study on post-traumatic stress disorder (PTSD) following the 2021 western Germany floods, which revealed that 17–24% of affected individuals experienced PTSD

symptoms—far higher than the national average. Presentations by Prof. Axel Bronstert, Prof. Ralf Merz, and Prof. Christian Kuhlicke introduced new paradigms such as forensic flood analysis, counterfactual scenario modelling, and the concept of habitable versus uninhabitable floodplains, linking scientific data to human adaptation and policy decisions

Breakout sessions identified several opportunities for future Indo-German collaboration:

- Integrating flood and drought management through nature-based solutions, traditional water-storage restoration, and inter-basin water transfer mechanisms.
- Addressing rare and high-impact flood events to ensure resilience of critical infrastructure under extreme scenarios.
- Broadening flood-risk research to include socio-economic and psychological dimensions, participative scenario planning, and data-driven communication strategies.



Ageing, Workplace and Mental Health

A Multipronged Approach to Addressing a Complex Bio-Social Challenge at Mannheim

It featured three major thematic sessions—Ageing and Mental Health, Ageing and Workplace, and Ageing and Interventions—spread across three days.

The Indo-German bilateral workshop titled “Ageing, Workplace and Mental Health: A Multipronged Approach to Addressing a Complex Bio-Social Challenge”, supported by the IGSTC was held from 25–27 June 2025 at the Mercure Hotel am Rathaus, Mannheim, Germany. Jointly coordinated by Prof. Dr. Jamuna Rajeswaran from the Department of Clinical Psychology, NIMHANS, India, and Prof. Dr. Christian Schmahl from the Central Institute of Mental Health (CIMH), Mannheim, the workshop brought together 24 exclusive experts—12 from India and 12 from Germany—to explore the intricate interplay between ageing, mental health, and workplace well-being in an evolving socio-economic context

The workshop sought to address mental health challenges among ageing populations by integrating perspectives from clinical psychology, psychiatry, neuroscience, public health, and industry. It featured three major thematic sessions—Ageing and Mental Health, Ageing and Workplace, and Ageing and Interventions—spread across three days. The deliberations aimed to develop a cross-cultural understanding of cognitive decline, psychosocial stress, and occupational health among older adults, while identifying new frameworks for early intervention and workplace-based mental health support.

On the first day, sessions focused on Ageing and Mental Health, with discussions centered on cognitive deficits, dementia, mild cognitive impairment (MCI),



and depression among older adults. Presentations examined psychobiological changes associated with ageing and highlighted the impact of rhythmic metabolism and physical health on psychological well-being. The critical role of early diagnosis, cognitive assessment, and mental rehabilitation in promoting healthy ageing was emphasized.

The second day was dedicated to the Ageing and Workplace, exploring how occupational stress, job engagement, and organizational environments affect the mental well-being of ageing employees. Industry representatives from Hindustan Aeronautics Limited, Toyota Kirloskar Motors, and Apollo Hospitals presented innovative, tech-driven approaches to workplace wellness. Discussions also underscored the potential of AI, text mining, and machine learning in assessing workplace stressors and predicting emotional and cognitive fatigue.

The final day themed Ageing and Interventions, delved into the application of ecological momentary assessments (EMA) and just-in-time adaptive interventions (JITIs) for personalized mental health care. Speakers presented novel frameworks for early interventions, digital tools for real-time monitoring, and AI-enabled mental health support systems. Emerging neurotechnological approaches, such as personalized tDCS for dementia patients and the use of biomarkers for cognitive decline, were discussed alongside public health strategies for ensuring workplace dignity and inclusivity for older adults.

The workshop also identified several new research directions—including workplace-based mental health monitoring using biological indicators, senotherapy for ageing-related diseases, and the socio-economic costs of mental health neglect. The need for cross-cultural studies, particularly examining

re-employment motivations among older adults in India and Germany, was highlighted. Key recommendations included fostering longitudinal and interdisciplinary research, integrating Social and Emotional Learning (SEL) frameworks into educational and professional environments, and utilizing AI-driven public health tools for cognitive and mental health screening. The participants emphasized the importance of policy-oriented collaboration between academia, industry, and government for developing affordable and scalable interventions for ageing populations.

As a major outcome, two collaborative research proposals were initiated under the themes "Workplace Environment and Ageing" and "Innovative Healthcare Interventions." A second Indo-German scientific meeting was proposed to be held at NIMHANS, Bengaluru, to strengthen partnerships and finalize joint funding applications under IGSTC programs. The workshop concluded with a shared vision to create age-sensitive, technology-based, and culturally adaptive mental health solutions, enhancing the quality of life for ageing individuals while promoting sustainable workforce participation in both India and Germany.



Quantum Technologies

Computing, Connectivity, and Security (QTCCS) at SASTRA Deemed University, Thanjavur

Active engagement from industry partners such as XeedQ GmbH, IBM India Research Lab, IQM, ParTec AG, Infineon Technologies AG, Siemens, and Womanium Quantum underscored the workshop's strong academia-industry interface.

The Indo-German Workshop on Quantum Technologies – Computing, Connectivity, and Security (QTCCS), supported by the Indo-German Science & Technology Centre (IGSTC), was held from May 5–7, 2025, at SASTRA Deemed University, Thanjavur, India. Jointly coordinated by Dr. Padmapriya Pravinkumar from SASTRA Deemed University, India, and Dr. Georgy Astakhov from the Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany, the workshop brought together leading scientists, technologists, and industry representatives from both countries to advance Indo-German collaboration in quantum computing, communication, and security

The event witnessed enthusiastic participation from premier academic and research institutions, including HZDR, Technical University of Munich, University of Stuttgart, Physikalisch-Technische Bundesanstalt (PTB), Anna University, IISER Thiruvananthapuram, Raman Research Institute, IIT Madras, and IIT Roorkee. Active engagement from industry partners such as XeedQ GmbH, IBM India Research Lab, IQM, ParTec AG, Infineon Technologies AG, Siemens, and Womanium Quantum underscored the workshop's strong academia-industry interface.

The workshop was inaugurated by Dr. Kamal K Agarwal, Deputy Director General (Quantum Technologies), Ministry of



Communication, Government of India, and Mr. Saquib Shaikh, Deputy Scientific Officer, IGSTC. Mr. Shaikh outlined IGSTC's ongoing initiatives, bilateral programs, and the strategic opportunities available for Indo-German research partnerships, while Dr. Agarwal highlighted India's National Quantum Mission (NQM) and the government's focus on Quantum Key Distribution (QKD), Post-Quantum Cryptography (PQC), and international standardization efforts.

Over three days, the workshop featured sessions on Quantum Computing, Connectivity, and Security, showcasing developments in quantum photonics, NV center engineering, cryogenic CMOS technologies, quantum cryptography, metrology, and hybrid quantum-classical algorithms. Participants presented advances in telecom-wavelength single-photon emitters, diamond-based quantum processors, and quantum random number generators (QRNGs). The discussions also emphasized the need for true randomness in cryptography, scalable nanophotonic

fabrication, and cross-platform standardization for quantum hardware interoperability

Key highlights included insights into cryogenic-compatible electronics for quantum hardware control, nanoscale quantum sensing using NV centers, and hybrid electromechanical systems for probing quantum noise. Presentations on quantum optimization techniques (QUBOs and QAOA) and quantum-enhanced algorithms demonstrated real-world applications in chemistry, logistics, and supply chain optimization. Panel discussions with government, academia, and industry representatives explored post-quantum cybersecurity, quantum hardware standardization, and capacity building for India's NQM.

The workshop identified several strategic recommendations:

- Collaborative R&D: Joint Indo-German research proposals under IGSTC and NQM calls.
- Quantum Device Design: Optimize cryogenic environments and focus on minimal-qubit real-time applications.

- Standardization and Integration: Develop common protocols and calibration standards for quantum sensing and metrology.
- Workforce Development: Initiate specialized training programs for quantum cryptography, photonics, and metrology professionals.
- Infrastructure Building: Establish shared fabrication facilities and co-develop simulation-experiment benchmarking frameworks.

Concrete collaborative plans emerged, including the design of a quantum photonic crystal structure at the University of Stuttgart, with performance analysis to be conducted by SASTRA University, and testing of quantum-based random number generators and encryption algorithms at IBM India Research Lab and IIT Madras.

The QTCCS workshop successfully laid the foundation for sustained Indo-German cooperation in quantum technologies. It fostered the exchange of expertise, inspired interdisciplinary research, and strengthened the Indo-German quantum ecosystem through shared vision and mutual commitment. By bridging quantum computing, communication, and security, the workshop aligned with IGSTC's mission to drive bilateral innovation partnerships and accelerate the translation of quantum research into transformative technological applications.



Leveraging Radiative Cooling Potential of Building Surfaces

Stepping Towards Net-Zero Emissions Target (RaCoPBuS: NET) at Indian Institute of Technology (IIT) Roorkee

The workshop laid a strong foundation for future joint research under IGSTC's collaborative programmes, with a focus on climate-responsive design, AI-driven building optimization, and nature-based cooling strategies.

The Indo-German bilateral workshop titled "Leveraging Radiative Cooling Potential of Building Surfaces: Stepping Towards Net-Zero Emissions Target (RaCoPBuS: NET)", supported by the Indo-German Science & Technology Centre (IGSTC), was held from 14–16 July 2025 at the Indian Institute of Technology (IIT) Roorkee, India. Jointly coordinated by Prof. Ravita Lamba from IIT Roorkee and Dr. Kedar Mehta from Technische Hochschule Ingolstadt, Germany, the workshop gathered leading experts, researchers, industry professionals, and doctoral scholars from both countries to explore innovative cooling strategies for energy-efficient and net-zero building design.

The workshop was designed to bring together multidisciplinary expertise across architecture, engineering, material science, and energy systems, fostering Indo-German collaboration in the areas of radiative cooling, passive design, and sustainable urban development. Over three days, participants engaged in technical sessions, roundtables, and networking activities that highlighted both scientific advancements and practical applications in the domain of sustainable cooling technologies.

