Materials Innovations



V. Sousa
Key Account Manager
CEA-Leti, Grenoble, France

Biography
Coming Soon

References

Raw Materials in Europe – Research and Innovation landscape



A. Rožkov
Programme Manager and Call coordinator
Health and Digital Executive Agency (HaDEA),
Raw Materials, Brussels, Belgium

Abstract
Microchips are made from specialized raw minerals sourced from global mining operations. Critical Raw Materials represent the essential mined minerals and metals—such as gallium, germanium, silicon, palladium, and rare earths — that are strictly required to manufacture microchips and semiconductors. In his session we present the portfolio of CRM research and innovation projects co-funded by European Union and managed by HADEA. We also present the funding opportunities for CRM topics under Horizon Europe program in 2027.

Biography
Dr. Andrej Rožkov is a Programme Manager at Health and Digital Executive Agency (HaDEA) "Raw Materials" in Brussels. He holds a PhD in Physics. Andrej has publications on ionising radiation metrology and radioanalytical chemistry. Andrej is managing research and innovation grants and is coordinating Horizon Europe calls for proposals.

References

High-throughput modelling for materials in microelectronics



E. Turunen
Executive vice president
VTT Technical research centre of Finland, Digital Systems, Espoo, Finland

Abstract
Material innovations are emerging as a key driver of semiconductor progress as conventional scaling and device architectures approach their practical limits. Future performance and functionality gains will increasingly depend on new materials, advanced integration technologies, and novel semiconductor platforms rather than geometric scaling alone.
The ability to systematically design and run virtual “what-ifs” scenarios in an integrated manner is widely recognised as a way to accelerate the respective R&D&I processes by an order of magnitude compared to trial-and-error approaches. The integrated computational materials engineering approach fuelled by AI-driven machine learning also enables the development of higher-performing materials and the identification of more cost-effective and sustainable solutions.
VTT ProperTune has been developed over the course of the last 20 years and can be applied to a range of material problems and subject domain areas. Most recently, the VTT ProperTune applied to microelectronics material domains has been initiated. In parallel with the development of new building blocks for this novel modelling tool on classical computing platforms, VTT is studying algorithmic concepts inspired by quantum computing to enhance future capabilities.
The objective is to investigate key material properties, including permittivity, piezoelectric coefficients, elastic constants, and density, as well as the differences between single-crystal and oligo-/polycrystalline materials. These properties largely determine the performance of microelectronics, sensors, and power electronics.
A key aspect is the implementation of high-throughput workflows in which computational and experimental tasks are highly automated, in line with the vision of VTT’s Material Accelerator Platform (MAP) initiatives. Equally important is the strong integration with VTT’s design microfabrication and piloting activities.

Biography
Dr. Erja Turunen is the executive vice president of one of VTT’s two business units: Digital systems. As the leader of the unit, Erja’s work involves strategic planning, engaging stakeholders and representing VTT in different organisations. Erja is also a member of VTT’s executive committee. Erja’s current responsibility area is Digital systems covering microelectronics, quantum, flexible electronics, sensing solutions, physical AI, connectivity and cyber security.
Prior to her current role, she used to work as vice president in two different excellence area at VTT. Turunen is also a respected researcher herself. She began her career at the Tampere University of Technology following by Aalto and has done her PhD from material science.
Erja has been at VTT 25 years and having various management positions more than 20 years. Erja has been member for multiple European initiatives and networks. Currently she is active in BoD’s for Kvanttinova Oy, Tamlink Oy and Enter Espoo Oy

References

HZO ferroelectric thin films and their applications to memory devices



L. Grenouillet
Senior Expert
CEA-Leti, Silicon Component Division, Grenoble, France

Abstract
The discovery of ferroelectricity in hafnia-zirconia-based (HZO) films, first published 15 years ago, could potentially change the (non-volatile) memory landscape. Indeed, HZO films are ferroelectric in the 5-10nm thickness range allowing low voltage operation, can be deposited in a three-dimensional configuration by Atomic Layer Deposition (ALD) to improve density, and are fully CMOS compatible, which potentially allow their introduction at any technological. In this talk, recent advancements in HZO-based memories will be reviewed, with a focus on FeRAM (Ferroelectric Random Access Memory) highlighting the opportunities but also the challenges at material, integration and design levels. The potential of HZO FeRAM in terms of applications will also be discussed.

Biography
Dr Laurent Grenouillet received the Engineer degree in physics in 1998 from the National Institute of Applied Sciences (INSA) in Lyon, France, and the PhD degree in electronic devices in 2001. From 2001 to 2009 he worked at CEA-Leti on Optoelectronics and Silicon Photonics. In 2009, he joined IBM Alliance in Albany, USA to contribute to the development of FDSOI technology and took part to the FDSOI technology transfer to Global Foundries (22FDX) in 2015. Back in France, he joined the Advanced Memory Device Laboratory at CEA-Leti where he worked on resistive switching memory devices. In 2018 he started to work on ferroelectric HfO_2-based memories (FeCaps, FeRAM, FTJs) and is now leading the Ferroelectric Memory group at CEA-Leti. Laurent Grenouillet authored or co-authored over 110 papers (conferences and journals) and has filed over 60 patents. He also serves as committee member in different memory-related conferences (IRPS, IMW, NVMTS and SSDM).

