IGSTC
INDO-GERMAN SCIENCE AND TECHNOLOGY CENTRE

NEWSLETTER
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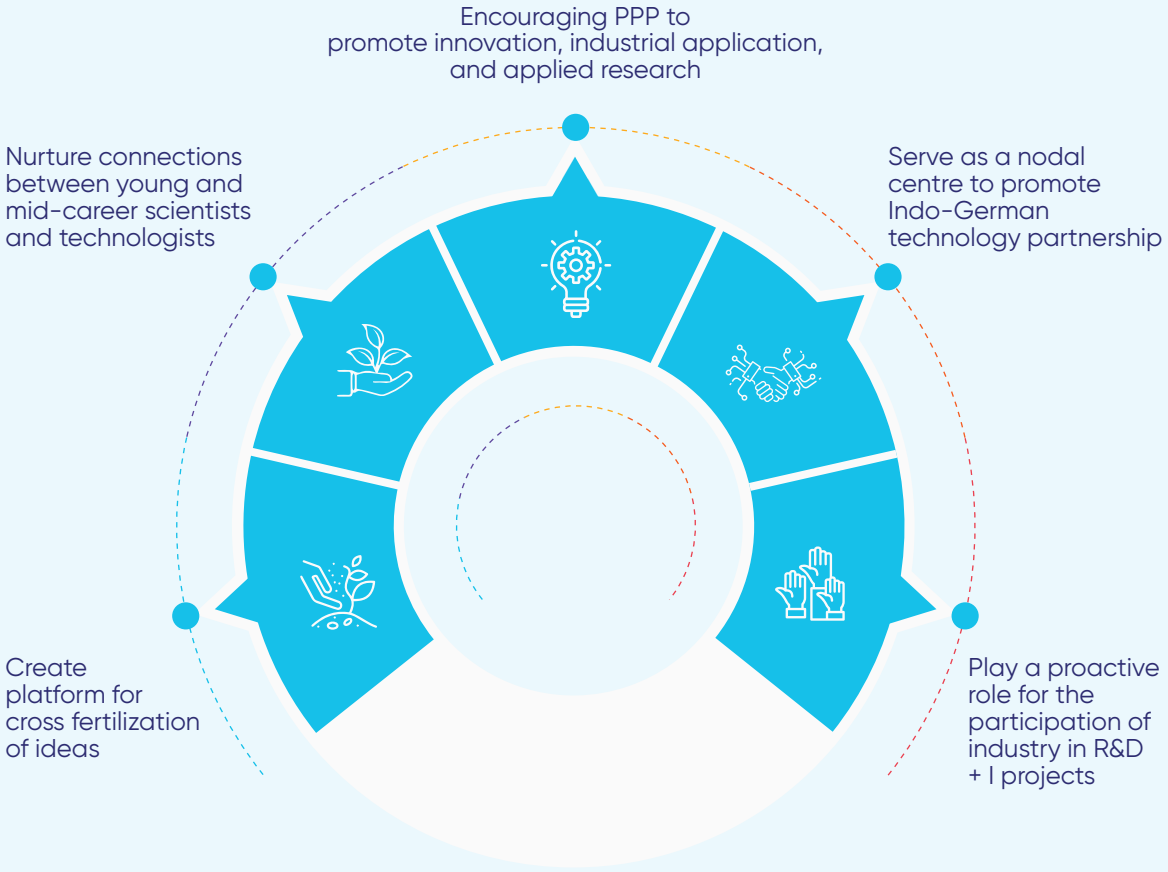
TO CATALYSE INDO-GERMAN
STRATEGIC R&D PARTNERSHIPS

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 Education and Research (BMBF), 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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18th Governing Body Meeting

The 18th IGSTC Governing Body (GB) meeting was held in person on 12th September 2024 at Mahabalipuram, Tamil Nadu. The GB comprises of Dr. Praveen Kumar S (DST & Indian Co-Chair), Ms Kathrin Meyer (BMBF & German Co-Chair), Dr. Tata Narasinga Rao (ARCI), Ms. Viktoria Apitzsch (German Embassy, New Delhi), Mr. Rohit Kumar (DST), Dr. Martin Goller (BMBF), Prof. K. K. Pant (IIT Roorkee), Dr Michaela Wilhelm (Univ. of Bremen), Dr. Raju Kadam (Bharat Forge Ltd), and Mr. Clas Neumann (SAP). Dr Ulrike Wolters (BMBF), and Dr Rajiv Kumar (DST), were present as Member Secretaries. Mr R Madhan (Director), Dr P V Lalitha, Mr Hans Westphal, Ms Doerte Merk, Dr Rupak Bhattacharya, Mr Pankaj Kothari, Mr Saquib Shaikh, and Ms Alexandra Stinner represented IGSTC in the meeting.

The GB focused holistically on IGSTC's activities, status and updates on different programmes including 2 + 2 projects, Workshops and various networking fellowships.

11th Finance Committee Meeting

The 11th Finance Committee (FC) meeting took place on 10th September 2024 at Mahabalipuram. The FC comprises of Mr Rohit Kumar (DST and Indian Co-Chair), Dr Ulrike Wolters (BMBF and German Co-Chair), Mr Rajiv Kumar (DST), Dr Martin Goller (BMBF). Mr R Madhan (Director), Dr P V Lalitha, Mr Inderjit Singh, Mr Pankaj Kothari (all from GSTC), Ms Alexandra Stinner (DLR-PT/IGSTC), Mr Hans Westphal (DLR-PT/IGSTC) & Ms Doerte Merk (DLR-PT/IGSTC) attended the meeting.

Discussions were held and decisions were taken on financials, audit report and budget estimates pertaining to IGSTC.

Partners Meet

The IGSTC Partners' Meet 2024 served as a dynamic platform for fostering collaboration and knowledge exchange among researchers and industry experts. Held in the historic town of Mahabalipuram on 11th September 2024, the event brought together all six projects from the 2+2 Call 2020 in the field of Additive Manufacturing.

With the participation of 30 distinguished researchers, the event facilitated in-depth discussions on ongoing research, challenges, and advancements. Two esteemed Scientific Committee members closely evaluated the progress of these projects, providing valuable insights.

Adding to the significance of the gathering, the event was graced by the Consulate General (in charge) of the German Consulate in Chennai, along with IGSTC Co-Chairs and Governing Body members. The innovative thematic, sector-focused format received widespread appreciation, reinforcing IGSTC's commitment to fostering high-impact Indo-German collaborations in cutting-edge research.

Indo-German S&T cooperation- Celebration of 50th year of S&T Cooperation

In 2024, the Indo-German Science & Technology (S&T) collaboration marked a significant milestone as it celebrated its Golden Jubilee, commemorating 50 years of successful partnership in advancing scientific research and technological development. The event, organized by the Department of Science & Technology (DST), Government of India, and the Indo-German Science and Technology Centre (IGSTC), was held in New Delhi, on 24th October 2024 with prominent dignitaries from both countries in attendance.

The celebration was inaugurated by Indian Union Minister Dr. Jitendra Singh and German Federal Minister of Education and Research of Germany, Ms. Bettina Stark-Watzinger, who expressed their gratitude to the scientific communities of both nations for their ongoing efforts and contributions to various joint research initiatives. The event underscored the long-standing collaboration in diverse fields such as Space Technology (ISRO & DLR), aeronautical science, medicine, biology, and emerging technologies like artificial intelligence, quantum technology, and green hydrogen fuel.

In his address, Dr. Jitendra Singh emphasized India's commitment to expanding its partnership with Germany, particularly in addressing global challenges such as environmental sustainability. He also highlighted India's ambitious Deep Ocean Mission, which presents new opportunities for

collaboration between the two countries. Ms. Bettina Stark-Watzinger praised the depth of Indo-German cooperation and stressed the importance of international collaboration in tackling pressing issues such as energy security, food security, and healthcare. She highlighted the potential of science and technology to improve the lives of people worldwide, stating, "Through science and technology, together we can make the world a better place."

The inaugural session featured the presentation of the prestigious WISER Award and the winner of the 50 Years of Indo-German Partnership logo competition. The event also included the inauguration of a science exhibition showcasing the achievements and ongoing projects under the Indo-German collaboration, where Dr. Jitendra Singh and Ms. Bettina Stark-Watzinger engaged with scientists and researchers involved in cutting-edge programs.

One of the key highlights of the celebration was the signing of a Memorandum of Understanding (MoU) between IGSTC and Bharat Petroleum Corporation Limited (BPCL). This partnership aims to foster research in renewable energy, carbon capture, green hydrogen, and innovative technologies. BPCL has committed to providing INR 10 crores annually to support joint research projects with German partners and to host bilateral workshops focused on these crucial areas.