In the first day, the opening session of the workshop was featured by keynote addresses and technical talks on thermal comfort modulation, energy-efficient building simulation, and the role of Phase



Change Materials (PCM) and radiant cooling systems in reducing indoor thermal loads. Presentations from Prof. Dibakar Rakshit (IIT Delhi) and Prof. Mathias Ehrenwirth (TH Nürnberg) provided comparative perspectives on energy simulation practices in India and Germany. The day concluded with a roundtable on "Solar Energy for Cooling: Innovations, Opportunities, and Challenges", emphasizing cross-border technology exchange and sustainable design integration.

The Sessions on the second day were focused on urban heat mitigation, retrofitting strategies, and the integration of green infrastructure for improving building performance. Talks by experts such as Prof. Ramesh Srikonda (SPA Vijayawada) and Dr. Florian Betz (University of Würzburg) highlighted the use of geospatial technologies, urban streams, and nature-based solutions for energy-efficient urban planning. Presentations on desiccant cooling technologies and adaptive building retrofits fostered discussions on the balance

between modern innovation and vernacular sustainability. A dedicated "Speed Networking Session" helped participants identify joint research themes and build Indo-German research clusters for future collaboration.

The final day concluded with passive cooling strategies, storage-enhanced solar cooling, and innovative materials for radiative heat management. Presentations on PU-based bio-bricks, hybrid PCM systems, and AI/ML-assisted building optimization showcased cutting-edge approaches for improving energy efficiency in tropical climates. The sessions also explored pathways for carbon credit mechanisms, building certification systems, and AI-driven energy modeling, followed by a visit to IIT Roorkee's Department of Hydro and Renewable Energy, providing participants with a practical demonstration of ongoing sustainable energy research.

Key Outcomes of the workshop are:

- Consensus on integrating micro-level building design parameters with macro-level ecosystem and climatic data for holistic urban planning.
- Recognition of geospatial datasets (e.g., LULC, solar irradiance maps) as essential tools for decentralized energy planning and cooling optimization.
- Identification of opportunities for hybrid cooling systems combining PCM, shading, green roofs, and passive ventilation.
- Proposal for developing joint Indo-German building certification frameworks and carbon credit mechanisms.
- Agreement on establishing academic exchange programs, interdisciplinary curricula, and pilot demonstrator projects for sustainable infrastructure.

The workshop came to an end with a renewed commitment to deepening Indo-German collaboration in sustainable building technologies and energy innovation. It laid a strong foundation for future joint research under IGSTC's collaborative programmes, with a focus on climate-responsive design, AI-driven building optimization, and nature-based cooling strategies. By seamlessly connecting scientific inquiry with practical implementation, the workshop reaffirmed the Indo-German partnership's dedication to advancing resilient, low-carbon, and net-zero building solutions for a sustainable future.

Women
Involvement
in Science &
Engineering
Research
(WISER)



Dr. Ramya Devi Durai

SASTRA Deemed University, Thanjavur

Dr Durai had participated in an international conference "Novel Concepts in Innate Immunity" from June 10-13, 2025, at Tubingen University, Germany and presented her research findings entitled "Immunomodulatory Effects of Long-Acting Rosuvastatin Nanoparticles on Inflamed Macrophages In-Vitro".

Dr. Ramya Devi Durai, Senior Assistant Professor at the School of Chemical & Biotechnology, SASTRA Deemed University, Thanjavur, has been awarded the IGSTC WISER-2023 Award for the project titled "Exploration of 3D adipose tissue models to study long-acting statin nanoparticles to assess the efficacy and suitability as an alternative for animal models." As part of this Award, she undertook a research visit to Germany, where she was hosted by Prof. Petra Kluger, formerly at Reutlingen University and currently Head of the Institute of Interfacial Process Engineering and Plasma Technology, University of Stuttgart, as well as the

Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB).

Dr. Durai was fortunate to visit both host institutions during her research stay of one month (1 to 30 June 2025) in Germany, and work with Dr. Petra Kluger's team to execute research work using adipose cells and 3D tissue models for different polymeric nanocarriers loaded with Atorvastatin and Rosuvastatin, which were developed and characterized in SASTRA University, India. She had delivered a talk entitled "Emerging Strategies for Improved Delivery of Micro- and Macromolecules" at the University of Stuttgart. Moreover, she had participated



in an international conference "Novel Concepts in Innate Immunity" from June 10-13, 2025, at Tübingen University, Germany and presented her research findings entitled "Immunomodulatory Effects of Long-Acting Rosuvastatin Nanoparticles on Inflamed Macrophages In-Vitro". She had also attended an IGSTC organized Indo-German Workshop on the topic "Ageing, Workplace and Mental Health" during June 25-27, 2025, at Mannheim, Germany, which was jointly organized by Heidelberg

University, Germany and the National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India.

During this short visit period, she was able to actively interact in-person with following scientists: (1) Dr. Andreas Blaeser, Professor for BioMedical Printing Technology, TU Darmstadt to work on biofabrication, bioprinting and organ-on-chip, (2) Dr. Dr. Meltem Avci-Adali, University Hospital Tübingen to work on stem cells, cardiomyocytes,

and haemocompatibility (3) Dr. Thanigaimalai Pillaiyar, Pharmaceutical Institute, University of Tübingen to work on organic and medicinal chemistry and (4) Dr. Suboor Bakht, Director, Heidelberg University Office for South Asia (HCSA), Heidelberg University to find new collaborations.

Dr. Durai expressed her sincere gratitude to IGSTC for providing the valuable opportunity to collaborate with leading German research institutes. The scientific exposure at German laboratories offered enriching hands-on experience and engaging interactions with scientists across diverse disciplines, significantly enhancing her knowledge. She also cherished the chance to explore Germany's rich cultural heritage—visiting castles, museums, and churches during the pleasant early summer—and thoroughly enjoyed the country's distinctive cuisine and beverages.



Dr. Rita Sharma

National Agri-Food Biotechnology Institute (NABI), Mohali

Dr. Rita Sharma, Scientist E at the National Agri-Food Biotechnology Institute (NABI), Mohali, was awarded the IGSTC WISER-2023 for undertaking the project titled "Deciphering hormonal signalling networks during seed development for crop improvement." As part of this Award, she visited the Max Planck Institute of Molecular Plant Physiology, Potsdam, Germany, where she was hosted by Dr. Duarte Dionísio Figueiredo, Research Group Leader.

Seed development is a tightly regulated process involving intricate communication between different seed

compartments. Dr. Figueiredo's research focuses on elucidating the crucial roles of auxins and brassinosteroids in regulating seed development and size. Their work uncovered the role of these hormones as key communication signals between different parts of the seed. With keen interest in deciphering this signalling cascade further, they analyzed the transcriptomic data generated from the brassinosteroid biosynthesis mutant in Arabidopsis in response to auxin and BR treatments. Among the target transcripts identified through this study, the top candidates were curated for experimental characterization.

Their work uncovered the role of the hormones as key communication signals between different parts of the seed.



They have prepared overexpression and editing constructs for the target genes and are now in the process of plant transformations. In-depth analysis of the transgenic plants will help elucidate the intricacies of seed development and provide a framework for follow-up studies with important

implications in agriculture and crop improvement.

Dr. Sharma's research stay in Germany facilitated the exchange of ideas, expertise, and protocols, which in turn helped to chart out a clear pipeline for the follow-up work on the proposed project. The key ideas that emerged during the project discussions and

literature survey led to the joint publication of a review article (Figueiredo, Duarte D., and Rita A. Sharma. "The mysterious dialogue between the embryo, endosperm, and seed coat, and its implications on seed traits." *Journal of Experimental Botany* (2025): eraf320; <https://doi.org/10.1093/jxb/eraf320>).



Dr. Pydi Ganga Mamba Bahubalindrani

Indian Institute of Science Education and Research (IISER) Bhopal

Under the WISER award, Dr Pydi undertook a research visit to the Fraunhofer Institute for integrated Systems and Device Technology (IISB), Erlangen, Germany

Dr. Pydi Ganga Mamba Bahubalindrani, Associate Professor at the Indian Institute of Science Education and Research (IISER) Bhopal, has been awarded the IGSTC WISER-2023 for the project titled "SiC Based Multi-Sensing System for UV, Magnetic Field, Temperature, and Pressure Monitoring in Real World Applications.". Under this award, she undertook a research visit to the Fraunhofer Institute for Integrated

Systems and Device Technology (IISB), Erlangen, Germany, where she was hosted by Dr. Mathias Rommel, Group Manager for SiC-BiCMOS Circuit Design and Analytics.

The WISER-funded research work focuses on the implementation of a multi-sensing system using 4H-SiC CMOS technology to monitor UV, Magnetic Field, Temperature, and Pressure for harsh environments. As part of



this, 4H-SiC CMOS-based magnetic sensors have been characterized with temperature, standalone UV sensors and integrated readout circuits have been developed and tested, and different circuits including amplifiers and current mirrors with 4H-SiC CMOS transistors have been characterized at high temperatures up to 600 °C for multi-sensing applications.

During the research stay in Germany, the team comprising Dr. Pydi Ganga M. B, Dr. Mathias Rommel, Mr. Leander Baier, Mr. Julian Kauth, and Mr. Michael Schraml carried out experimental characterization of 4H-SiC CMOS circuits including amplifiers and self-compensating designs with PMOS and NMOS transistors at long ($>5\ \mu\text{m}$) and short ($\sim 1\ \mu\text{m}$) channel lengths up to temperatures $\geq 500\ ^\circ\text{C}$.

Experimental characterizations of different on-chip sensors (UV and magnetic) with the same technology were also performed, along with testing of integrated UV sensors and readout circuits. Preliminary results from these studies have shown reliable functionality even at high temperatures $\geq 500\ ^\circ\text{C}$, paving the way for the implementation of multi-sensing systems for harsh environments with 4H-SiC CMOS technology.

Research article published: Khan, Md Asif, Pydi Ganga Bahubalindrani, Alexander May, Chiara Rossi, and Mathias Rommel. "Temperature Sensing Readout Circuits with 4H-SiC Technology." In 2024 IEEE International Symposium on Smart Electronic Systems (iSES), pp. 60-63. IEEE, 2024; <https://doi.org/10.1109/iSES63344.2024.00023>



Dr. Monika Gupta

Indian Institute of Technology (IIT) Jodhpur

Dr. Monika Gupta, Assistant Professor at the Indian Institute of Technology (IIT) Jodhpur, has been awarded the IGSTC WISER-2023 Award for the project titled "Development of Solid-state Solar Thermal Fuels Derived from Liquid Crystalline Norbornadiene Derivatives." As part of this award, she undertook a research visit to the Julius Maximilians University of Würzburg, Germany, where she was hosted by Prof. Frank Würthner at the Institute of Organic Chemistry and Center for Nanosystems Chemistry.

