Universität Bremen

MAPEX Bremen
Material. Process. Excellence.

Program

MAPEX Anniversary Symposium 2025

10 Years of Collaboration in Materials Science and Technology

Wednesday, October 8, 2025
Forum at Domshof

MAPEX Anniversary Symposium

10 years of collaboration in Materials Science and Technology

MAPEX has shaped and inspired research and innovation in materials and processes in Bremen for more than ten years. This symposium brings together current and former MAPEX members and scientists of their working groups.

Looking back, moving forward

We look back at its significant achievements, highlight ongoing research activities and share visions for its future. Selected projects from our idea competition will showcase the pathways towards new research themes and collaborations. During a podium discussion, experts will share and discuss their visions about “The Next Decade: Strategies for Advancing Innovation in Materials and Processes”.

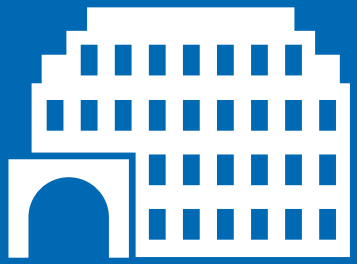
Celebrate with us

After a day of scientific exploration, we invite registered participants to join us for a boat cruise dinner, where we‘ll be treated to a unique blend of science and art, featuring a scientist‘s insights into the development of instrument strings and a concert by two musicians of the NDR Elbphilharmonie.

Organizing Committee

Lucio Colombi Ciacchi (University of Bremen)
Hanna Lührs (University of Bremen)
Kurosch Rezwan (University of Bremen | Matena innovate! Center)
Hannah Zindel (University of Bremen | Matena innovate! Center)

Support: Enis Bicer, Ekin Dutar, Corinna González, Britta Hinz, Touhidul Islam, Vanessa Röttger, Wilken Seemann, Ankita Tiruvannainallur Vijaya, Joris Wegner



Venue

Forum at Domshof
Banking hall (Kassenhalle)
Domshof 26
28199 Bremen
08:30–18:00 CEST

Boat Cruise Dinner

Ship “Gräfin Emma”
Boat Cruise Dinner
Pier Martinianleger
Martinistraße 12–16
28195 Bremen
18:30–21:30 CEST
Boarding: 18:15–18:30 CEST

Later boarding not possible. Only open if you received a seperate invitation to the dinner by email in advance.

Program

Wednesday, October 8, 2025

All times are given in CEST (UTC + 2)

Welcome		
08:30	Registration and coffee	Organizing Team
09:00	Opening	Kurosch Rezwan (University of Bremen | Matena innovate! Center)
09:05	Welcome by the President of the University of Bremen	Jutta Günther (University of Bremen)
Looking Back		
09:15	A look back at 10 years of MAPEX	Lucio Colombi Ciacchi (University of Bremen) Hanna Lührs (University of Bremen) Kurosch Rezwan (University of Bremen | Matena innovate! Center)
Talks		
09:45	A research journey in additive manufacturing: From ProMat student to PhD project	Maylin Homfeldt (Leibniz-IWT)
10:05	Rare events and the likelihood of change: An atomistic perspective of electrochemistry and an insight into my scientific journey	Robert Meißner (Hamburg University of Technology)
10:35	Coffee break	
Flashlights on Flagship Projects		
11:00	Matena innovate! Center: invent. ignite. inspire.	Jan Wedemeier (Matena innovate! Center) Kurosch Rezwan (University of Bremen | Matena innovate! Center)
11:10	The Martian Mindset: A scarcity-driven engineering paradigm	Marc Avila (University of Bremen) Kirsten Tracht (University of Bremen)
11:20	MarsLab: A facility to study production under Mars-like conditions	Christiane Heinicke (University of Bremen)
Moving Forward		
Idea Competition: Future Collaborative Research Themes		
11:30	Circular electronic materials for advanced e-waste management	Spokesperson Björn Lüssem (University of Bremen) and group
12:45	Lunch break and group picture	
14:00	Functionality of products under material uncertainties	Spokesperson Andreas Rademacher (University of Bremen) and group
15:15	Coffee break	
Talks		
15:30	Electrokinetic particle separation for material recycling – from Bremen via Dublin to Vienna	Georg Pesch (TU Wien)
16:00	CALPHAD-based high-throughput simulations for metal additive manufacturing	Evgeniya Kabliman (University of Bremen | Leibniz-IWT)
16:30	Mini break and room prep	

further dates see next page

Podium Discussion

16:45	The next decade: Strategies for advancing innovation in materials and processes	Julia Hansen (Airbus Defence and Space GmbH) Katharina Koschek (Fraunhofer IFAM) Nicola Marzari (École Polytechnique Fédérale de Lausanne – EPFL | University of Cambridge) Chiara Pedersoli (OHB System AG) Kurosch Rezwan (University of Bremen | Matena innovate! Center)