In addition to the inaugural activities, the celebration included interactive sessions and panel discussions featuring agencies like DAAD, DFG, and Mega Science, which highlighted the achievements and future goals of Indo-German cooperation. These discussions provided valuable insights into the collaborative programs and research initiatives that have shaped the trajectory of this successful partnership.

As the Indo-German S&T cooperation enters its next phase, the 50th anniversary celebration serves as a testament to the enduring strength of this bilateral relationship, which continues to drive innovation, research, and progress for the benefit of both nations and the global community.

2+2 Projects

CirCulTeX

Circular urban cultivation systems with re-useable textile growing substrates (CirCulTeX): Project consortium meeting in Germany

Consortia meet at German Institutes of Textile and Fiber Research, Denkendorf

The CirCulTeX consortium convened in Germany from September 21st to 27th, 2024, to assess the latest progress of the project. Hosted by the German Institute of Textile and Fiber Research (DITF), the weeklong event seamlessly blended hybrid sessions, site visits, and strategic discussions, all focused on steering the project's outcomes, charting its future direction, and exploring commercialization opportunities.

The hybrid sessions provided an invaluable platform for reviewing ongoing developments and formulating the next steps, with plans to publish in prestigious outlets such as Hortidaily. The accompanying tour was equally engaging, offering visits to cutting-edge research and agricultural sites. The DITF served as an inspiring starting point, where the team explored innovative terrabioponics and hydroponics systems—essential methods for testing sustainable agricultural practices, especially when integrated with textile substrates.

The consortium's journey continued with a visit to the University of Hohenheim, where enriching discussions took place regarding upcoming publications, with an emphasis on business strategies and emerging industry trends. A key highlight of the visit

was the scientific excursion to ROKO GARDEN in Ulm, Germany. There, the team witnessed the real-world application of CirCulTex's pioneering textile solutions in the cultivation of microgreens on textile substrates, offering a tangible glimpse of the project's potential to revolutionize agricultural practices.

As the meeting advanced, plans were laid for the forthcoming International Networking Workshop at Amity University Kolkata, which will be held in a hybrid format. This event will provide an invaluable space for the consortium to exchange ideas with a global audience. Furthermore, the team solidified its strategy for participation in key seminars, conferences, and trade fairs over the upcoming year, ensuring that CirCulTex's innovative solutions continue to gain international recognition.

The meeting also offered a pivotal opportunity to refine strategies for marketing textile substrates—an essential aspect of the successful commercialization of the project's technologies. In-depth discussions on preparing publications for esteemed peer-reviewed journals and strengthening international collaborations further enriched the agenda.

In conclusion, the visit was both highly productive and enlightening. It allowed for valuable reflections on the project's progress, reinforced partnerships, and laid a solid foundation for the next phase of CirCulTex. With a clear roadmap ahead, the project is poised to make significant strides in advancing sustainable textile solutions, with broad applications in agriculture and beyond.

Consortia meet at German Institutes of Textile and Fiber Research, University of Hohnenheim

Add-Bite

Development of patient specific additively manufactured mandibular implants with biotechnology inspired functional structures (add-bite): Visit of German researcher to Indian partners

Visit of Dr Nico Ulff, Karlsruhe Institute of Technology to IIT Delhi

As part of the ongoing IGSTC 2+2 project "add-bite," Nico Ulff from the Institute of Production Science at Karlsruhe Institute of Technology (KIT) participated in an academic research exchange at the Indian Institute of Technology (IIT) Delhi. Spanning from October 26 to November 16, 2024, this visit focused on the significant progress and challenges in additive manufacturing of patient-specific implants, highlighting the need for advanced medical implants and exploring potential improvements.

Dr. Kaushik Mukherjee, the Indian academic PI from IIT Delhi, warmly welcomed Nico Ulff and his workgroup, including Girish Chandra, Vivek Verma, and Jyoti Chauhan. The team engaged in biomechanical simulations of implant designs based on real patient data provided by AIIMS.

A key highlight of the visit was Nico's introduction to several leading faculty members from related disciplines, such as Prof. Anoop Chawla, Prof. Devendra Kumar Dubey, Prof. Jitendra Prasad Khatait, Prof. Kusum Meena, Prof. Naresh Varma Datla, Prof. Sagar Sarkar, and Dr. Sudipto Mukherjee. This interdisciplinary exchange fostered enriching discussions, particularly with Prof. Sagar Sarkar on the latest advancements in additive manufacturing

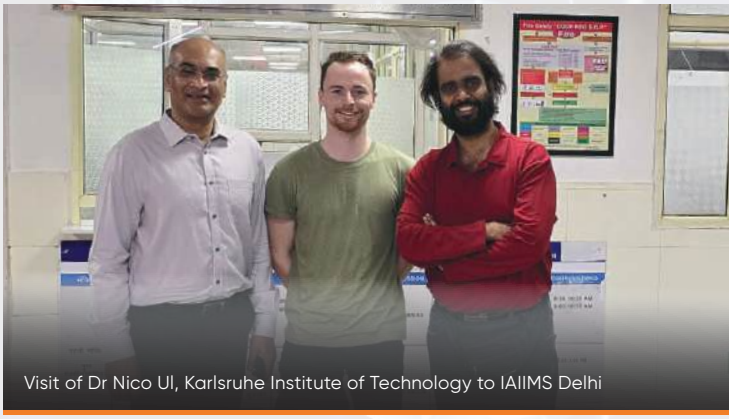
at IIT Delhi, including a demonstration of the high-profile EOS M290 system.

The newly established Biomechanics Lab, led by Dr. Mukherjee, was another significant aspect of the visit. This state-of-the-art facility provided a critical resource for advancing research into biomechanically inspired product development. It played a vital role in analyzing and discussing the ongoing project results, forming the backbone of preparations for a joint journal publication. The publication will focus on the simulation framework and mechanical evaluation of additively manufactured bone-like implant structures, which achieve mechanical strengths and feature sizes comparable to human bone (100–300 µm).

The visit also set the stage for the upcoming "Workshop on Additively Manufactured Patient-specific Implants," scheduled for February 3, 2025. This event will delve deeper into the practical applications of additive manufacturing, incorporating current research findings to create personalized treatment solutions, while also paving the way for future research collaborations.

Additionally, Dr Nico visited the All India Institute of Medical Sciences (AIIMS), Delhi, where Prof. Ajoy Roychoudhury, Head of Oral & Maxillofacial Surgery, shared valuable insights into comparative mastication evaluation in normal and TMJ-implant patients as part of the "add-bite" project. His contributions were crucial in refining the goals for the upcoming collaborative workshop.

Overall, this exchange visit strengthened the partnership between KIT, IIT Delhi, and AIIMS Delhi, laying a solid foundation for future innovations in medical technology. This collaboration not only enhances academic ties but also significantly contributes to the global advancement of additive manufacturing and implant design



Visit of Dr Nico Ul, Karlsruhe Institute of Technology to IAIIMS Delhi

INGERBDIAM

Indo German project on development of biodegradable implants (INGERBDIAM) – One day symposium on Biodegradable Implants: Materials and Processes

Project Symposium at ARCI, Hyderabad

Project Symposium at ARCI, Hyderabad

The International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), hosted a one-day workshop titled "Biodegradable Implants: Materials and Processes (BIMP-2024) on 17 September 2024. This event gathered scientists, academics, researchers, grant managers, incubators, clinicians, and industry experts to exchange insights and share their experiences regarding all aspects of biomedical implants and devices, with a particular focus on biodegradable materials and processes.

The workshop was supported by IGSTC as a part of ongoing 2+2 Call 2020 project INGERBDIAM. The event was convened by experts from various relevant sectors to discuss the pressing need for translational research on biomedical implants in India, highlighting the importance of collaboration between fundamental research and technology development alongside clinicians. Prof Sanjay Behari, Director of the Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), chief guest of the event, delivered a comprehensive overview of the evolution of various categories of medical devices. He underscored the critical need for the indigenous development of high-risk devices, including implants, and elaborated on the specialized medical devices and implants developed in India

to reduce the import cost and of world class standard. Dr. R. Vijay, Director, ARCI mentioned the efforts of ARCI on the development of metal alloy powders for permanent and biodegradable implants, additive manufacturing of the devices and surface modification in order to enhance the biocompatibility for the soft tissue anchor applications. The event was graced by the presence of various motivated speakers including Dr. V. Surya Prakash Rao & Dr. Sunil Apsingi, Medicover Hospital, Hyderabad, Prof. Frank Witte from Charite University, Prof Kaushik Chatterjee, IISc Bangalore, Dr. Rajiv Chhibber, Vice President, Sahajanand Medical Technologies, Hyderabad. The event concluded with a panel session moderated by Dr. Sanjay Bhardwaj, ARCI initiated brainstorming discussion on the issues related to fundamental research, manufacturability, connectivity with surgeons and industry, and regulatory aspects through its three interconnected topics.