Dr. Gupta from IIT Jodhpur is advancing the frontiers of clean energy research through her pioneering work on

liquid-crystalline solid-state solar thermal fuels. Her research explores the development of innovative solar thermal fuels derived from liquid crystal materials that uniquely combine structural order with molecular mobility at the supramolecular level. By engineering visible-light-responsive norbornadiene-based liquid crystalline systems, she seeks to create highly efficient materials capable of storing and releasing solar energy on demand. These next-generation fuels hold immense potential for applications ranging from solar blankets and de-icing coatings to smart building materials, biomedical devices, and waste heat recovery systems.

These next-generation fuels hold immense potential for applications ranging from solar blankets and de-icing coatings to smart building materials, biomedical devices, and waste heat recovery systems.



During her WISER research visit, she worked alongside Prof. Würthner's internationally acclaimed research group, known for developing advanced organic materials from functional dyes. During her stay, she engaged in lively scientific discussions with the German team on topics spanning liquid crystals, supramolecular materials, photoswitches, and optoelectronics. She also carried out sophisticated analyses of her liquid

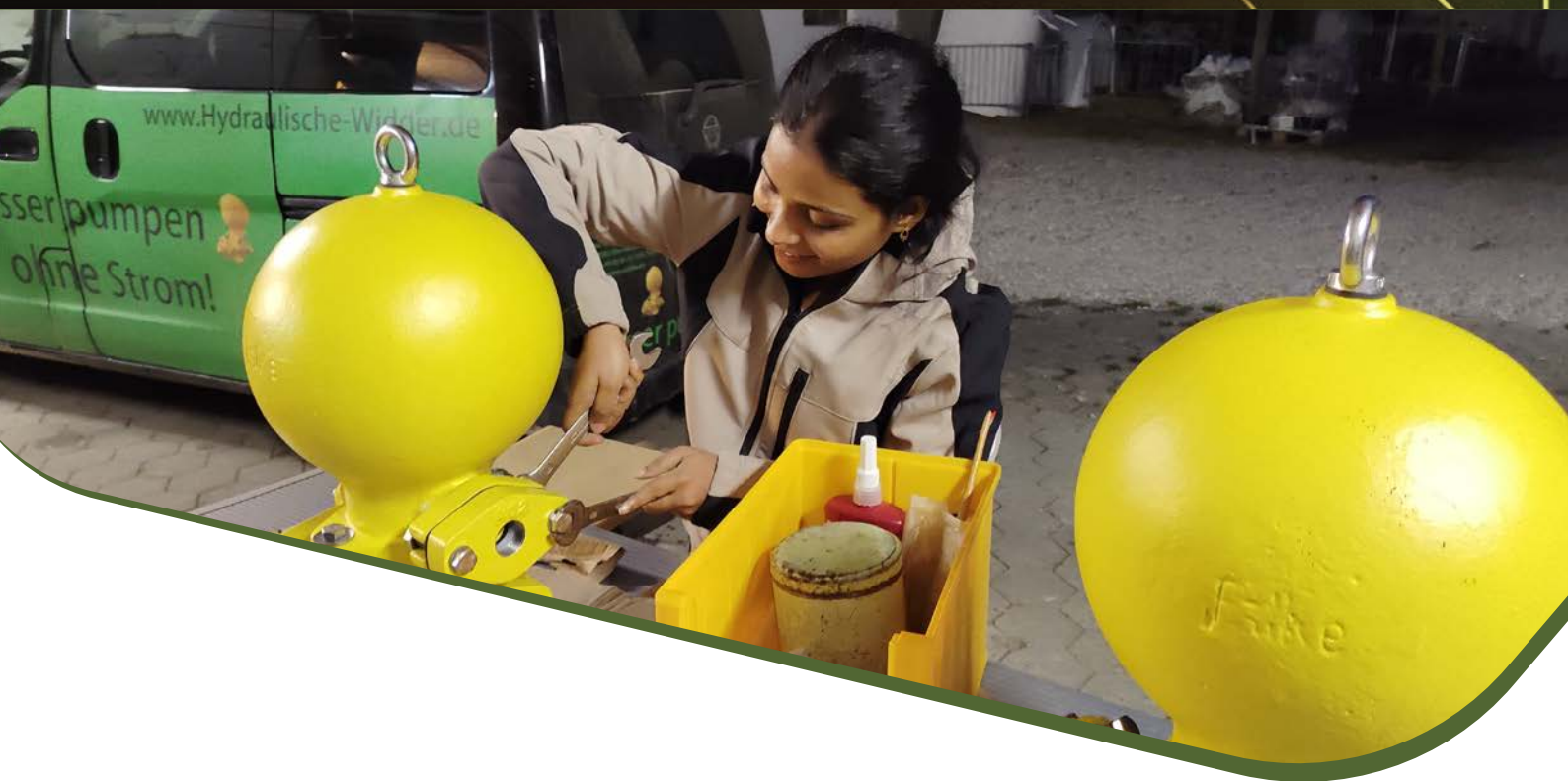
crystalline samples using polarized optical microscopy and small-angle/wide-angle X-ray scattering (SAXS/WAXS). These experiments offered exciting insights into how the molecules organize themselves and how their unique structures influence light absorption and energy storage—key steps toward developing efficient solar thermal fuels. To Dr. Gupta, the visit was far more than a scientific exchange—it was an enriching cultural journey that

broadened her horizons and strengthened the collaborative bond between IIT Jodhpur and the University of Würzburg. Through her pioneering research and international engagement, Dr. Gupta is not only advancing the pursuit of a sustainable energy future but also inspiring a new generation of young researchers to follow her trailblazing path.

As an outcome of her WISER-supported research, Dr. Monika Gupta has published six research articles in reputed international journals. These include high-impact papers such as *Advanced Energy Materials* (2024, 14, 2303845, doi:10.1002/aenm.202303845) and *Advanced Functional Materials* (2024, 34, 2409245, doi:10.1002/adfm.202409245), alongside contributions in *Journal of Materials Chemistry A* and *ACS Applied Energy Materials*.

The background is a dark gradient with abstract elements. A large white circle is centered, containing the text. To the left, green lines resembling a circuit board with glowing nodes extend towards the circle. Below the circle, a low-poly, orange-glowing shape, possibly representing a landscape or a stylized object, is visible. The overall aesthetic is futuristic and technological.

Industrial Fellowship



Dr. Siddhi Kesharwani

Indian Institute of Science (IISc), Bangalore

The collaboration has provided access to state-of-the-art manufacturing facilities, real-time performance testing, and expert mentorship, bridging the gap between academic concepts and industrial applications.

Dr. Siddhi Kesharwani, a recipient of the IGSTC Post-Doctoral Industrial Fellowship (PDIF), is currently pursuing her fellowship at Wama Widder, Germany. She earned her Ph.D. in Civil Engineering from the Indian Institute of Science (IISc), Bangalore, where she focused on developing electricity-free, low-head hydraulic pumping systems to serve rural and underserved communities. With a strong foundation in hydrological modelling, fluid mechanics, and system design, her research is dedicated to developing sustainable, affordable, and renewable water distribution solutions tailored to the needs of resource-constrained regions.

At Wama Widder, a leading German manufacturer specializing in innovative hydraulic ram pumps, Dr. Kesharwani has gained invaluable exposure to advanced industrial practices. The collaboration has provided access to state-of-the-art manufacturing facilities, real-time performance testing, and expert mentorship, bridging the gap between academic concepts and industrial applications. This opportunity enabled her to translate theoretical designs into practical prototypes, rapidly validate them under field conditions, and optimize scalable models for real-world implementation.



Lifting Device for Input Supply Criterion of 40-120 l/s, 2-5 m, with Case Study of an Implemented Project."

Sāadhanā, Springer, alongside an upcoming presentation at the 13th World Congress on Water Resources and Environment (EWRA 2025) in Palermo, Italy.

Beyond the laboratory and field sites, Dr. Kesharwani's stay in Germany has been marked by rich cultural and community engagement. From celebrating Oktoberfest and Maypole traditions to sharing meals with local families and interacting with farmers exploring off-grid water solutions, her experiences have been both personal and professional. Visits to industries, seminars in the Black Forest, and collaborations with Austrian and Swiss communities on site-specific water solutions have further broadened her global perspective.

Her research at the German host focuses on designing, simulating, and field-validating low-head hydraulic pumps, particularly ram and axial turbine pumps that operate without electricity. Through the fellowship, she has refined design parameters such as stroke ratios and drive pipe lengths by conducting extensive field testing under diverse conditions. These efforts have led to the development of robust, efficient, and adaptable micro-hydro pump solutions,

with proven functionality in ungauged river basins and challenging terrains. Her research has resulted in significant publications, including: Unni R. P., Kesharwani Siddhi, et al. (Accepted, 2025), "Experimental Study of Renewable Hydro Powered Tyre Piston Pumps for Water Supply and a Case for Application of Similitude Theory," *Journal of Power and Energy (Part A, IMechE)*; Unni R. P., Kesharwani Siddhi, et al. (2025), "Design of Turbine Pumps as a Niche Water



Dr. Pradnya Ranjan Kamble

ICMR-National Institute for Research in Reproductive and Child Health, Mumbai

Dr Kamble has successfully generated novel anti-IL-2 monoclonal antibodies using hybridoma technology, purified them by affinity chromatography, and rigorously characterized their reactivity using ELISA and Western blot analysis.