Evening Program

18:00	Transfer	
18:30	Start boat cruise dinner on the Weser	
20:00	Baroque strings: Modern Material Science	David May (University of Bremen | FIBRE)
	Lively Latin American rhythms	Barbara Gruszczynska, violin Christopher Franzius, cello (NDR Elbphilharmonie Orchestra)
21:30	End	

Looking Back

Maylin Homfeldt
(Leibniz-IWT)

09:15 A look back at 10 years of MAPEX

→ Lucio Colombi Ciacchi
(University of Bremen)

→ Hanna Lührs
(University of Bremen)

→ Kurosch Rezwan
(University of Bremen |
Matena innovate! Center)

As we mark a decade of MAPEX, we take a moment to reflect on the highlights of the past 10 years, celebrating our progress along four core missions: sharing research infrastructure, supporting early-career researchers, facilitating transfer and outreach, and driving excellence in science. We pay tribute to the many individuals who have contributed to MAPEX's success, whose visions and dedication have helped shape our research community.

09:45 A research journey in additive manufacturing: From ProMat student to PhD project

The presentation highlights the journey from ProMat Student to PhD research in additive manufacturing. Maylin Homfeldt's PhD research focuses on the layer-based additive production of iron-based shape memory alloys, which presents both novel opportunities and inherent process-related phenomena that warrant thorough consideration. The elevated manganese content of these shape memory alloys poses a significant challenge to the additive manufacturing process: namely, the need to maintain the homogeneity of the alloy -and thereby its functional properties- throughout the entire component, or to exploit this variability in a deliberate and controlled manner.

Maylin Homfeldt was first drawn to Bremen by the international and interdisciplinary Biomimetics Bachelor. Captivated by the city's atmosphere she chose to pursue her Master's degree here as well. Within the ProMat program, she was given the opportunity to tailor her studies thus laying a focused and deliberate foundation for her current position, which she holds since January 2024, as a PhD Student at the Leibniz-IWT. Motivated by the vast potential and evolving capabilities of additive manufacturing, she chose a number of specialized lectures during her Master's studies – an area which, today, profoundly influences the daily course of her research.

Robert Meißner
(Hamburg University
of Technology)

10:05 Rare events and the likelihood of change: An atomistic perspective of electrochemistry and an insight into my scientific journey

Rare events can influence many physical systems and occur on a large scale. While not strictly physical, I will also provide some brief insights how such events may have impacted my career, from my beginnings as a physics student in Bremen, through my time in Lausanne, to finally settling in Hamburg and Geesthacht. From a scientific perspective, I will discuss the ubiquity of water and its unique structural dynamics. Water plays a pivotal role in shaping the properties and functionality of natural materials as a ‚working fluid'. Inspired by these marvels of nature, the core idea is to develop a new class of sustainable, interactive and architected, blue materials' that derive their functionality from the multiscale structures of hard matter interacting with water. Novel effects achieved through the nanoconfinement of water are increasingly being exploited for this, but unfortunately these often do not exceed the laboratory scale. I will demonstrate how these nanoconfinement effects could be exploited to store energy more efficiently in supercapacitors, harvest energy from temperature differences via the electrolytic Seebeck effect, and utilise capillary-driven imbibition and drying cycles in nanopores to enable energy harvesting on a much larger scale. I will also present recent fluidic insights into the solid–liquid interface, which is often only nanometres thick yet tremendously important for many physical and chemical processes. Along this line, I will explain why machine learning force fields are becoming increasingly important and how they are currently disrupting the field.

Robert Meißner is a professor and the head of the Institute for Interface Physics and Engineering at the Hamburg University of Technology. He is also head of the Department of Atomistic Corrosion Informatics at the Helmholtz-Zentrum Hereon. He obtained a diploma in physics in 2010 and a PhD in production engineering in 2015, both from the University of Bremen. Prior to moving to Hamburg, he was a postdoctoral fellow at the École polytechnique fédérale de Lausanne. His research focuses on applying machine learning methods to atomistic simulations, particularly for modelling electrochemical processes which includes using virtual potentiostats in empirical force fields and ab initio methods. He aims to understand the underlying mechanisms of electrochemical processes, energy storage and corrosion at solid-liquid interfaces by combining these methods to improve materials from the atomic scale. He is passionate about science and interpreting the world through algorithms.