Bilateral Workshops

Scoping Out Net Zero with Next Generation Electrical Power Drive Systems: A step towards SDG-2030

IGSTC supported bilateral workshop titled Scoping Out Net Zero with Next-Generation Electrical Power Drive Systems – A Step Towards SDG-2030 organised at Leibniz University, Hannover, Germany, on November 7-8, 2024.

The event brought together 21 distinguished participants from India and Germany, including experts from academia, research institutions, and industry. The discussions centered on energy-efficient electrical power drive systems, circular economy principles, digitalization, and innovative policy frameworks to accelerate the transition towards sustainable electrification. One of the major focal points was enhancing the efficiency of electric motors and drive systems, which account for approximately 45% of global electricity consumption. The adoption of ultra-premium efficiency motors (IE5 and above) and Variable Speed Drives (VSDs) was emphasized as key measures to reduce energy waste and optimize industrial performance. Participants explored advanced strategies for minimizing Scope 1, 2, and 3 emissions across sectors.

Sustainable materials and circular economy approaches were highlighted as crucial elements in the next generation of power systems. Researchers and industry leaders discussed the use of recyclable materials like steel and copper, as well as emerging innovations such as graphene-coated wires and novel magnetic materials, to enhance energy

efficiency and promote material recovery at the end of product life.
The workshop also delved into the role of digitalization in modern power drive systems. IoT-enabled real-time energy monitoring, AI-based predictive maintenance, and Big Data analytics were identified as game-changers in optimizing motor performance. The integration of wide-bandgap semiconductors, such as silicon carbide (SiC), was presented as a breakthrough in improving energy efficiency and system reliability in industrial and electric vehicle applications.

Collaborative research and development emerged as a central theme, with Indo-German partnerships playing a key role in advancing high-power-density electric motors, hybrid energy systems, and sustainable manufacturing practices. Industry leaders like ABB showcased successful case studies, including the implementation of energy-efficient motors in geothermal power plants, achieving 98.76% efficiency and significantly reducing carbon footprints.

The workshop concluded with key recommendations to scale up energy efficiency efforts. Mandating ultra-premium efficiency motors in high-energy-demand sectors, promoting the widespread adoption of VSDs, and integrating AI-driven energy monitoring were among the top priorities. The participants stressed the need for financial incentives to encourage high-efficiency motor adoption and for standardizing circular economy practices in motor design and manufacturing.

Strengthening Indo-German collaboration was identified as a crucial enabler for innovation, with recommendations to establish international testbed facilities, increase funding for joint research programs, and foster skill development initiatives for professionals in next-generation power drive technologies.

Awareness programs targeting industries and policymakers were also proposed to drive the transition toward sustainable electrification.

The Scoping Out Net Zero workshop marked a significant step in achieving SDG-2030 by fostering cross-border collaboration and advancing the development of energy-efficient, digitalized, and sustainable motor systems. With continued innovation and cooperation, industries are set to move closer to a cleaner and more energy-efficient future.

SupraSys 2024

The Indo-German Science & Technology Centre (IGSTC) recently supported SupraSys 2024, a high-impact workshop that brought together 30 leading scientists to discuss advancements in supramolecular chemistry. Held in Goa, this high-impact event was co-organized by Dr Raja Mitra, IIT Goa and Prof. Jochen Niemeyer, University of Duisburg Essen, creating a dynamic platform for interdisciplinary collaborations among experts in synthetic chemistry, materials science, catalysis, and biological sciences.

The workshop featured groundbreaking research on supramolecular interactions and their applications in medicine, materials science, and nanotechnology. Discussions spanned diverse topics such as self-assembled metallo-cages for catalysis and drug delivery, supramolecular nanotubes for biomedical applications, and novel chemical sensing techniques for detecting essential biological ions. Experts also highlighted the role of supramolecular chemistry in tackling neurological diseases like Alzheimer's and developing new approaches to precision polymer synthesis for electronic devices.

In the field of biomedical applications, researchers explored artificial ion carriers for anticancer treatment, photo-responsive molecules for controlled drug release, and supramolecular scaffolds for designing synthetic vaccines. A key highlight was the development of bioinspired supramolecular systems

capable of dynamic self-organization, leading to new possibilities in biomaterials and tissue engineering.

Materials science innovations took center stage with discussions on Aggregation-Induced Emission (AIE) materials, liquid crystalline polymers, and supramolecular foldamers with catalytic properties. The workshop also featured insights into furan-based heterocyclic chemistry, mechanically interlocked molecules like rotaxanes and catenanes, and metal-directed self-assembly techniques for single-crystal foldamer growth.
The event underscored the importance of Indo-German collaborations in driving next-generation scientific research. By combining expertise from both countries, researchers aim to push the boundaries of supramolecular chemistry, creating sustainable and high-performance materials for future technologies. SupraSys 2024 provided a dynamic platform for knowledge sharing and strategic planning, paving the way for transformative advancements in supramolecular science.

Vibroacoustic Characterization and Mitigation Using Metamaterials

The IGSTC supported workshop "Vibroacoustic Characterization and Mitigation Using Metamaterials (ViMeta)" was organised during September 23 to 26, 2024, at the Indian Institute of Technology (IIT) Delhi. This prestigious event brought together 28 distinguished researchers and experts from India and Germany to foster collaboration and explore cutting-edge advancements in vibroacoustic mitigation and metamaterial technologies.

The workshop, jointly led by Dr Arnab Banerjee, IIT Delhi and Prof Steffen Marburg, Technical University of Munich, aimed to address key challenges in vibration control, noise reduction, and structural resilience through innovative metamaterial solutions. The meticulously curated agenda included in-depth discussions on vibroacoustic measurement techniques, computational modeling, and real-world industrial applications.

The event was inaugurated by eminent dignitaries including Prof. Rangan Banerjee, Director, IIT Delhi, and Mr. R. Madhan, Director, IGSTC. The ceremony featured a traditional lamp-lighting ceremony and a cultural performance by IIT Delhi students, symbolizing the intellectual and cultural synergy between India and Germany.

The workshop featured insightful keynote lectures from leading researchers, covering topics such as low-frequency bandgaps in metamaterial plates by Prof. Chandramouli P (IIT Madras), vibration control in wind turbines by Prof. Kamal K. Bera (NIT Trichy), topological metamaterials for wave manipulation by Prof. Rajesh

Chaunsali (IISc Bangalore), and structural vulnerability and mitigation under multiple hazards by Prof. Sandip Saha (IIT Mandi). Other important discussions included blast-resilient lightweight functionally graded structures by Prof. Manmohan Dass Goel, auxetic mechanisms for biomedical and aerospace applications by Prof. Sahil Kalra (IIT Jammu), geotechnical designs under uncertainty by Dr. Anindya Pain (CSIR-CBRI Roorkee), and active vibration control and metamaterials for vibration mitigation by Prof. Vasant Matsagar and Prof. Arnab Banerjee (IIT Delhi).

Renowned German experts also presented groundbreaking research, including sustainable sound absorbers based on fungal mycelium by Mr. Jonas Schmid (Technical University of Munich), neural operators for acoustic metamaterial design by Mr. Johannes Schmid, damping modeling of composite materials by Dr. Matthias Klärner (Chemnitz University of Technology), energy harvesting using vibroacoustic metamaterials by Dr.-Ing. Hendrik Holzmann (Fraunhofer Institute), and mechanical behavior of wood-based materials in theater acoustics by Prof. Michaël Scheffler.

A key highlight of the workshop was the hands-on experimental and computational sessions, which allowed participants to engage in practical vibroacoustic testing and design optimization. These interactive sessions facilitated discussions on AI-driven acoustic metamaterials, sustainable noise reduction technologies, and energy harvesting methods.

The event concluded with a strong commitment to Indo-German collaboration. Participants agreed to initiate joint research projects, student exchange programs, and co-authored publications. A significant outcome was the proposal to co-author a comprehensive book chapter summarizing the workshop's findings and innovations.

The workshop successfully laid the foundation for transformative advancements in vibroacoustic metamaterials and interdisciplinary research collaborations. The event reinforced the role of international scientific partnerships in solving critical global engineering challenges, ensuring that Indo-German expertise continues to drive innovation in noise mitigation, energy efficiency, and structural resilience.
The success of this workshop has set a benchmark for future IGSTC initiatives, strengthening the scientific and technological ties between India and Germany.

Path to Sustainable Future: Innovations in Bio manufacturing

The IGSTC supported Workshop - Path to Sustainable Future: Innovations in Bio manufacturing was organised during 14-15 October 2024 at the National Centre for Cell Science (NCCS), Pune. This event brought together experts from India and Germany to discuss advancements in bio manufacturing, focusing on microbial processes, sustainable agriculture, and biotechnology-driven solutions.