Dr. Pradnya Ranjan Kamble is an awardee of the IGSTC Post-Doctoral Industrial Fellowship (PDIF) and is currently pursuing her fellowship at Lionex Diagnostics and Therapeutics GmbH, Braunschweig, Germany, under the mentorship of Prof. Mahavir Singh. Dr Kamble has completed her Ph.D. at the ICMR-National Institute for Research in Reproductive and Child Health (NIRRCH), Mumbai, under the supervision of Dr. Bhakti Pathak, where her research focused on investigating the active immunotherapeutic potential of the tumor antigen Trop-2 for ovarian cancer treatment. Through her doctoral work, she gained strong expertise in immunology, molecular biology, and cell

biology, mastering techniques such as B-cell epitope mapping, recombinant protein production, antibody generation and purification, and their validation using ELISA, Western blotting, and flow cytometry.

At Lionex GmbH, Dr. Kamble is contributing to the development of a highly sensitive and specific whole-blood ELISA kit based on IL-2 cytokine release for the diagnosis of active tuberculosis (TB)—a crucial advancement given the global challenge of distinguishing active TB from latent infection. She successfully generated novel anti-IL-2 monoclonal antibodies using hybridoma technology, purified them by affinity chromatography,



students during their internships and thesis projects, strengthening her leadership and collaborative capabilities. A manuscript based on her current research is in preparation, reflecting the significant scientific outcomes of her fellowship.

Beyond the laboratory, Dr. Kamble's stay in Germany had been a culturally enriching experience. She explored historical cities such as Braunschweig, Berlin, and Munich, celebrated Oktoberfest, New Year's Eve at Brandenburg Gate, and the Spring Carnival in Braunschweig, and travelled through the scenic countryside and alpine regions of southern Germany. A memorable highlight was a winter journey to the Harz Mountains aboard a nostalgic steam train. Her active engagement in intercultural exchange—sharing Indian cuisine with colleagues, participating in workplace celebrations, and experiencing traditional German food and festivals—fostered warm friendships and cross-cultural understanding.

Through the IGSTC Post-Doctoral Industrial Fellowship, Dr. Kamble has not only advanced her scientific expertise in diagnostic assay development and immunotechnology but also broadened her global perspective, embodying the spirit of Indo-German scientific collaboration and cultural exchange.

and rigorously characterized their reactivity using ELISA and Western blot analysis. These validated antibodies were integrated into a diagnostic ELISA platform, which she analytically optimized for detection limit, accuracy, and linearity. For clinical validation, she collaborated with Städtisches Klinikum Braunschweig (SKBS) GmbH, where blood samples from suspected TB patients were tested to measure IL-2 cytokine responses upon antigen stimulation. The ongoing statistical evaluation aims to establish the assay's diagnostic sensitivity and specificity through ROC-curve analysis, paving the way for a reliable clinical diagnostic tool for active TB.

The fellowship has offered Dr. Kamble an invaluable opportunity to bridge academic research and industrial translation. Exposure to the industrial R&D environment at Lionex GmbH has provided hands-on experience with large-scale assay development, quality control, and IVDR-compliant documentation, deepening her understanding of regulatory processes and quality management systems in the medical diagnostics industry. Working closely with experienced scientists and clinicians from SKBS has enhanced her problem-solving and workflow optimization skills, accelerating progress in assay development. She has also mentored four M.Sc.



Dr. Satya Kumar Dewangan

National Institute of Technology (NIT) Raipur

Dr Dewangan's research focuses on Artificial Intelligence (AI) safety and reliability, particularly on the qualification of AI-assisted defect detection software for computed tomography (CT) evaluations in aviation applications.

Dr. Satya Kumar Dewangan is an awardee of the IGSTC Post-Doctoral Industrial Fellowship (PDIF 2024) and is currently pursuing his fellowship at Testia GmbH, an Airbus company, located in Ottobrunn, Munich, Germany, under the supervision of Dr. Jonas Holtmann. His research focuses on Artificial Intelligence (AI) safety and reliability, particularly on the qualification of AI-assisted defect detection software for computed tomography (CT) evaluations in aviation applications.

Dr. Dewangan completed his Ph. D. in Metallurgical and Materials Engineering from the National Institute of Technology (NIT) Raipur under the guidance of Dr. Manoranjan Kumar Manoj and Dr. Manwendra Kumar Tripathi. His doctoral research, titled "Effect of Process Parameter, Tool Design, and Interlayer on Similar and Dissimilar Friction Stir Welding of Aluminum and Magnesium Alloy," provided key insights into joining dissimilar lightweight materials. He also holds B.E. and M.Tech degrees in Mechanical Engineering from Chhattisgarh Swami Vivekanand



algorithms are integrated into non-destructive evaluation (NDE) workflows. His work at Testia bridges academic knowledge and industrial practice, enhancing his expertise in AI-based quality assurance, additive manufacturing, and materials reliability. He also had the opportunity to attend the BAU 2025 World's Leading Trade Fair for Architecture, Materials, and Systems (January 13–17, 2025, Messe München), broadening his understanding of cross-sectoral innovations in materials and inspection systems.

Expressing his gratitude to IGSTC, Dr. Dewangan acknowledges that the fellowship has been a transformative experience—strengthening his research acumen, broadening his industrial perspective, and opening avenues for collaborative innovation in AI-driven aerospace inspection technologies. He remains committed to completing his planned research outcomes and contributing meaningfully to the advancement of AI-assisted defect detection and non-destructive testing applications within the global aerospace ecosystem.

Technical University (CSVTU), Bhilai, where his M.Tech work focused on the mechanical characterization of metal matrix composites. Prior to this fellowship, he gained valuable experience at IIT Bhilai, contributing to an AI-based defect detection project for continuous cast steel billets.

At Testia GmbH, a subsidiary of Airbus specializing in structural integrity and non-destructive testing (NDT), Dr. Dewangan is developing and qualifying an AI-driven defect detection model for X-ray computed tomography (CT) images used in aerospace component inspections. The project aims to reduce the cost and time of defect analysis by automating the

interpretation of high-resolution CT scans. Since CT imaging enables three-dimensional visualization of internal structures, the model is designed to detect and classify even minute artefacts within complex geometries, taking into account scanning parameters, material properties, and part geometry. The research directly contributes to improving the accuracy, consistency, and qualification standards of AI-assisted inspection systems in aviation manufacturing.

Through the fellowship, Dr. Dewangan has gained extensive exposure to the German aerospace industry, learning how advanced AI



Mr. Ravi Raj

CSIR–Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur

Mr Raj's scientific expertise spans molecular biology, animal cell culture, protein purification, and pre-clinical studies, forming a strong foundation for translational biomedical research.

Mr. Ravi Raj is an awardee of the IGSTC Phd Industrial Exposure Fellowship (PIEF) 2024 and is currently pursuing his research at LIONEX GmbH, Braunschweig, Germany, under this prestigious fellowship. He holds an M. Sc. in Biotechnology and is presently undertaking his doctoral research at CSIR–Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur. His scientific expertise spans molecular biology, animal cell culture, protein purification, and pre-clinical studies, forming a strong foundation for translational biomedical research.

At LIONEX GmbH, a leading German biotech company known for its pioneering work in diagnostics and therapeutics, Mr. Raj is contributing to research focused on infectious diseases—particularly tuberculosis (TB). The company is globally recognized for developing diagnostic kits, monoclonal antibodies, and vaccines targeting major health challenges such as TB, making it an ideal setting for his applied research experience.

During his fellowship, Mr. Raj has been engaged in the isolation and characterization of monoclonal antibodies specific to Lipoarabinomannan (LAM)—a



- Completion of a full R&D batch of LioDetect TB Urine Rapid Test Kits for research and evaluation.
- Demonstration of detection sensitivity as low as 0.5 ng/test, marking a significant achievement in TB diagnostics.
- Initiation of work on a next-generation ProteoLAM Rapid Test Kit, integrating multiple TB antigens to enhance diagnostic accuracy.
- Meaningful contributions toward global TB diagnostic innovation, aligning with the UN Sustainable Development Goals for health.

Through the IGSTC PIEF fellowship, Mr. Raj has gained invaluable international exposure to industrial R&D practices, bridging academic research and product development. The fellowship has enhanced his technical expertise, broadened his perspective on global collaborative research, and empowered him to contribute toward developing affordable, high-impact diagnostic solutions for global health challenges.

key TB antigen—along with other TB-associated targets. His work focuses on the development of a multi-antigen-based TB urine rapid test kit, designed to provide a non-invasive, rapid, and accurate diagnostic solution. By employing hybridoma technology for antibody production and gold conjugation methods for antigen detection, he has

contributed to the creation of the LioDetect TB Urine Rapid Test Kit, which demonstrates high sensitivity and reliability for detecting LAM antigens.

Among his key accomplishments under the fellowship are:

- Successful revival and culture of hybridoma cells producing anti-LAM and anti-ESAT6 IgM antibodies.



Dr. Vinay Hegde

ICAR–National Institute of Abiotic Stress Management (NIASM), Maharashtra

Dr. Vinay Hegde is an awardee of the IGSTC Post-Doctoral Industrial Fellowship (PDIF) and is currently pursuing his fellowship at Bayer AG, Crop Science Division, Germany. He completed his Ph. D. (Agriculture) in Plant Physiology from the ICAR–National Institute of Abiotic Stress Management (NIASM), Baramati, Maharashtra, and Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. During his doctoral studies, he was awarded the prestigious Prime Minister's Research Fellowship (PMRF) for his work on enhancing water-use efficiency in sugarcane. His research expertise encompasses crop physiology, abiotic stress management,

and biostimulant evaluation, with a strong foundation in field assessment, crop health monitoring, and high-throughput plant phenotyping. He is proficient in advanced analytical tools and software, including R, ImageJ, LemnaTec, and techniques such as thermal, fluorescence, and hyperspectral imaging. Dr. Hegde has several peer-reviewed international publications, book chapters, and conference presentations to his credit.

At Bayer AG, a global leader in life sciences with a core focus on health care and agriculture, Dr. Hegde is contributing to research within the Crop Science Division, which is dedicated to developing sustainable and

During his doctoral studies, Dr Hegde was awarded the prestigious Prime Minister's Research Fellowship (PMRF) for his work on enhancing water-use efficiency in sugarcane.



regenerative agricultural solutions. Bayer's vision—"Health for All, Hunger for None"—drives its mission to transform agriculture through innovations that enhance productivity, biodiversity, and soil health. The division's focus on regenerative agriculture aims to achieve higher yields while improving environmental sustainability and resource efficiency, aligning perfectly with Dr. Hegde's expertise in sustainable crop physiology.