Moving Forward

11:00 Flashlights on Flagship Projects

Matena accelerates the transfer of cutting-edge materials research into practical applications. By uniting science, industry, and entrepreneurship, Matena serves as a hub for pioneering material solutions that transform research results into tangible impact, driving sustainability and competitiveness across industries.

The **Martian Mindset** Cluster of Excellence will lay the foundations for a fossil-fuel-free production of materials and parts from scarce resources in a highly automated and resilient way. The cluster thus targets responsible space exploration, while simultaneously providing new impetus for the green transition on Earth.

A **Mars Production Facility** will be built next to the existing Moon and Mars Base Analog (MaMBA) at the ZARM. It will provide a common space for experiments under operational and environmental constraints similar to those on Mars.

IDEA COMPETITION

Idea Competition: Future Collaborative Research Themes

To shape the next generation of collaborative research, the MAPEX Center for Materials and Processes invited all members to submit idea proposals and will fund one original and innovative project from 2026. In this session the two short-listed ideas will be presented.

The ideas should present a clear vision demonstrating the potential to contribute to the profile building of MAPEX and the University of Bremen, addressing materials, processes and technologies. They should also contribute to the University's fundamental guiding principle: sustainability. In the sense of high-risk funding, the proposed projects must break new ground and be distinct from ongoing or past activities of the applicants. The project's idea is expected to pave the way for third-party funding for collaborative institutional projects, e.g. in the dimension of a DFG research training group or DFG collaborative research center.

11:30

Spokesperson
Björn Lüssem
(University of Bremen) and group

Circular electronic materials for advanced e-waste management

Electrification and digitalization of our daily life have led to an ever-increasing amount of electronic waste (e-waste). Since 2010, the amount of electronic waste has doubled to 62 billion kg in 2022, with Europe being the largest contributor. Still, most of the electronic waste is not properly collected or recycled.

Although e-waste is highly heterogeneous, almost all electronic devices contain printed circuit boards (PCB). PCBs are responsible for approx. 3-6 % of the total mass of all e-waste, with a total worth of more than USD 60 billion in 2022. Previous attempts to recycle PCBs were only partially successful, resulting in PCBs being either landfilled or incinerated. To make matters worse, halogenated flame retardants in PCBs can release toxic substances during thermal or chemical recycling.

In this session, we discuss current approaches to address this challenge, either by biodegradable or circular materials. Based on the MAPEX research landscape, we outline a strategy for the design of fully circular printed circuit boards, alongside circular semiconductor materials and first circular organic sensors.

IDEA COMPETITION

14:00

Spokesperson
Andreas Rademacher
(University of Bremen) and group

Functionality of products under material uncertainties

In the development cycle of new products, the prediction of the properties of the incorporated materials during production, usage, and recycling is fundamental. However, experimental results are usually only obtained on coupon level and cannot provide an accurate prediction.

The proposed project Functionality of Products under Material Uncertainties (FoPuMU) comes into play at this point by increasing the accuracy through the mathematical understanding of the underlying extrapolation. To ensure a broad application focus and prevent overfitting of the methodology, we consider two use cases representing different challenges: hydrogen tanks consisting of composite materials and dry-adhesive tapes consisting of polymers. Hydrogen is stored at very low temperatures, at which experiments are very hard to carry out. In the loosening process of dry-adhesive tapes, very large elastic deformations in the limit range of material characterization are observed.

Our approach to overcome these challenges lies in the understanding and improvement of the extrapolation of the available experimental results on coupon level to the application. To this end, we utilize two approaches: One based on classical models and one using artificial intelligence. The work on the extrapolation can only be done in a strongly interdisciplinary network including expertise from material design, application, measurement technique, and mathematics providing the necessary knowledge on all different fields supporting the control of all arising uncertainties.

Georg Pesch
(TU Wien)

Evgeniya Kabliman
(Leibniz-IWT)

15:30 Electrokinetic particle separation for material recycling – from Bremen via Dublin to Vienna

Lithium-ion batteries (LIB) are prevalent in electric vehicles (EV). EV sales are exponentially increasing and so is the LIB waste we produce. Current LIB waste recycling methods cannot recover graphite and other key elements. Dielectrophoresis (DEP) – an electrokinetic particle manipulation technique – allows for environmentally friendly direct recycling of each LIBs. DEP can separate particles based on differences in composition, size, and shape. Black mass, an intermediate product during LIB recycling, contains tiny graphite and lithium metal oxide (LMO) particles, which can be separated using DEP; this will not only recover the valuable graphite but will also increase recovery efficiencies other materials in subsequent steps. DEP can therefore be used as an intermediate step in LIB recycling.