With 11 Indian and 8 German participants, the workshop was led by Dr. Avinash Sharma from NCCS Pune and Prof. Dr. Jorg Overmann from DSMZ, Germany. The workshop commenced with a welcome address by Dr. Sharmila Bapat, Director (Additional Charge) of NCCS Pune, who highlighted the role of international collaborations in fostering innovations in bio manufacturing. Dr. Alka Sharma from the Department of Biotechnology (DBT), India, elaborated on India's BioE3 policy, emphasizing its focus on bio-innovation, entrepreneurship, and sustainable economic growth.

Dr. P. V. Lalitha, Chief Scientific Officer, IGSTC presented an overview on IGSTC's programs, including 2+2 projects, bilateral workshops, and fellowships supporting Indo-German collaboration. Technical sessions featured prominent researchers from both countries. Dr. Avinash Sharma showcased genome-based studies on uncultivable microbes from extreme environments and their potential for bio manufacturing. Prof. Dr. Jorg Overmann emphasized the significance of microbial resources and data in advancing the bioeconomy. Dr. Abhishek Jha from ISRO discussed techniques for space bio

manufacturing, highlighting challenges in microgravity conditions.

Dr. Daniel Schindler explored the synthetic biology advancements in large-scale DNA production and genome editing applications, while Dr. Sanjukta Subudhi shared sustainable biohydrogen production techniques using microbial processes. Dr. Yogesh Shouche presented research on gut microbiome engineering for improved health, while Prof. Torsten Waldminghaus discussed on the plasmid-based gene therapy innovations. Discussions on plant-microbiome interactions and agricultural sustainability were led by Prof. Shilpi Sharma and Prof. Gabriele Berg, who explored the role of microbial solutions in enhancing crop resilience. Additional talks covered bioprospecting for antimicrobial agents, novel bioprocessing strategies, and fungal pigment applications for antimicrobial therapies.

The workshop facilitated networking sessions, resulting in agreements to initiate joint Indo-German research projects. Key areas identified for future research include metabolite-based therapies, antimicrobial resistance, enzyme production, and synthetic genomics. Participants proposed drafting concept notes for DBT and IGSTC, focusing on climate resilience and sustainable bio manufacturing. NCCS Pune was identified as a lead institution for future projects, with discussions on regulatory challenges and the establishment of a microbial strain database.

A significant outcome was the agreement to co-author a proposal on microbiome-based bio manufacturing, addressing global challenges through Indo-German expertise. The event underscored the importance of bilateral collaborations in advancing sustainable technologies, fostering innovation, and strengthening scientific ties between India and Germany.

Women Involvement in Science & Engineering Research (WISER)

WISER Awardees

Dr. Radha Chaube

Banaras Hindu University

Dr. Radha Chaube, Professor and Head of the Molecular Reproductive Physiology Unit at the Department of Zoology, Institute of Science, Banaras Hindu University (BHU), Varanasi, has been actively engaged in an international research collaboration under the WISER Programme. Partnering with Prof. Dušan Palić from Ludwig-Maximilians-University Munich, Faculty of Veterinary Medicine, Chair for Fish Diseases and Fisheries Biology, Munich, Germany, Dr. Chaube has been working on the project titled "Brain endocrine indicators of welfare in fish subjected to autogenous vaccine against bacterial infection", for which she was awarded in 2022.

The project focuses on developing autogenous vaccines to prevent bacterial diseases in fish and reduce antimicrobial usage. As part of the initiative, Dr. Chaube visited the host institute in Munich to carry out key project activities, including the collection of farmed fish for experimental studies under both challenged and non-challenged conditions with autogenous vaccines. Brain tissue samples were collected for transcriptome analysis to better understanding of neuro- immune interactions under challenged conditions. During her visit, she also gained insights into Oxford Nanopore NGS technology, a cutting-edge tool for transcriptome research.

The collaboration facilitated knowledge exchange, with LMU partners presenting their latest research advancements in vaccine development. Dr. Chaube engaged in discussions with lab members and faculty on ongoing research areas and explored future opportunities for academic exchange and joint research activities at BHU.

In addition to her academic endeavors, Dr. Chaube also visited Bayerische Landesanstalt für Landwirtschaft – Institut für Fischerei (Bavarian State Institute for Agriculture; Institute of Fisheries) in Starnberg, which plays a vital role in research, education, and awareness initiatives related to fish farming and fisheries management.

Beyond research, she immersed herself in the local culture, participating in Oktoberfest at Marienplatz and the Tollwood Summer Festival at Olympia Park, Munich.

The collaborative project has gained recognition, with findings being presented and published at various national and international conferences and symposiums, marking a significant step forward in fish welfare and sustainable aquaculture research.

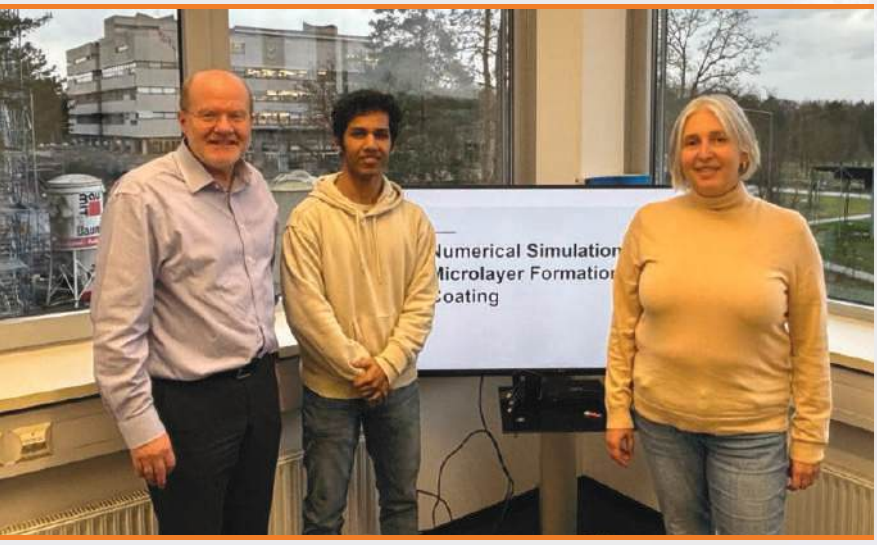
Dr. Poulomi Ganguli
IIT Kharagpur

Dr. Poulomi Ganguli, Assistant Professor at the Indian Institute of Technology Kharagpur was awarded under the WISER 2022 for her research at GFZ German Research Centre for Geosciences, Potsdam. She was hosted by Prof. Bruno Merz at section Engineering Hydrology, GFZ Potsdam.

Her time at GFZ allowed her to understand sequential climate hazards from humid heat stress and extreme precipitation (both 'low' and 'high' ends) across different climate regions. An example includes the recent record-breaking heatwaves followed by extreme rainfall and resulting rain-induced floods in July 2023 in northern India, which had catastrophic consequences as their sequential occurrence within a short time window has severe impacts or more complicated recoveries than the individual isolated climate stressors. Probabilistic tools have been developed and are in the process of being linked to physics-based models to identify and track vulnerable urban settlements where sequential hazards pose significant concerns. A climate-informed flood risk assessment tool is planned for development to assess identified vulnerable locations by integrating statistical and process-based frameworks. Currently, the model is being tested for flood risk mapping in the densely populated, low-lying coastal city of Chennai, where humid heat stress and extreme precipitation-induced flash floods are major concerns, further intensified by tropical cyclones. Dr. Ganguli's WISER research work has been highlighted in Nature India and the German journal Geographische Rundschau (German Journal on social and physical geography). Furthermore, Dr. Ganguli has discussed her research findings in the European and American Geophysical Union's General Assemblies and Fall meetings.
The research experience at the Section Hydrology, GFZ Potsdam, under the mentorship of Prof. Bruno Merz, has been profoundly enriching, fostering both skill development and a broader research perspective for her. The knowledge gained at GFZ has not only inspired new research ideas but also facilitated the creation of innovative tools and methodologies while strengthening collaborations across Europe and beyond. Moreover, it has expanded her research scope in natural hazards, encompassing floods, droughts, extreme precipitation, and, more recently, compound extremes in hydrology.

This collaboration continues to enhance the quality and impact of her research.

Prof. Janani Srree Murallidharan
IIT Bombay



Prof Janani Srree Murallidharan from IIT Bombay has been awarded WISER to collaborate with Prof Peter Stephan, TU Darmstadt on computational modelling of boiling heat transfer. This project focuses on multiphase and multiphysics flow and heat transfer, addressing phenomena spanning multiple length and time scales. The research aims to develop computational multi-scale techniques to accurately model boiling processes. With over a decade of expertise in this domain, the team is making significant strides in understanding complex microscale heat transfer phenomena.