Under his PDF project titled "Efficacy of Biological Products for Stimulating Growth Benefits in Sunflower Seed Treatment," Dr. Hegde is investigating biological seed treatments to improve germination rate, early vigor, and yield potential in sunflower crops. The research objectives include identifying challenges associated with seed treatments, evaluating the impact of selected biological products on germination and plant development, and comparing

treated seeds with untreated controls. This study aims to develop practical and scalable solutions for enhancing crop resilience and productivity through biological interventions.

The collaboration with Bayer AG has significantly advanced Dr. Hegde's research through access to state-of-the-art imaging platforms, growth chambers, and seed treatment facilities. Working closely with Bayer's R&D teams has provided him with exposure to industrial-scale product development, regulatory frameworks, and translational research approaches. This experience has deepened his understanding of how fundamental science is converted into commercially viable agricultural products that benefit farmers and ecosystems alike.

Through the fellowship, Dr. Hegde has achieved several milestones, including the standardization of protocols for

evaluating biological seed treatments, initiation of a comparative study on sunflower growth promotion, and participation in interdisciplinary workshops on seed treatment technologies and product commercialization. He has also gained valuable insights into regulatory compliance and quality control standards required for biological product registration in the agricultural industry. A manuscript based on his current findings is in progress, reflecting the scientific and practical outcomes of his fellowship.

Beyond research, Dr. Hegde's stay in Germany has been culturally enriching. Immersing himself in local traditions, festivals, and community events, he has experienced the country's sustainable lifestyle, diverse cuisine, and multilingual environment. His travels across historic cities and participation in European scientific networking events have further broadened his professional and cultural horizons.

Through the IGSTC Post-Doctoral Industrial Fellowship, Dr. Hegde has successfully bridged academic research and industrial application, contributing to the development of biological and sustainable agricultural solutions. His work exemplifies the essence of Indo-German collaboration, promoting innovation that addresses global challenges in food security and environmental sustainability.

Paired
Early Career
Fellowship
in Applied
Research
(PECFAR)



Dr. Sujeet Kumar Singh

Indian Statistical Institute (ISI) Hyderabad

Dr. Sujeet Kumar Singh, Assistant Professor at the Indian Statistical Institute (ISI), Hyderabad unit, has been awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR). As part of this fellowship, he is collaborating with Prof. Pirmin Fontaine from the Catholic University of Ingolstadt on a project that addresses the e-commerce delivery problem within the broader context of urban logistics. The research focuses on developing and analyzing mathematical models for urban logistics using multi-objective optimization techniques. By integrating economic, social, and environmental criteria, the team aims to generate balanced trade-offs that reflect the interests of various stakeholders in the urban mobility ecosystem.

Through his fellowship, Dr. Singh benefited greatly from the research environment and state-of-the-art infrastructure at his host institution in Germany. The collaboration broadened

his perspective on logistics, enabling him to explore both land and water logistics systems in a comprehensive manner. During his stay, he actively engaged with faculty members, postdoctoral researchers, and Ph.D. students, expanding his academic network and gaining valuable insights into European research practices and urban mobility frameworks.

Beyond academia, Dr. Singh also immersed himself in Germany's rich cultural and historical heritage. He visited the First World War Museum in Ingolstadt and explored the city of Munich, gaining a deeper understanding of the region's infrastructure, architecture, and way of life.

The IGSTC-PECFAR Fellowship has provided Dr. Singh with a platform to pursue interdisciplinary research and foster international collaboration. The exposure and insights gained during the fellowship are expected to enhance his future research and academic endeavors at ISI Hyderabad, supporting his continued growth in the field of optimization and urban logistics.

The research focuses on developing and analyzing mathematical models for urban logistics using multi-objective optimization techniques.



Dr. Tess Holling

University Medical Center Hamburg-Eppendorf

As part of this fellowship, she is collaborating with Dr. Vivekananda Bhat, Clinical Geneticist at the Department of Medical Genetics, Kasturba Medical College, Manipal, India, on a project focused on understanding rare genetic disorders and identifying their underlying genetic causes.

Dr. Tess Holling, a Postdoctoral Research Scientist at the Institute of Human Genetics, University Medical Center Hamburg-Eppendorf, Germany, has been awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR) 2024. As part of this fellowship, she is collaborating with Dr. Vivekananda Bhat, Clinical Geneticist at the Department of Medical Genetics, Kasturba Medical College, Manipal, India, on a project focused on understanding rare genetic disorders and identifying their underlying genetic causes. While Dr. Holling brings expertise in molecular biology and cellular analysis, and Dr. Bhat specializes in clinical genetics, their combined

efforts aim to bridge the gap between molecular and clinical perspectives in rare disease research.

The collaborative research seeks to refine and integrate bioinformatic pipelines used in exome sequencing data analysis, enhancing the precision of variant prediction and genetic annotation. During her recent visit to Manipal in 2025, Dr. Holling worked closely with Indian colleagues to compare analysis workflows and identify areas for methodological improvement. She also shared her expertise in experimental techniques such as the cultivation of patient-derived primary fibroblasts and DNA, RNA, and protein analyses, strengthening



patient care and novel discoveries in the field of medical genetics.

Beyond the laboratory, Dr. Holling's stay in India offered her a vibrant cultural experience—marked by warm hospitality, traditional Indian cuisine, and explorations of Manipal's scenic landscapes. Her visits to local temples and festivals provided her with a deeper appreciation of Indian culture and spirituality, enriching her professional and personal journey. Through the IGSTC–PECFAR fellowship, Dr. Holling and Dr. Bhat have exemplified the spirit of Indo–German scientific collaboration. Their ongoing partnership underscores how international cooperation can advance research in rare genetic disorders and foster meaningful intercultural exchange.

the technical capabilities of both teams. Dr. Bhat's upcoming visit to Hamburg will further advance this collaboration by expanding their work on data interpretation and integrating clinical insights into molecular

findings. Together, their research aims to enhance diagnostic accuracy and deepen understanding of the molecular mechanisms driving rare genetic disorders. The outcomes of this collaboration hold potential for improved



Mr. Volker Recksiek

Helmholtz Institute Freiberg for Resource Technology (HIF),
Helmholtz-Zentrum Dresden-Rossendorf (HZDR)

Mr. Volker Recksiek, Acting Head of Pyrometallurgy, Department of Process Metallurgy at the Helmholtz Institute Freiberg for Resource Technology (HIF), Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany, has been awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR 2023) jointly with Dr. Nikhil Dhawan, Associate Professor in the Department of Metallurgical and Materials Engineering at the Indian Institute of Technology (IIT) Roorkee. Their collaborative project, titled "PREclous METals recovery from secondary feeds: efficient processes by complimentary Indo-German expertise (PRIME)," focuses on the recovery of valuable metals from electronic waste (e-waste) through

the integration of hydrometallurgical and pyrometallurgical techniques.

The joint project addresses one of the major challenges of the modern technological era, efficient recycling of electronic waste, which continues to grow due to the rapid expansion of electronic device usage. Improper disposal of e-waste poses significant environmental hazards, and sustainable recovery processes are crucial to mitigate this impact. Through the PRIME project, the partners aim to develop optimized and eco-efficient methods for recovering high-value metals such as gold, copper, and indium, while minimizing the generation of toxic by-products.

During his recent visit to IIT Roorkee, Mr. Recksiek collaborated closely

Improper disposal of e-waste poses significant environmental hazards, and sustainable recovery processes are crucial to mitigate this impact.



safety, and laboratory planning. The collaboration resulted in three key outcomes: (1) identification of metallurgical synergies for achieving both metal recovery and by-product detoxification, (2) enhancement of IIT Roorkee's experimental infrastructure through German expertise, and (3) formulation of new collaborative research ideas and potential 2+2 project proposals, including plans for joint experiments and publications.

Building on these promising results, both partners aim to expand their cooperation by involving industrial stakeholders from India and Germany to develop scalable, application-oriented recycling processes. The upcoming exchange visit of Dr. Dhawan to HIF, HZDR is expected to strengthen experimental outcomes and lead to prospective publications in the domain of e-waste recycling. The Helmholtz Institute Freiberg looks forward to hosting Dr. Dhawan and continuing this dynamic Indo-German collaboration under the spirit of the IGSTC-PECFAR program.

with Dr. Dhawan's research team, which has substantial experience in hydrometallurgical processing of various e-waste streams, including printed circuit boards (PCBs), LEDs, LCDs, and lithium-ion and alkaline batteries. Leveraging this expertise, Mr. Recksiek contributed to the design and implementation of pyrometallurgical process steps for PCB recycling. Detailed analytical data provided by Dr. Dhawan's group served as essential input for thermochemical modelling and process design.

Subsequent laboratory-scale experiments validated the theoretical calculations, successfully producing copper nuggets and homogeneous slags, encouraging results that will be further refined during Dr. Dhawan's upcoming visit to HIF, HZDR in 2025.

The visit also facilitated significant knowledge transfer and infrastructure development at IIT Roorkee. Mr. Recksiek assisted in setting up high-temperature experimental capabilities, providing technical guidance on process design, operational



Dr. Majd Al-Naji

Universität Leipzig

Dr. Majd Al-Naji, Interim Professor at the Institute of Chemical Technology, Universität Leipzig, and Group Leader of the Sustainable Value Chains team at BasCat – UniCat BASF JointLab, Technische Universität Berlin, was awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR -2024). He is also a Group Leader within the Cluster of Excellence Unifying Systems in Catalysis (UniSysCat).

renewable fuels. The partnership leverages complementary expertise in catalytic materials and sustainable process design. His stay at IIT Hyderabad provided an excellent platform to engage with faculty and students across the Department of Chemistry, exchange ideas on advanced catalyst development, and explore interdisciplinary approaches toward green chemistry and circular economy principles.

Dr. Majd's collaboration with Dr. Putla from IIT Hyderabad brings together complementary expertise in catalytic materials and sustainable process design.