Georg Pesch is professor for Particle Technology and Sustainable Engineering at TU Wien. His research focuses on electrokinetic methods for the handling and separation of particles for green and circular technologies. He obtained his PhD in Production Engineering from University of Bremen in 2018 and was a post-doctoral fellow in the Department of Chemical Engineering at Delft University of Technology. After being a group leader at the University of Bremen, he became a lecturer at University College Dublin in 2022 and professor at TU Wien in 2025. He was a member of MAPEX from 2018 to 2022.

16:00 CALPHAD-based high-throughput simulations for metal additive manufacturing

When designing and optimizing materials and manufacturing processes, numerous combinations must be tested. Utilising computational tools for automated screening, such as high-throughput screening (HTS), can reduce the number of real trials needed, saving material costs and energy. This lecture will review solutions for the computational materials community, focusing on HTS in alloy design. The CALPHAD method facilitates the prediction of microstructure evolution by calculating phase distributions in multi-phase systems under various manufacturing conditions. We will demonstrate examples of application of the CALPHAD-based HTS to optimisation of heat treatment for additively manufactured metallic alloys.

Evgeniya Kabliman is a professor for knowledge-based digitalization in materials-oriented production at the University of Bremen and the director of the newly established area “Digital Technologies” at the Leibniz Institute for Materials Engineering – IWT. Prof. Kabliman applies computational methods in materials science and engineering to describe the material‘s behavior at multiple length scales. Her current research focuses on implementing a computational high-throughput screening approach combined with machine learning.

Podium Discussion

16:45 The next decade: Strategies for advancing innovation in materials and processes

As we embark on the next decade, our panel of experts from academia and industry will share their insights on the key strategies for driving innovation in materials and processes. Our discussion will delve into the latest breakthroughs and trends in this field, highlighting the opportunities and challenges that will shape the future of materials and processes research.

Julia Hansen
(Airbus Defence and Space GmbH)

Julia Hansen studied civil engineering in Braunschweig (Germany) and Trondheim (Norway). Since 2024, she is the head of Materials and Processes Space Systems Germany at Airbus Defence and Space where she has been working in different positions since 2010.

Katharina Koschek
(Fraunhofer IFAM)

Katharina Koschek leads a division at Fraunhofer IFAM developing advanced adhesive bonding technology and lightweight materials and manufacturing processes for applications in aerospace, mobility, and energy sectors. As a chemist she is particularly interested in the research of sustainable polymers and composite materials with focus on repairability and circularity.

Nicola Marzari
(École Polytechnique Fédérale de Lausanne – EPFL | University of Cambridge)

Nicola Marzari earned his PhD in Physics from the University of Cambridge in 1996. He currently holds the Chair of Theory and Simulation of Materials at the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. He also serves as the Director of the National Centre for Computational Design and Discovery of Novel Materials. In addition, he heads the Laboratory for Materials Simulations at the Paul Scherrer Institute (Switzerland) and holds an Excellence Chair at the University of Bremen, Germany. He has recently been elected to the prestigious Cavendish Professorship of Physics at the University of Cambridge (UK).

Chiara Pedersoli
(OHB System AG)

Chiara Pedersoli studied aerospace engineering at the Politecnico di Milano (Italy). She worked at various institutions (DLR/GSOC, ESA-ESOC, Eumetsat, Airbus UK/DE, Kayser-Threde/OHB), initially as an engineer on Earth observation, navigation and exploration missions with increasing responsibility. Since January 2020, she has been a member of the Management Board of OHB System responsible for Engineering and Testing and is responsible for all technical departments in the company in Bremen and Oberpfaffenhofen. Since 2024, she has taken over the role as CEO of OHB System AG, a subsidiary of OHB SE, Germany‘s first listed space and technology company.

Kurosch Rezwan
(University of Bremen | Matena innovate! Center)

Kurosch Rezwan is professor of Advanced Ceramics and holds a PhD in Materials Science from ETH Zurich. He works at the intersection of science and innovation, developing advanced ceramic materials for healthcare, sustainability, clean energy, and high-performance technologies. Since 2019 he has been spokesperson of MAPEX, driving major research initiatives together with colleagues. In 2024 he also co-founded the Matena innovate! Center as the scientific director, where research teams turn scientific breakthroughs into practical innovations and strong industry partnerships.

Notes

Universität Bremen
MAPEX Center for Materials and Processes
www.uni-bremen.de/mapex