Prof. Stephan's research at TU Darmstadt delves into energy conversion, heat, and mass transfer processes, employing theoretical models, numerical simulations, and experimental methods. His laboratory hosts advanced experimental facilities for visualizing boiling heat transfer, providing a strong foundation for the collaborative research effort. The joint project investigates microlayers, extremely thin liquid films that play a vital role in nucleate boiling. These microlayers are challenging to observe due to their microscopic thickness and rapid dynamics. The research utilizes a dip coating setup as a controlled method for studying microlayer behavior, allowing for independent manipulation of parameters such as temperature and de-wetting velocity.

This WISER project focuses on developing a high-fidelity physics-based microlayer CFD simulation module to integrate with an existing macro-scale boiling code. The goal is to achieve accurate computational predictions of boiling-induced heat transfer and identify optimal heat transfer regimes across various operating conditions. The project has made significant progress by developing a numerical methodology to investigate microlayer formation in dip coating and validating results against experimental data.

High-fidelity CFD-based direct numerical simulations (DNS) have been performed, capturing microlayer formation and evaporation. Modifications to the multi–Region Phase Change Flow solver in OpenFOAM enables accurate modelling of phase change dynamics.

The implementation of a dynamic contact angle model further refines predictions by incorporating experimental data and Cox-Voinov theory.
The study also includes detailed simulations to characterize microlayer dynamics, velocity, and temperature

variations. Early simulations, initialized with constant substrate temperatures, yielded shorter microlayers than observed in experiments. Introducing a volume heat source at the solid-liquid interface to mimic joule heating provided better agreement with experimental results. Simulations with different initial wall superheat values successfully captured the transition from contact line evaporation to microlayer evaporation, validating the numerical approach. Future work will explore variations in substrate temperature and their effects on microlayer characteristics across diverse operating conditions.

A reduced-order mechanistic model has been developed using insights from DNS simulations and lubrication theory. This model is being evaluated against resolved CFD simulations to enhance computational efficiency while maintaining predictive accuracy. The ability to simulate boiling processes with high precision has significant implications for industries in both India and Germany. Accurate heat transfer predictions will benefit sectors such as aerospace cooling, nuclear reactor heat exchangers, and battery cooling systems. The research findings can be applied to industrial systems utilizing boiling for thermal management.

The collaboration between IIT Bombay and TU Darmstadt, supported by IGSTC, underscores the potential of Indo-German partnerships in advancing fundamental and applied research. By leveraging expertise from both institutions, this project aims to provide innovative solutions for critical engineering challenges. The talent pool from both countries is contributing to groundbreaking advancements in microelectronic cooling and other high-impact industrial applications. This initiative exemplifies the spirit of international scientific cooperation, driving innovation in heat transfer and thermal management technologies.

Dr. Özlem Günay-Esiyok
Humboldt University

Dr. Özlem Günay-Esiyok, postdoctoral researcher at the Department of Molecular Parasitology at Humboldt University of Berlin, Germany, has been awarded the prestigious WISER research grant by the IGSTC in 2023. The three-year grant supports her collaboration with Prof. Nishith Gupta, research group leader of Intracellular Parasite Education and Research Labs (iPEARL) at Birla Institute of Technology and Science, Pilani (BITS-P), Hyderabad, India.

Her project, titled "Optogenetic modulation of cAMP and cGMP signaling in Toxoplasma gondii", focuses on unraveling the proteins that regulate crucial biological processes such as infection, pathogenesis, and persistence of the parasite. Using an innovative Optogenetics-Molecular Parasitology approach, her research aims to identify new drug targets that could lead to the development of effective antiparasitic treatments and help prevent the spread of such pathogens.
As part of the WISER grant, Dr. Günay-Esiyok visited BITS Pilani, Hyderabad, to exchange expertise on parasite culturing, molecular manipulation techniques, and signaling research. During her visit, she engaged in in-depth discussions with doctoral researchers, gaining valuable insights into their projects and paving the way for potential future collaborations.

This collaboration highlights the growing Indo-German scientific partnerships and the potential of interdisciplinary research in addressing global health challenges.

Industrial Fellowship Awardees

Industrial Fellowship 2024-Awardees

Veejay Karthik J
IIT Bombay

Veejay Karthik J, a robotics researcher and recipient of the IGSTC PhD Industrial Exposure Fellowship (PIEF) 2024, is currently pursuing his Ph.D. at the Autonomous Robots and Multi-Agent Systems (ARMS) Laboratory, IIT Bombay. His research focuses on developing advanced motion planning algorithms to ensure safe and efficient autonomous navigation for mobile robots in complex, dynamic environments, including crowded spaces.

Veejay is currently enhancing his expertise at the Fraunhofer Institute for Manufacturing Engineering and Automation (Fraunhofer IPA), a global leader in applied engineering research especially in the field of robotics, automation and manufacturing in Stuttgart, Germany. As part of the Fraunhofer Society, the institute specializes in cutting-edge technologies across industries, including robotics, healthcare, logistics, and environmental technology. With its state-of-the-art facilities and strong focus on industry collaboration, Fraunhofer IPA drives the deployment of innovative solutions to tackle real-world challenges. During his visit under IGTSC fellowship, he contributes to the development of an advanced autonomy stack for tractor-trailer systems. His work aims to enable autonomous operation in constrained logistics environments, thereby revolutionizing automated transportation solutions in sectors like agriculture and outdoor logistics.

Veejay's research at Fraunhofer IPA centers around developing an autonomy stack for tractor-trailer systems, addressing the challenges posed by the articulated dynamics of these systems. This work involves designing advanced algorithms for perception, motion planning, obstacle avoidance, and control to navigate and manoeuvre trailer systems efficiently and safely. By enabling real-time decision-making, the autonomy stack aims to optimize logistics and transportation tasks, particularly in constrained environments like agricultural fields and busy urban areas.

During his time in Stuttgart, Veejay has immersed himself in Germany's rich cultural heritage. He experienced the vibrant atmosphere of the Canstatter Volksfest, indulging in traditional food and music. At the Esslingen Medieval Christmas Market, he wandered through charming streets lined with craftsmen and festive performances. His autumn adventures were further enriched by the Ludwigsburg Pumpkin Festival, where intricate pumpkin sculptures and seasonal delights made the experience truly unforgettable.

Sukriti Sharma
IIT Ropar

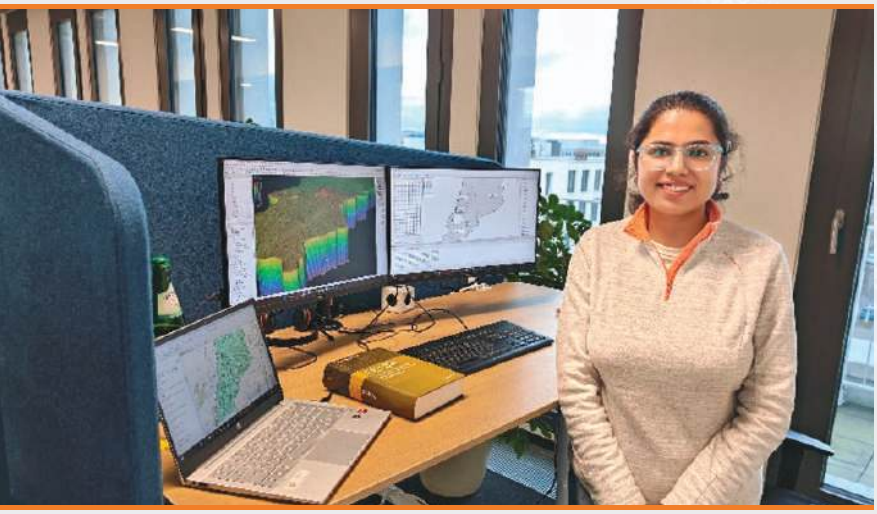
Sukriti Sharma, a Ph.D. researcher in the Department of Chemical Engineering at IIT Ropar, received IGSTC PhD Industrial Exposure Fellowship (PIEF) 2024 award. Sukriti's doctoral research focuses on developing hydrogen transportation infrastructure for India using natural gas pipelines combining advanced computational tools, such as Computational Fluid Dynamics and system-level simulations, to assess transient flows and conduct techno-economic and life-cycle analysis. The aim of her research aligns with the goals of the European Hydrogen Backbone (EHB) initiative, focusing on creating sustainable and efficient hydrogen infrastructure.

Sukriti is currently conducting her research at the Department of Advanced Carbon Conversion Technologies at Fraunhofer UMSICHT in Sulzbach-Rosenberg, Germany. Fraunhofer UMSICHT is renowned for its pioneering research in environmental safety, energy technologies, and sustainable practices. She is actively involved in the BeWiseR Project, which investigates the potential of biogenic raw materials and residues in steel production, aiming to replace fossil fuels and carbon sources in industrial processes.