Under the IGSTC–PECFAR program, Dr. Al-Naji initiated a promising collaboration with Dr. Sudarsanam Putla from the Indian Institute of Technology (IIT) Hyderabad, focusing on catalyst development for sustainable chemical processes, particularly the conversion of waste biomass into fine chemicals and

During his visit, Dr. Al-Naji was also invited by Prof. Sebastian Peter to deliver a lecture at the International Conference on Carbon Capture and Utilization 2024 in Bengaluru, hosted by the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR). The visit offered not only valuable scientific interactions but



also an opportunity to experience Bengaluru's vibrant blend of technological innovation, cosmopolitan energy, and cultural richness. He further explored southern India's diversity, including the serene coastal landscapes of Goa and Gokarna, where he found inspiration in the region's natural beauty, spirituality, and cuisine.

Dr. Al-Naji's scientific engagements extended beyond Hyderabad and Bengaluru. At IIT Madras (Chennai), invited by Prof. Parasuraman Selvam and Prof. Jithin John Varghese, he discussed cooperation in chemical technology and theoretical chemistry, while immersing himself in the cultural vibrancy of Tamil Nadu, its architecture,

festivals, and cuisine. His visit to IIT Delhi and interaction with Prof. Sameer Sapra's group led to fruitful exchanges on materials for energy conversion and energy-efficient processes, sparking ideas for a potential IGSTC workshop proposal. His fellowship concluded with a memorable visit to IIT Mandi, hosted by Prof. Venkata Krishnan, where he delivered a talk titled "A Step Forward in Sustainable Chemical Processes Through Heterogeneous Catalysis." During this visit, he engaged with multiple research groups, including those of Prof. Garima Agrawal (Functional Polymers & Nanomaterials Lab), Prof. Bhaskar Mondal (Computational Catalysis Laboratory), and Prof. Prem Felix Siril, discussing

collaborative prospects in designing heterogeneous catalysts for waste biomass valorization. The visit also included a retreat and an excursion to Prasher Lake, a serene mountain destination that left a lasting impression.

Through the opportunity under PECFAR fellowship, Dr. Al-Naji successfully combined scientific collaboration, interdisciplinary learning, and cultural immersion, building enduring professional partnerships and personal connections across India. His engagement underlines the spirit of the IGSTC-PECFAR program, fostering Indo-German collaboration, advancing sustainable technologies, and bridging science with shared human experience.



Prof. Pirmin Fontaine

Catholic University of Eichstätt-Ingolstadt (KU)

Prof Fontaine's work seamlessly integrates real-world applications with mathematical and computational modelling, with a particular focus on urban logistics, mobility systems, and supply chain resilience.

Prof. Pirmin Fontaine, Full Professor of Logistics and Operations Analytics at the Ingolstadt School of Management, Catholic University of Eichstätt-Ingolstadt (KU), Germany, has been awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR). He is also a member of the Mathematical Institute for Machine Learning and Data Science at KU and a collaborative member of the Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT) in Montreal, Canada.

Prof. Fontaine's research centers on developing advanced decision-support models for

mobility, logistics, and supply chain management. His work seamlessly integrates real-world applications with mathematical and computational modelling, with a particular focus on urban logistics, mobility systems, and supply chain resilience. By combining optimization methodologies with machine learning, he creates models that enhance strategic and operational decision-making for businesses, policymakers, and society—striking a balance between sustainability, cost efficiency, and social impact. His research has been featured in leading international journals, including Operations Research, Transportation Science, and the European Journal of Operational



algorithmic approaches to handle the complexity of realistic urban logistics networks and formulated initial ideas for efficient computational methods to solve large-scale problems.

Beyond academic collaboration, Prof. Fontaine engaged with Ph.D. scholars, postdoctoral researchers, and faculty members at ISI, discussing opportunities for future joint research and exchange programs. His visit also provided valuable cultural exposure experiencing the warmth and hospitality of Hyderabad, its vibrant cuisine, and local heritage sites.

Through his PECFAR fellowship, Prof. Fontaine strengthened Indo-German collaboration in logistics analytics and sustainable mobility, laying the foundation for continued joint research in smart urban logistics systems that integrate technology, sustainability, and social welfare.

Research, and he serves on the editorial board of Transportation Research Part E: Logistics and Transportation Review.

Under the IGSTC-PECFAR program, Prof. Fontaine collaborated with Dr. Sujeet Kumar Singh at the Indian Statistical Institute (ISI), Hyderabad, to develop a multi-objective optimization model for urban logistics

management, with a focus on online order and last-mile delivery systems. The objective of the project was to create a holistic decision-making framework that incorporates economic, environmental, and social criteria, helping to generate actionable trade-offs between stakeholders such as logistics providers, customers, and urban authorities. Together, they explored innovative



Dr. Ritwik Mondal

Indian Institute of Technology (ISM) Dhanbad

Dr. Ritwik Mondal, Department of Physics, Indian Institute of Technology (ISM) Dhanbad, and Dr. Alexander Mook, Johannes Gutenberg University Mainz, have been jointly awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR 2024) for their collaborative project on ultrafast magnetisation dynamics and topological spin systems.

Dr. Mondal's group at IIT (ISM) Dhanbad develops theoretical and computational frameworks to study magnetisation dynamics driven by diverse spin torques, such as inertial torque, field-derivative torque, optical spin-orbit torque, and spin-transfer torque, induced by polarized light. Dr. Mook's research at Mainz focuses on topological spin dynamics in quantum condensed-matter systems, particularly the behavior of topological magnons as potential

information carriers for next-generation technologies.

Through the PECFAR fellowship, both researchers synergized their expertise to uncover novel phenomena in topological inertial magnons. They observed an anti-crossing between precessional and inertial magnon bands within a two-dimensional honeycomb lattice, where an energy gap—tunable via time-reversal-symmetry breaking—emerges with distinct topological features. Their analysis further revealed chiral edge states bridging these bands and a six-fold symmetric Berry curvature associated with the energy gap. The collaboration successfully accomplished all milestones set forth in their PECFAR proposal, marking a significant breakthrough in the understanding of topological spin dynamics with promising implications for next-generation ultrafast spintronic devices.

Through PECFAR, both the awardees synergize their expertise to uncover novel phenomena in topological inertial magnons.



Dr. Prosenjit Das

Indian Institute of Science (IISc) Bengaluru

The exchange successfully combined simulation-driven process design and experimental coating development, advancing the understanding of sustainable Mg alloy processing and protection strategies.

Dr. Prosenjit Das, Associate Professor at the Department of Materials Engineering, Indian Institute of Science (IISc) Bengaluru, and Dr. Valeryia Kasneryk, Research Scientist at the Institute of Surface Science, Helmholtz-Zentrum Hereon, Germany, were jointly awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR 2024) for their collaborative project on smart hybrid coatings and process modelling of magnesium alloys. Their research focuses on developing environmentally friendly, corrosion-resistant coatings and advanced solidification process models for lightweight Mg-based materials

crucial for automotive and aerospace applications.

Under the fellowship, Dr. Das visited the Institute of Surface Science, Helmholtz-Zentrum Hereon, from 1 to 22 June 2025, to work with Dr. Kasneryk's group on the development of in-situ Layered Double Hydroxide (LDH) coatings for gravity- and rheo-gravity-die-cast (RGDC) magnesium alloys and Al-Mg composites. The collaboration aimed to combine computational materials modelling and surface engineering, integrating CFD-, Phase-field-, and Molecular-Dynamics-based simulations with experimental surface-coating processes.



During his stay, Dr. Das gained hands-on experience in preparing in-situ LDH coatings on Al-15Mg₂Si-4.5Si composites and AZ91D Mg alloys, and in characterising these coatings through XRD, SEM, and EDS analyses. He shared his expertise in process modelling of solidification phenomena, offering insights into the effects of process parameters—such as die temperature, melt-pouring conditions, and cooling-slope geometry—on the microstructural morphology

and thermophysical properties of cast materials. His lectures and interactive sessions with Hereon's PhD students and postdoctoral researchers strengthened Indo-German knowledge exchange in computational metallurgy and coating science.

The visit also initiated experimental investigations into the corrosion performance of coated and uncoated samples, assessed via electrochemical impedance spectroscopy (EIS). These

studies will lead to joint publications and serve as the basis for a long-term collaboration between IISc and Hereon. Beyond Hereon, Dr. Das delivered invited talks at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) and Lille University, France, followed by participation in the THERMEC 2025 International Conference in Tours, France, where he presented two invited lectures on phase-field modelling and microstructural evolution of Al-Mg-Si composites.

This PECFAR exchange successfully combined simulation-driven process design and experimental coating development, advancing the understanding of sustainable Mg alloy processing and protection strategies. The collaboration also set the stage for a future Indo-German 2+2 project, integrating advanced modelling, surface modification, and corrosion-resistance technologies for next-generation lightweight materials.



Mr. Ashish Gaurav

CSIR–Central Scientific Instruments Organisation
(CSIR-CSIO), Chandigarh

Mr Gaurav has contributed to the project's system design by integrating AI-driven methodologies and systems engineering principles, which provided a structured approach to developing a scalable and reliable detection framework.

Mr. Ashish Gaurav, Scientist at the CSIR–Central Scientific Instruments Organisation (CSIR-CSIO), Chandigarh, and Mr. Konrad Wartke, Researcher at Goethe University, Germany, were jointly awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR) for their collaborative project on radar-based human activity recognition. This partnership brought together CSIO's expertise in advanced radar sensing and system design with Goethe University's strengths in hybrid artificial intelligence (AI) and model-based systems engineering (MBSE), aiming to develop a non-intrusive

radar-based anomalous activity detection system for healthcare and assisted living applications.

The collaboration was structured in two phases. During the first phase, Mr. Wartke visited CSIR-CSIO, India, where he gained hands-on experience with radar sensor hardware and experimental setups designed for simulating human motion and fall events. He contributed to the project's system design by integrating AI-driven methodologies and systems engineering principles, which provided a structured approach to developing a scalable and reliable detection framework.



In the next phase, Mr. Gaurav visited Goethe University, where he engaged deeply with MBSE approaches to align radar system architectures with real-world operational scenarios. His work focused on generating synthetic radar signatures of human activities, a crucial step toward enhancing AI model robustness given the limitations of real-world datasets. By leveraging simulated yet realistic radar data, the team improved the adaptability and accuracy of anomaly detection algorithms, particularly for use in elderly care and medical monitoring contexts.

Beyond the core collaboration, Mr. Gaurav visited multiple leading research institutions across Germany, including the University of Würzburg, University of Applied Sciences Erfurt, Karlsruhe Institute of Technology, and Düsseldorf University of Applied Sciences. These visits fostered meaningful academic exchanges and opened new avenues for collaboration in areas such as rule-based AI, biomedical instrumentation, and pedestrian movement analysis. The fellowship also strengthened institutional ties

between the Academy of Scientific and Innovative Research (AcSIR) at CSIR-CSIO and Goethe University, laying the groundwork for future joint research initiatives and capacity-building programs.

In addition to the scientific outcomes, the fellowship provided a rich intercultural experience. Mr. Gaurav participated in community engagements and cultural festivities, including Easter, Pentecost, and Latin American celebrations, which offered valuable perspectives on global diversity and collaboration. Through this PECFAR-supported partnership, the team successfully advanced research in radar-based human activity monitoring while deepening Indo-German cooperation in applied AI and system design. The fellowship exemplified how scientific collaboration can simultaneously drive technological innovation and foster cross-cultural understanding, creating a lasting impact on both research and international academic exchange.



Dr. Samala Rathan

Indian Institute of Petroleum and Energy (IIPE),
Visakhapatnam

Dr. Samala Rathan, Assistant Professor at the Indian Institute of Petroleum and Energy (IIPE), Visakhapatnam, and Dr. Jan Friedrich, Postdoctoral Researcher at RWTH Aachen University, Germany, were awarded the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR 2024) for their collaborative project titled "Design and Development of Numerical Schemes for Nonlocal Conservation Laws in Multi-Dimensions." Their research lies at the intersection of applied mathematics and computational modelling, focusing on the theory and numerics of hyperbolic conservation laws and their applications in simulating real-world systems that exhibit

collective behavior, such as traffic and pedestrian flow.

The project focuses on nonlocal conservation laws, a class of partial differential equations (PDEs) that incorporate space-dependent integral terms in their flux functions. These terms make the equations mathematically challenging but enable realistic modelling of systems where agents respond to nonlocal information, such as drivers adjusting to traffic conditions ahead. Since analytical solutions are rarely feasible, the collaboration aimed to design efficient finite volume-based numerical schemes that can accurately capture such complex interactions.

The collaboration aimed to design efficient finite volume-based numerical schemes that can accurately capture complex interactions.



During his PECFAR visit at RWTH Aachen University, Dr. Rathan collaborated with Prof. Michael Herty's group, working closely with Dr. Jan Friedrich and Ms. Anika Beckers. Together, they extended existing central numerical schemes—initially developed during Jan's visit to India—into higher-order methods using the Weighted Essentially Non-Oscillatory (WENO) framework. They analyzed key mathematical properties of these schemes, such as positivity preservation and boundedness, to ensure numerical stability and accuracy. During the first week of his stay, Dr. Rathan also delivered a talk on higher-order schemes for conservation laws and presented a hybridization algorithm, which the team plans to adapt for nonlocal

models. One of the major outcomes of their collaboration was the development of a new central-upwind flux for nonlocal conservation laws, successfully integrated within the central-WENO framework. This work laid the foundation for ongoing efforts to hybridize and extend these methods to multi-dimensional problems, which better represent realistic traffic and flow systems.

Beyond his core collaboration in Aachen, Dr. Rathan engaged with leading researchers across Germany. He exchanged ideas with Dr. Shaoshuai Chu on high-order methods for hyperbolic systems and visited the research groups of Prof. Simone Göttlich (University of Mannheim) and Prof. Christian

Rohde (University of Stuttgart). These interactions led to new collaborative ideas in numerical schemes for both local and nonlocal models, including relaxation systems. He also attended the NumHyp 2025 Conference in Darmstadt (June 9–13), where he interacted with international experts in numerical methods for hyperbolic conservation laws, broadening the impact of his work.

Outside the academic sphere, Dr. Rathan's stay in Germany was equally rewarding. He visited Monschau, Heidelberg, and Maastricht, where he immersed himself in the region's rich history, architecture, and cultural diversity. The warm hospitality of the RWTH Aachen research group, through shared lunches, discussions, and informal gatherings, made his experience both intellectually fulfilling and personally memorable. The IGSTC–PECFAR Fellowship has been instrumental in advancing Indo–German collaboration in applied mathematics, facilitating innovation in the numerical modelling of nonlocal systems. The partnership between IIPE and RWTH Aachen has opened avenues for joint publications, new research proposals, and long-term cooperation, making the fellowship a scientifically significant and culturally enriching experience for both collaborators.

Small
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Prof. Punit Kumar

University of Lucknow

This Award, the Indo-German research collaboration has achieved significant progress in advancing the understanding of shock wave dynamics in quantum plasmas, paving the way for applications that extend far beyond academic curiosity.

Prof. Punit Kumar, from Department of Physics, University of Lucknow, has been awarded the IGSTC-SING grant in collaboration with Prof. Michael Bonitz of Kiel University to utilise their expertise to build a unique Indo-German ecosystem advancing industrially relevant quantum simulations.

Through this Award, the Indo-German research collaboration has achieved significant progress in advancing the understanding of shock wave dynamics in quantum plasmas, paving the way for applications that extend far beyond academic curiosity. With potential impact on energy, materials, electronics, and defence industries, this

research project, demonstrates how fundamental physics can drive innovations relevant to modern technology and future quantum industries.

At the heart of the project is the development of a 1D Quantum Hydrodynamics (QHD) simulation code, incorporating key quantum effects such as the Bohm potential and Fermi pressure. These features make it possible to model dense plasma regimes with a realism that classical approaches cannot capture. Early results have revealed distinctive behaviors such as shock speed variation, steepening of shock fronts, and instabilities, phenomena that are crucial for industries working with high-energy-density plasmas.

The project has laid the groundwork for integrating Quantum Kinetic Theory (QKT), enhancing accuracy in regimes dominated by nonlocal and dispersive quantum effects. This step is vital for the development of advanced materials under extreme conditions. Industrially, such insights can accelerate innovation in semiconductors, nanotechnology, and plasma-assisted material processing, areas where controlling energy transport at quantum scales is critical.

Further, an unique strength of this collaboration is the planned integration of the German-developed G1-G2 quantum kinetic simulation framework with Indian expertise in quantum hydrodynamic modelling. This fusion promises a comprehensive simulation platform for correlated quantum plasmas, opening new possibilities for industries seeking to design quantum devices, high-power electronics, or plasma-based manufacturing systems. Prof Kumar has already undertaken

the training to acquire advanced simulation techniques and gain direct access to the G1-G2 framework, ensuring that this expertise will contribute to India's preparedness for the upcoming National Quantum Mission, which explicitly emphasizes applications in quantum technologies and materials.

The potential beneficiaries of this research are numerous. Energy industries may leverage quantum shock modelling to improve fusion reactor designs, electronics industries could use the findings to advance quantum semiconductors and ultra-miniaturized devices, while materials industries may benefit from plasma-based methods to create stronger, more efficient nanostructures and coatings. Even the defence sector can apply these insights in the development of advanced plasma-based shielding technologies for space missions or directed energy systems. The Indo-German partnership has paved the

way for joint publications, student exchanges, and future proposals, and its outcomes are poised to support long-term bilateral cooperation in areas where science, technology, and industry converge.

By combining fundamental advances with a clear eye on applications, this collaboration demonstrates how plasma science at the quantum scale can help shape the technological foundations of the 21st century quantum economy.





Dr. Milind Thomas Themalil

Indian Institute of Information Technology (IIIT) Kottayam

Dr. Milind Thomas Themalil, Assistant Professor in the Department of Electronics and Communication Engineering at Indian Institute of Information Technology (IIIT) Kottayam, India, has been awarded the IGSTC-SING grant in collaboration with Mr. Johannes Schumacher, Managing Director and Mr. Mayank Sharma, Co-Founder, Celestial Space Technologies GmbH, Nuremberg, Germany. This Indo-German partnership utilizes their joint expertise in design and development of solar panel integrated transparent microstrip patch antennas with isoflux coverage for small satellite applications in S and X bands. Their research focuses on isoflux

beam steered solar panel integrated antenna supporting low earth orbit positioning and navigation of small satellite constellations with reliable and robust signals, with potential to offer services across multiple frequency bands. The antenna material transparency ratio is to be maintained at 70%. A power generation module to be used by small satellites, where mounting area and power are the biggest constraints for satellite developers. The system is developed to ensure maximum safety and minimum loss of data by considering favourable configurations like circular polarization, high gain, enhanced bandwidth etc. Technology Readiness Level at commercial phase TRL 9, with in orbit

This Indo-German partnership utilizes the joint expertise in design and development of solar panel integrated transparent microstrip patch antennas.



Through this alliance, a dynamic exchange of insights will foster the adoption of best practices and inventive methodologies, benefiting the space interests of India and Germany. The infusion of real-world industry challenges will substantially enrich the skill sets of Indian students and researchers, paving the way for adeptness in practical scenarios. Cultural immersion will foster cross-cultural comprehension, refining cooperative dynamics and paving the path for future joint projects. This collaboration presents dual avenues for Celestial Space and IIITK, projecting opportunities for expansion and network enhancement within their respective spheres. In culmination, this IGSTC partnership bears the potential to establish robust ties with a diverse array of organizations and institutions, both domestically and internationally. An outcome of the initial simulations performed titled "A Novel Solar Panel Integrated Microstrip Antenna for Small Satellite Payloads", has been communicated as a conference paper to the IEEE Microwaves, Antennas and Propagation Conference (IEEE MAPCON 2025), Kochi (India), to be held from December 14 – 18, 2025.

demonstration will make the antenna space grade. The proposed antenna holds great promise for satellites in Low Earth Orbit. Unlike traditional GNSS satellites, which suffer from vulnerabilities like jamming and spoofing due to low signal strength, LEO constellation can provide more reliable and robust navigation signals with the potential to offer navigation services across multiple bands, significantly enhancing the positional accuracy for users. Under the IGSTC-SING framework, Dr. Milind Thomas, Mayank Sharma and Johannes Schumacher are investigating, designing and fabricating highly reliable satellite antennas for space

missions. During Dr. Milind's visit to Nuremburg, Germany, in June 2025, the team initiated simulation studies on integrating transparent antennas on solar panel platforms. The team also made plans to explore the potential European space market to showcase their findings. Through this bilateral collaboration, there will be an enhanced engagement academically and commercially, wherein Celestial Space Technologies optimizes antenna performance needs and commercial opportunities, while IIIT Kottayam addresses research, antenna design, fabrication, and testing.