As part of the Industrial Fellowship, her research revolves around the performance optimization of the Thermo-Catalytic Reforming (TCR) unit, a patented technology of Fraunhofer UMSICHT. By working closely with UMSICHT researchers, she has gained critical insights into optimizing operating conditions to enhance hydrogen yields while minimizing byproducts. Her experimental trials with the TCR unit have been instrumental in advancing the technology's efficiency and scalability for sustainable energy applications.

Sukriti recently presented her work at the 8th AIEE Energy Symposium held at the University of Padua in Italy (28–30 November 2024). This prestigious platform allowed her to engage with global experts and share her innovative contributions to energy security. Sukriti has fully embraced her identity as a "global nomad," a sentiment shared by many PhD students. Her journey has been a seamless blend of research excellence and cultural exploration. From savoring traditional Bavarian delicacies like Cheese Spätzle and Mandarinen Schmandkuchen to experiencing the warmth and hospitality of her hosts at Fraunhofer UMSICHT and within the German community, every moment has been enriching.

Set against the picturesque backdrop of Sulzbach-Rosenberg in the Bavarian Alps, her research thrives in a serene yet inspiring environment. With Nuremberg-famed for its Christmas markets and medieval charm—nearby, and Munich, Bavaria's vibrant cosmopolitan hub, within reach, Sukriti has had the opportunity to immerse herself in both historical and contemporary cultural experiences.



Stuti Srivastava

Amrita Vishwa Vidyapeetham

Stuti Srivastava, a Ph.D. student from School for Sustainable Futures, Amrita Vishwa Vidyapeetham is an IGSTC PhD Industrial Exposure Fellowship (PIEF) 2024 awardee. Under the expert supervision of Dr. Alka Singh, Assistant Professor at the Center for Wireless Networks and Applications, her doctoral research delves into the probabilistic forecasting of groundwater scenarios in the Yamuna sub-basin micro-watershed. Her work aims to inform regional, climate-resilient groundwater management strategies.

Under the IGSTC PIEF 2024 Stuti is hosted by DHI WASY GmbH, a renowned globally for its cutting-edge hydrodynamic modeling software in Berlin. Guided by Dr. Carlos A. Rivera Villarreyes, Global Product Specialist and Senior Advisor at DHI, Stuti is using FEFLOW software to model groundwater dynamics and integrate climate-crop synergies. This research will help understand how climate change, shifts in cropping patterns, and water usage collectively impact groundwater resources.

Using FEFLOW, Ms. Srivastava models the groundwater budget under both sustainable and unsustainable practices, identifying the most resilient strategies to safeguard water resources. The findings of her research are expected to play a pivotal role in shaping sustainable groundwater management strategies for regions impacted by climate variability.

Through her fellowship, Stuti has deepened her expertise in groundwater numerical modeling, refining both her research capabilities and technical proficiency. Additionally, the experience has broadened her intercultural competencies, providing her with a global perspective through immersion in Germany's rich cultural landscape.

She is set to present her research paper, 3-D Groundwater Flow Modeling in the Yamuna Micro-Watershed Using FEFLOW, at the upcoming International Ground Water Conference (IGWC) 2025 at IIT Roorkee.

Shefali Tripathi

IIT Roorkee

Shefali Tripathi, a Ph.D. researcher from the Department of Paper Technology at IIT Roorkee, is an IGSTC PhD Industrial Exposure Fellowship (PIEF) 2024 awardee. The fellowship has provided a remarkable opportunity to collaborate with a renowned company, Dr. Oetker, in Germany.

Her research focuses on active packaging, aiming to develop sustainable solutions that extend the shelf life of food products. At Dr. Oetker, under the guidance of Dr. Avdesh Chaudhary, she is working on the "Replacement of Primary Packaging for Frozen Pizza." This six-month industrial exposure allows her to tackle real-world technical challenges, applying her research in a dynamic industrial setting to drive innovations in food packaging that align with sustainability goals.

Dr. Oetker, known for its cutting-edge R&D and commitment to sustainability, has broadened Shefali's perspective on the intersection of packaging innovation, food preservation, and environmental responsibility. The company's emphasis on sustainable solutions and product quality has deepened her understanding of how advancements in packaging can significantly impact both consumer safety and ecological footprint.

Beyond the technical realm, Shefali has been captivated by Germany's rich cultural heritage. She particularly admires the country's strong values of discipline and efficiency, which she finds deeply embedded in both personal and professional spheres. These principles, she believes, have positively influenced her work ethic and research approach.

Shefali encourages fellow Ph.D. scholars to explore the IGSTC fellowship as a transformative opportunity to gain practical insights into industrial research while fostering international collaborations. By offering a unique blend of scientific innovation and cultural immersion, the fellowship enables researchers to build a global network and gain a deeper understanding of industrial research dynamics.

Ravi Raj
CSIR-IHBT

Ravi Raj, an IGSTC PIEF Fellow for 2024, is currently undertaking research at LIONEX GmbH, Braunschweig, renowned for its cutting-edge research in diagnostics and therapeutic solutions in Germany. The company specializes in the development of diagnostic kits, monoclonal antibodies, and vaccines for infectious diseases, with a particular focus on TB and other global health challenges. Ravi Raj has an expertise in Molecular biology, Animal cell culture, Protein purification and pre-clinical studies.

During the research stay, he is working on isolating and characterizing monoclonal antibodies specific to Lipoarabinomannan (LAM), a critical TB antigen along with other TB antigens and development of a multiantigen based TB urine rapid test kit. His research focuses on optimizing hybridoma techniques for antibody production, developing and manufacturing the LioDetect TB Urine Rapid Test Kit, and advancing urine-based diagnostics for TB. This kit utilizes gold conjugation to detect LAM antigens with high sensitivity, providing a non-invasive, rapid, and accurate diagnostic solution.

Through the IGSTC PIEF Fellowship Ravi raj has accomplished following results:

(1) Successfully revived and cultured hybridoma cells for anti-LAM and anti-ESAT6 IgM antibodies;

(2) Completed the production of a full batch of LioDetect TB Urine Rapid Test Kits for R&D purposes;

(3) Demonstrated high sensitivity in detecting LAM antigens, with detection limits as low as 0.5 ng/test;

(4) Initiated work on a next-generation ProteoLAM Rapid Test Kit, which will incorporate additional TB antigens for enhanced diagnostic accuracy;

(5) Contributed significantly to advancing TB diagnostics, aligning with global healthcare goals.

This fellowship has been instrumental in enhancing Ravi Raj's research skills, fostering international collaboration, and contributing to the development of impactful diagnostic solutions.

Paired Early career Fellowship in Applied Research (PECFAR)

PECFAR Awardee

Dr. Snehasis Bhakta

Cooch Behar College

Dr. Snehasis Bhakta currently serves as an Assistant Professor in the Department of Chemistry at Cooch Behar College, WB, India. He is one of the recipients of Paired Early Career Fellowship in Applied Research (PECFAR) – Call 2024 funded by IGSTC along with Dr. Mehmet Dinc, Head of Hahn- Schickard-Gesellschaft für angewandte Forschung e.V., Ulm, Germany.

Human serum contains thousands of low- abundant proteins and biomolecules which may be associated with various human diseases. However, presence of high-abundant albumin (HSA) and globulins (IgGs) (~90%) in human serum make it difficult to detect those important biomolecules especially in mass-spectrometry proteomics research. There are many industrial columns available, but most of them are single use, very expensive and stability remains an issue.

Material-based alternative technologies are rapidly emerging as viable options to mimic existing biosensors. One such recognized method is molecular imprinting technology, which has the potential to be widely industrialized despite some limitations.
Dr. Snehasis Bhakta and Dr. Mehmet Dinc aim to work on "Concurrent Selective Depletion of High-abundant Albumin and Antibodies from Human Serum using Surface-imprinted Nanocomposites". During the visit, they successfully developed some highly selective particles for human serum albumin, characterized those using cutting edge facilities at Ulm University and Hahn-Schickard. During his visit, he had the opportunity to work in both Institutes and made some connection with other faculty members. The success of this project is expected to significantly advance proteomics research by improving the detection of low-abundant biomolecules. This award helped Dr. Bhakta to build a helpful connection with the Institute as well as Prof. Boris Mizaikoff who is a renowned expert in the field of molecularly imprinted polymers. In future, both Dr. Bhakta and Dr. Dinc are looking to submit joint research proposals. Besides, he also visited Dr. Anamitra Chatterjee, Regulatory Affairs Manager at Viatris, a pharmaceutical company in Frankfurt and learnt about product development processes in industry.