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Plus



Dr. Surjya Ghosh

BITS Pilani, K. K. Birla Goa Campus

Dr. Surjya Ghosh, Assistant Professor in the Department of Computer Science and Information Systems at BITS Pilani, K. K. Birla Goa Campus, received travel support under the IGSTC-CONNECT Plus Programme to visit the Berlin School of Economics and Law (HWR Berlin), Germany.

Prior to joining BITS Pilani, Dr. Ghosh worked as a Postdoctoral Researcher at CWI Amsterdam and completed his Ph.D. from the Department of Computer Science and Engineering, IIT Kharagpur. His research interests span Human-Computer Interaction, Applied Artificial Intelligence, Affective Computing, and

Computer Systems, with a particular focus on designing intelligent computing systems that enhance user experience and influence human behaviour.

Under the CONNECT Plus travel support, Dr. Ghosh undertook a collaborative research project titled "Investor Behavior Modeling in Financial Market using Affective and Physiological Signatures: A Quantitative Approach" with Prof. Dr. Natalie Packham, Professor of Mathematics and Statistics at the Berlin School of Economics and Law. HWR Berlin is one of Berlin's largest universities of applied sciences, specializing in business, administration, public security, law,

The visit aims to analyse how user attributes such as affective, physiological, and personality traits influence financial decision-making.



and engineering. Prof. Natalie Packham, host of Dr Ghost at HWR Berlin, is widely recognized for her work in Mathematical Finance, Financial Risk Management, and Computational Finance.

The objective of the visit was to analyse how user attributes such as affective, physiological, and personality traits influence financial decision-making. The

study also aimed to identify whether distinct user profiles can be derived from these behavioural signatures to develop predictive models that anticipate investor actions under various market conditions. To achieve this, surveys and preliminary user studies were conducted among participants from both Germany and India to assess financial preferences,

risk perception, and behavioural patterns. The ongoing research intends to expand this work through large-scale cross-cultural studies, deepening the understanding of user behaviour prediction in financial contexts.



Prof. Kantesh Balani

Institute of Technology (IIT) Kanpur

Prof. Kantesh Balani, Professor in the Department of Materials Science and Engineering at the Indian Institute of Technology (IIT) Kanpur, received travel support under the IGSTC CONNECT-Plus Programme to visit Germany from June 29 to July 19, 2025. During this period, he delivered multiple lectures and engaged in extensive research discussions with leading German scientists and research groups, strengthening Indo-German collaborations in advanced materials and biomaterials research.

Upon arrival in Berlin on June 29, 2025, Prof. Balani met Prof. Katharina Herkendell at TU Berlin,

followed by interactions with Dr. Clements Schmitt, Dr. Cecile Bidan, Dr. Shahrouz Amini, and Prof. Peter Fratzl at the Max Planck Institute (MPI) of Colloids and Interfaces, Potsdam. On June 30, 2025, he delivered a lecture titled "Multifunctional 3D-Printed Scaffolds for Bone Tissue Engineering with Effective Antibacterial, Cytocompatibility, Porosity, and Mechanical Properties" at MPI Potsdam, highlighting his group's innovations in biocompatible scaffold design.

Between July 3–5, 2025, Prof. Balani visited Charité – Universitätsmedizin Berlin, where he met Prof. Franziska Schmidt from the Department of

The fellowship has opened up avenues for collaborative research in high-temperature ceramics, multifunctional biomaterials, and next-generation implant technologies.

Prosthodontics, Geriatric Dentistry, and Craniomandibular Disorders to explore collaborative research in dental biomaterials. He also delivered a talk titled "Designing Next Generation Implant Materials: Assessment & Visualization" on July 3, 2025, at Charité University, which drew considerable interest from faculty and researchers.

During his stay at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) from July 8–11, 2025, Prof. Balani met Prof. Tobias Fey, delivering a colloquium on "Designing Next Generation Biocomposites for Implants" on July 8, 2025, and also interacted with Prof. Aldo

R. Boccaccini, a renowned expert in bioactive glass and bioceramics, to explore potential joint research directions.

Later, at the Karlsruhe Institute of Technology (KIT), he was hosted by Prof. Christoph Kirchlechner and interacted with Prof. Martin Dienwiebel, Prof. Martin Heilmaier, and Prof. Kaline P. Furlan to discuss ongoing research on thermal barrier coatings, ultra-high temperature ceramics, and atomic layer deposition. On July 15, 2025, he delivered two technical lectures at KIT: (i) "Bimodal Microstructure in Thermal Barrier Coatings" and

(ii) "Damage Tolerance of Ultra-High Temperature Ceramics for Re-entry Space Vehicles."

These engagements, made possible through combined support from the Alexander von Humboldt (AvH) Foundation CONNECT Fellowship and the IGSTC CONNECT-Plus travel grant, proved highly productive. They opened strong avenues for collaborative research in high-temperature ceramics, multifunctional biomaterials, and next-generation implant technologies, further deepening Indo-German scientific cooperation.





IGSTC Networking



Mr. R. Madhan

Director, IGSTC, delivered an insightful talk titled "The Story Leading to Opportunities for Indo-German S&T Cooperation" at VDMA India. In his address, he outlined IGSTC's remarkable journey in advancing bilateral scientific cooperation.

Mr. R. Madhan

Director, IGSTC, featured on the Science Diplomacy Podcast "Bridging Minds" alongside Ms. Viktoria Apitzsch, Head of Science & Technology at the German Embassy, New Delhi. In this engaging conversation, he shared insightful reflections on the evolution of Indo-German research partnerships, discussed emerging trends in R&D collaboration, and highlighted key elements that make a research proposal truly stand out.



Mr. R. Madhan Director, IGSTC, visited the project site of the IGSTC 2+2 project "MAX-RAP" at IIT Madras, which focuses on the thematic area of "Waste to Wealth." During the visit, he reviewed the ongoing progress of the collaborative research, engaged with the project investigators and team members, and discussed future directions to strengthen Indo-German cooperation.



Mr. R. Madhan

Director, IGSTC, met with Dr. Nisha Mendiratta from IUSSTF and Prof. Nitin Seth from CEFIPRA to discuss the evolving landscape of bilateral science and technology collaborations.

Mr. R. Madhan

Director, IGSTC, had a productive visit to hte GmbH in Heidelberg, Germany, where he interacted with representatives from hte GmbH and BASF SE. The discussions focused on strengthening the Indo-German research collaborations and exploring new avenues for deeper engagement in science and technology.



Mr. R. Madhan

Director, IGSTC, visited the collaborative IGSTC 2+2 project "ECOPAVE" at the Karlsruhe Institute of Technology (KIT), Germany. During his visit, Mr. Madhan reviewed the project's progress, interacted with the research teams, and discussed future directions to advance Indo-German collaboration.





IGSTC Celebrated its
15th Foundation Day on
14th June 2025.

Mr. R. Madhan

Director, IGSTC, delivered an
engaging session at the event
organised by the Heidelberg
Indian Students Association
(HISA) at German Cancer
Research Center (DKFZ).

He spoke about IGSTC's diverse
portfolio of funding programs and
the avenues for Indo-German
research collaboration.



H.E. Dr. Philipp Ackermann

German Ambassador to
India & Bhutan hosted a
high tea for the staff of
IGSTC at the
Ambassador's residence
on the occasion of
farewell to Mr. R.
Madhan, Director, IGSTC.



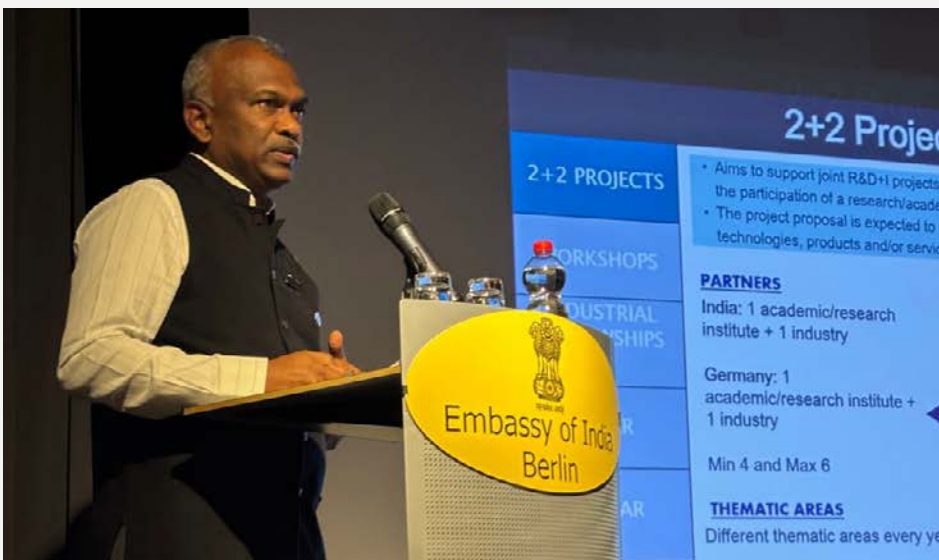
Mr. R. Madhan

Director, IGSTC, delivered an insightful and engaging talk to the faculty and researchers of the National Institute of Technology Raipur (NIT Raipur).

He highlighted the various research funding opportunities offered by the Indo-German Science & Technology Centre (IGSTC), aimed at strengthening Indo-German cooperation in science and technology.

Mr. R. Madhan

Director, IGSTC, met with H.E. Mr. Ajit Gupte, Ambassador of India to Germany, during a session on "IGSTC Schemes: Its Outcome and Implementation" held at the Embassy of India, Berlin.



The Embassy of India in Berlin hosted an event titled "Artificial and Human Intelligence – The Metrics Connect."

Mr. R. Madhan, Director, IGSTC, delivered a key address at the event, emphasizing the transformative role of Artificial Intelligence and Human Intelligence in advancing technology.

IGSTC Programmes



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