Beyond his scientific achievements, Dr. Bhakta embraced cultural experiences during his free time in Germany. He completed three one-day treks in the picturesque Bavarian region with his lab mates, offering him a glimpse into German culture and lifestyle. Dr. Bhakta is very thankful to the PECFAR for selecting him for this award funded by IGSCT and hopefully this visit will help him in long run in his career.

Dr. Alexander Sieberath

University Hospital Knappschaftskrankenhaus Bochum

Dr. Alexander Sieberath from the Experimental Surgery Group, University Hospital Knappschaftskrankenhaus, Bochum, Germany, has participated in the IGSTC Paired Early Career Fellowship in Applied Research (PECFAR) 2023 to collaborate with Dr. Janani Radhakrishnan at the DBT-National Institute of Animal Biotechnology (NIAB), Hyderabad, India. During this exchange, Dr. Sieberath worked on developing osteoblast-osteoclast co-culture-based functional models of bone remodelling, leveraging the advanced research infrastructure and expertise at NIAB.

The fellowship has been pivotal in combining the strengths of the research groups from Germany and India to advance the project titled 'Multi-scale porous construct for bone regeneration and in vitro organotypic functional model.' At NIAB, efforts focused on the bio fabrication and in vitro mineralization of three-dimensional (3D) hydrogel constructs, with initial investigations demonstrating promising osteogenic potential. This collaboration has not only facilitated the preparation of a joint manuscript but also laid the foundation for a sustained partnership between the research teams.

Dr. Sieberath commended the PECFAR fellowship for its unique emphasis on fostering interdisciplinary collaborations and international networking. He engaged with researchers at NIAB to explore synergies in cell production technologies, bioprinting strategies, and biomaterial development. The exchange provided a rich platform for knowledge sharing and skill development, significantly contributing to the progress of ongoing 3D biofabrication goals and the development of functional 3D in vitro models.

Dr. Sieberath expressed his appreciation for the hospitality and scientific environment at NIAB, emphasizing that the fellowship has provided a transformative experience at a crucial stage of his career, strengthening international ties and accelerating advancements in functional bone regeneration models.

Mr. Bojan Lukic
German Aerospace Center (DLR)

PECFAR-2023 Awardee Bojan Lukic, a research associate at the German Aerospace Center (DLR), visited his host institute CSIR-National Aerospace Laboratories (NAL), India, where he worked with his Pair Dr Sunil Prasad as part of the fellowship. Mr Lukic, an expert in avionics systems, is currently working on the development of next-generation avionics architectures compliant with ARINC 653 at DLR. His research focuses on formal methods for automated configuration and validation of Integrated Modular Avionics (IMA) systems, particularly in the context of mixed-criticality functions and dynamic reconfiguration.

During his visit to NAL, Mr Lukic & research team did several tests with the complete aforementioned development environment on aviation grade hardware, specifically on the Curtiss-Wright VPX3-152 development board, multiple tests with varying degrees of software integration, simulating functionalities in a dedicated software environment and testing on aviation-grade hardware. One of the major outcomes of the visit was the successful demonstration of reconfiguration capabilities of real-time operating systems (RTOS) and hypervisors in real-time scenarios with health monitoring events. These capabilities were tested in avionics systems, such as flight control software, with the aim of ensuring safe and predictable behaviour in case of error scenarios.

The collaboration between DLR and NAL is ongoing, with further testing and exploration of complex reconfiguration scenarios. The shared setup, which includes an identical replica of the development environment used during Mr Lukic's stay at NAL, is now available at DLR, facilitating continued research and mutual knowledge exchange.

In addition to the technical collaboration, Mr Lukic also experienced the vibrant culture of India. Welcomed warmly by his colleagues at NAL, he participated in several local events, including a wedding and visits to sacred temples. He was introduced to numerous NAL experts and researchers, gaining a deeper understanding of the work conducted at NAL and in the broader Indian aerospace sector. His interactions with local professionals, especially during a visit to MIT in Chennai, helped expand his network and enriched his cultural experience, providing valuable insights into India's rich aerospace research landscape.

This visit marked a significant milestone in fostering international collaboration between DLR and NAL and advancing the development of future avionics systems.

Dr. Satish Naik Banavath

IIT Dharwad

Dr. Satish Naik Banavath is an Assistant Professor in the Department of Electrical Electronics and Communication Engineering at the Indian Institute of Technology (IIT) Dharwad, India. His research focuses on developing efficient, reliable, and cost-effective power electronics conversion systems for next-generation grids.

Dr. Banavath, along with Dr. Giovanni De Carne from the Karlsruhe Institute of Technology (KIT) in Germany, received IGSTC PECFAR-2024 Award to work together to develop an innovative and cost-effective DC Solid State Circuit Breaker designed to protect residential DC buildings. DC systems are gaining popularity for their cost-effectiveness, high efficiency, and reduced need for grid synchronization. These systems are becoming increasingly essential in residential and commercial buildings, data centers, EV charging stations, and transportation systems.

However, the challenge remains in developing reliable DC protection hardware, such as circuit breakers. Dr. Banavath and Dr. De Carne aim to address this challenge with an innovative solution to safeguard DC microgrids. The PECFAR grant has provided valuable networking opportunities, facilitating collaborations with several organizations in the EU and Germany. Dr. Banavath attended the 5th Estonian DC Innovation Workshop in November 2024, organized by Prof. Dmitri Vinnikov at Tallinn University of Technology. During the event, he engaged in discussions on collaborative activities with TalTech, Estonia. On December 5, 2024, Dr. Banavath delivered a lecture at KIT, sharing his research insights and exploring opportunities in solid-state circuit breakers. Additionally, he participated in the EATON Summit on MVDC Technologies held in Aachen, Germany, from December 10-11, 2024, where he met Dr. Martina Josevski, Regional Manager of EATON Research Labs, further expanding his network.

The fellowship has fostered significant research collaborations, with a manuscript co-authored by Dr. Banavath and Dr. Martina Josevski being accepted in the December 2024 issue of IEEE Power Electronics Magazine. This successful collaboration highlights the long-term potential of the partnership between Dr. Banavath's and Dr. De Carne's research groups.

Dr. Banavath and Dr. De Carne expresses their sincere gratitude to IGSTC for their generous support through the PECFAR award, which continues to enhance their work on innovative power electronics solutions.

Dr. Hesam Amiri
RWTH Aachen University

Dr. Hesam Amiri, a Ph.D. researcher specializing in bio-nano interfaces at the Institute of Materials in Electrical Engineering (IWE1), RWTH Aachen University, Germany, has been awarded the prestigious PECFAR-2023 fellowship, alongside Dr. Navneet Kaur from Punjab Engineering College (PEC), India.
Dr. Amiri's research focuses on integrating novel materials into nano-electronic systems. In collaboration with Dr. Navneet Kaur, he aims to characterize and optimize the interactions between innovative metallovesicles (MVs) and electronic devices, paving the way for their seamless integration into advanced electronic systems.

With the guidance of Dr. Vivek Pachauri and Prof. Sven Ingebrandt at IWE1, and support from the PECFAR fellowship under IGSTC, Dr. Amiri traveled to PEC to investigate MV interactions with thin metallic electrodes commonly used in nano-electronics.

Leveraging cutting-edge techniques such as Field-Emission Scanning Electron Microscopy (FESEM) and Energy Dispersive X-ray Spectroscopy (EDX), the team successfully observed MV deposition and analyzed the resulting electrochemical, hydrophilic, and topological modifications of the electrodes.

The findings unveiled unique electrochemical properties of MVs, marking a significant breakthrough in materials science and nanotechnology. This research enhances the understanding of bio-nano interfaces and holds immense potential for advancing next-generation electronic systems. Dr. Amiri's work, made possible through the PECFAR fellowship, is expected to have a lasting impact on the development of cutting-edge nano-electronic technologies.

Through this international collaboration and the support from IGSTC, Dr. Amiri is making important strides in the field of nanotechnology, and his work will contribute to the future of materials science and nanoelectronics.

Dr. Vineet Aniya

CSIR-Indian Institute of Chemical Technology (IICT)

Dr. Vineet Aniya, senior scientist at the CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad, India, has been honored with the prestigious IGSTC Paired Early Career Fellowship in Applied Research (PECFAR), which promotes international collaboration, providing a unique platform for advancing innovative material science. Dr. Aniya collaborated with Dr. Pauline Shamraienko from the Leibniz Institute for Polymer Research Dresden e.V. (IPF), Germany, a globally recognized center for cutting-edge polymer research under PECFAR. This fellowship has enabled Dr. Aniya to deepen his expertise in bio-derived polyurethane (PU), a sustainable material at the forefront of polymer research. During his research stay at IPF Dresden, he focused on synthesizing rigid PU foams using bio-based aliphatic diisocyanates, tackling challenges inherent in traditional PU synthesis. His bio-based approach represents a significant step toward reducing reliance on fossil fuel-derived materials while maintaining high performance and durability.

The collaborative environment at IPF Dresden enriched Dr. Aniya's research through access to state-of-the-art facilities and engagement with leading scientists in polymer processing. He explored advanced fabrication techniques, characterization methods, and innovative formulations to enhance the properties of bio-derived PU foams. Beyond the lab, he engaged in meaningful dialogues with renowned German scientists, including discussions on fiber polymer processing with Prof. Christina Scheffler and Dr. Cindy Elschner. He also toured the Processing Technology Department with Dr.-Ing. Ines Kuehnert and explored the possibility of collaboration in the field of polymeric material development.

Dr. Aniya's experience in Germany was not limited to scientific pursuits. He explored the breathtaking Saxon Switzerland Mountains and Dresden's historical landmarks, including the Frauenkirche and Zwinger Palace. His immersion in local culture, including attending a Christmas Eve party and enjoying traditional delicacies such as Sauerbraten, Wurst, and Dresden's famous Stollen, fostered meaningful connections with peers and a deeper appreciation of Germany's heritage.

Reflecting on his fellowship, Dr. Aniya expressed gratitude to IGSTC for this transformative opportunity. The exposure to world-class research practices and international collaboration significantly broadened his professional network and interdisciplinary outlook. The insights and skills he gained will play a pivotal role in advancing his ongoing research at CSIR-IICT.
Dr. Vineet's work in bio-derived polyurethane represents a critical stride toward sustainable polymer solutions, aligning with global efforts to combat environmental challenges through innovation. His achievements highlight the vital role of international partnerships in driving scientific progress and fostering a sustainable future

Small Immediate Need Grants (SING) – Awardees

Dr. Ragesh G. K.
IIIIT Kottayam

Dr. Ragesh G. K., associate professor and Dean for Industry Relations and Funding at the Indian Institute of Information Technology Kottayam (IIIT Kottayam), received IGSTC Small Immediate Need Grants (SING) – Award. With a Ph.D. in Information and Communication Engineering, Dr. Ragesh specializes in areas such as Cyber-Physical Systems (CPS), Internet of Things (IoT), Wireless Networks, UAVs and 5G and beyond communication systems.

His host institution for this project is Offenburg University of Applied Sciences, Germany, a leading academic institution known for its emphasis on applied research and development in engineering and technology. The collaboration is led by Prof. Marlene Harter, an expert in the field of antenna systems and high-frequency technologies. Offenburg University's state-of-the-art research facilities have enabled extensive experimental work and practical insights for the project.

His research project, titled "Isolation Enhancement of CPW Fed Mimo Array Using Substrate Integrated Waveguide (Siw)", focuses on developing innovative antenna systems for 5G and beyond communication networks. The primary objective is to achieve high isolation and low interference within MIMO (Multiple-Input Multiple-Output) antenna arrays. This is accomplished by utilizing Substrate Integrated Waveguide (SIW) technology, which provides excellent isolation performance and low signal leakage. The project aims to design, prototype, and validate antenna arrays that can support high-speed, low-latency 5G networks. Advanced techniques, such as the incorporation of metamaterial-loaded filters, have been applied to achieve significant isolation enhancements. This approach not only ensures high-quality signal transmission but also reduces electromagnetic interference, making the system suitable for mission-critical applications like autonomous vehicles, UAVs, and IoT-based communication systems.

Through the support of the IGSTC SING Grant, significant strides have been made in the design, fabrication, and testing of MIMO antenna systems. The collaboration has enabled knowledge sharing and access to world-class facilities at Offenburg University, thereby fostering joint research and innovation. This collaborative effort has also led to the preparation of IPR/Patents, thereby contributing to the scientific community's understanding of isolation-enhanced MIMO arrays for 5G networks.

Dr. Ragesh had the opportunity to experience the vibrant cultural landscape of Offenburg and engage with the local community. The exposure to Germany's research ecosystem and academic work culture has been an enriching experience. Interactions with German faculty and students provided insights into new perspectives and best practices in research and development.

As part of the visit, Dr. Ragesh also participated in an International Meet at Offenburg University. During this event, he delivered a lecture to Master's students of the CME Department on the topic of Internet of Medical Things. This experience facilitated deeper academic engagement and further strengthened Indo-German educational and research ties.

IGSTC Networking & Events

IGSTC organized a two-day Team Building Workshop aimed at enhancing coordination and fostering teamwork to cultivate a more productive and collaborative work environment.

IGSTC Annual Report released at the Partners Meet by Joern Rosenberg (German Consulate, Chennai), Praveen Kumar Somasundaram (DST & Indian Co-Chair, IGSTC), and Kathrin Meyer (BMBF & German Co- Chair, IGSTC)

An IGSTC delegation, led by Kathrin Meyer from BMBF, visited IIT Madras to engage in discussions on joint 2+2 projects supported by IGSTC, with a particular focus on advancing water treatment technology for Common Effluent Treatment Plants in the textile industry.

An IGSTC delegation, led by Kathrin Meyer from BMBF, visited IIT Madras to discuss joint 2+2 projects funded by IGSTC, with a key focus on developing sustainable hybrid electric drive technology for two-wheelers.

An IGSTC delegation, led by Kathrin Meyer (German Co-Chair, IGSTC), met with K. J. Sreeram, Director of CSIR-CLRI, to strengthen Indo-German bilateral cooperation. The delegation also visited the Pyrolysis Plant developed under the 2+2 Project Pyrasol.

Mr. R. Madhan, Director, IGSTC attended a bilateral meeting in Berlin, jointly organized by DST, Government of India, and BMBF, Government of Germany.

Chandrasekhar N, Head (R&D), and Dr. Bharat Newalkar, Chief General Manager (R&D) of BPCL, met with Mr. R. Madhan, Director of IGSTC, to discuss strategies for strengthening Indo-German S&T collaborations.

Mr. R. Madhan, Director, IGSTC, and Dr. P. V. Lalitha, Chief Scientific Officer of IGSTC, met with Prof. Dr. Jens Strackeljan, Rector of Otto-von-Guericke University Magdeburg, to explore opportunities for strengthening Indo-German research collaborations through IGSTC.

IGSTC Team led by Mr. R. Madhan, Director IGSTC, held discussion with Dr. Renata Feldmann, BMBF, to discuss ongoing activities and explore innovative opportunities to enhance Indo-German collaboration.

R. Madhan, Director of IGSTC, highlighted IGSTC's climate action initiatives, including projects and workshops, at an event hosted by the German Embassy in India to mark 50 years of Indo-German S&T cooperation. The panel discussion was moderated by H.E. Dr. Philipp Ackermann, Ambassador of Germany to India and Bhutan.

Outcomes from different successful IGSTC projects were displayed at an event organised by German Embassy, India to commemorate 50 years of Indo-German S & T cooperation. It provided insights into climate challenges tackled by projects of IGSTC.

Dr. P V Lalitha Nair, Chief Scientific Officer, IGSTC participated in the 13th Indo-German Frontier of Engineering Symposia 2024, a series of interdisciplinary, bilateral conferences organised by Indian Institute of Technology, Bombay and jointly supported by India DST and Alexander von Humboldt Foundation Germany.

Amity University, Kolkata hosted an IGSTC Networking Workshop under the CirCulTex Consortium, funded by the 2+2 IGSTC programme. The workshop focused on circular, resource-efficient urban farming with reusable textile substrates, supporting the bioeconomy transition. The CirCulTeX is partnered by Amity University Kolkata, Bidhan Chandra Krishi Viswavidyalaya and HariMitti Agro P. Ltd. from the Indian side and the University of Hohenheim, German Institutes of Textile and Fiber Research and Eschler Textil GmbH from the German side.

IGSTC team visited the project site of BETTERyRec, a 2+2 project at Helmholtz Institute Freiberg for Resource Technology (HIF) at HZDR in Germany. The project aims to enhance battery recycling by integrating biotechnological approaches, specifically biosurfactants, to improve metal recovery from battery waste and wastewater

R Madhan, Director, IGSTC, participated in a panel discussion of Women in Engineering (WiE) during the 10th IEEE International Symposium on Smart Electronic Systems (iSES) hosted by Indraprastha Institute of Information Technology, Delhi. He highlighted the IGSTC WISER Program, which plays a pivotal role to empower women in STEM from both India and Germany.

IGSTC Outreach Event

IGSTC organized the Outreach Event at IIT Jammu

IGSTC organized the Outreach Event at NIT Silchar

IGSTC recently organised an Outreach Event at Forschungszentrum Jülich in Germany. The event exchanged notable views on further enhancing the Indo-German Cooperation in S&T and highlighted the significant potential for strengthening Indo-German research collaborations.

IGSTC Programmes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