References

Novel Semiconductors for future Power Devices



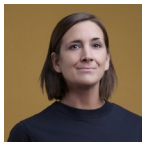
E. Meissner
Fraunhofer Insitute for Integrated Systems and
Device Technology, Erlangen, Germany

Abstract
Power electronics is increasingly shaped by novel semiconductor materials that enable higher efficiency, faster switching, and greater power density. Among these, gallium nitride (GaN) and SiC are already highly relevant for next-generation power devices. Ultra-wide-bandgap materials, are considered the next generation of semiconductor materials, offering even greater potential for advancing power density, high-temperature, and high-frequency opperation, with aluminum nitride (AlN) being an extremly promising candidate. AlN, gaining fast growing attention for future power devices. Although challenges remain, AlN has a strong potential to advance future power electronics and support disruptive innovation beyond GaN and SiC.

Biography
Dr. Meissner is an experienced senior professional active in the field of semiconductor materials development and crystal growth. She brings along a broad perspective across the entire value chain, from materials and device technology to applications in power modules and systems, with a particular focus on ultra-wide-bandgap semiconductor materials.
After more than two decades as a researcher, she is today engaged in strategic planning at Fraunhofer IISB and represents the strategic business development for semiconductor materials and technology. At the same time, she is involved in fundamental research as a member of the Chair of Electron Devices at the University of Erlangen–Nuremberg.

References

Accelerating Materials Discovery for the Semiconductor Industry



A. Jatsch
Head of Materials Innovation Pipeline
Merck KGaA, Berlin, Germany

Abstract
As semiconductor technologies advance, materials must deliver increasingly complex combinations of performance, reliability, manufacturability, and sustainability. At the same time, new device architectures and growing process complexity are shortening development and qualification cycles. New materials are therefore becoming an increasingly important lever for future semiconductor performance, while the scientific and experimental design spaces continue to expand. The challenge is not only to discover new materials, but to accelerate the full innovation process from material design through experimentation, characterization, process optimization, and integration.
The effective use of AI in materials R&D depends on accessible, structured, and connected scientific data. Digital laboratory infrastructure, consistent data capture, instrument connectivity, and integrated workflows provide the foundation to make experimental information usable. Building on this, modeling, AI, automation, and data analytics can support better experimental decisions, explore larger design spaces, and shorten learning cycles by combining scientific understanding with data-driven and increasingly predictive approaches.
We will share its perspective on how materials R&D can evolve from fragmented workflows toward connected, data-enabled, and predictive innovation environments. We will discuss how materials and process expertise, digital infrastructure, computational methods, and experimentation can be combined into integrated learning loops. Real use cases from semiconductor materials R&D will illustrate how these principles can accelerate materials innovation.
The presentation will also highlight how Europe can build on its scientific excellence, R&D infrastructure, industrial capabilities, and collaborative ecosystem to advance materials innovation. Connecting internal R&D capabilities with research and industry partnerships can help translate scientific advances into industry-relevant solutions and strengthen Europe’s contribution to future semiconductor technologies.

Biography
Anja Jatsch, Head of Materials Innovation Pipeline within the Chief Technology Office of the Electronics Business of Merck KGaA, Darmstadt, Germany
Anja Jatsch is Head of Materials Innovation Pipeline at Electronics Business of Merck KGaA, Darmstadt, Germany, where she leads the development and advancement of new material platforms with a strong focus on semiconductor materials and technologies. Her work centers on accelerating materials innovation by combining deep materials science with portfolio strategy, digitalization, AI, and external collaboration.
She has more than 16 years of experience in Electronics R&D and innovation leadership. Before taking on her current role, she held several leadership positions in Optronics, including Head of Material Research and Head of Early Innovation, where she worked across OLED materials, display technologies, and emerging Optronics-related fields.
Anja holds degrees in chemistry and business administration and economics and has a scientific background in organic chemistry and advanced materials.

References

Leading the Transition - Cleanroom Filtration without added PFAS.



F. Spehl
Principal Expert Air Filtration
MANN+HUMMEL, Bochum, Germany

Abstract
The semiconductor industry is under increasing pressure to eliminate substances of concern from manufacturing ecosystems while maintaining the highest standards of contamination control. PFAS chemicals are becoming a growing focus of regulators and sustainability programs worldwide.
This presentation showcases how advanced air filtration technology can support the industry's transition toward more sustainable cleanroom operations. Through extensive laboratory and field validation, attendees will learn how filtration products designed without added PFAS chemistry deliver the same trusted performance in efficiency, energy consumption, pressure drop, and lifetime as traditional solutions.
The session will discuss regulatory drivers, lessons learned during product development, and practical strategies for implementing technologies without added PFAS in semiconductor facilities. Participants will leave with a clearer understanding of how sustainability and cleanroom performance can be achieved together.

Biography
Frank Spehl, Principal Expert Air Filtration Solutions at MANN+HUMMEL, brings more than 35 years of experience in air filtration and cleanroom technology. Prior to his current role, he led R&D activities in air filtration, driving the development of innovative filtration technologies and solutions. His expertise spans sustainable filtration concepts, energy-efficient manufacturing environments, contamination control, and advanced solutions for highly regulated industries, including semiconductors, microelectronics, and other high-tech manufacturing sectors.

References

Buried crystallographic defect detection in Si/SiGe structures with Photomulinescence imaging



T. Sipőcz
R&D Team Leader
Semilab Semiconductor Physics Laboratory Co. Ltd., Optics Dept., Budapest, Hungary

Abstract
Next generation logic and memory structures are build on Si/SiGe superlattice layers for creating FinFET/CFET or 3D-DRAM devices. The lattice constant difference of Si and SiGe is leading to strained EPI layers, which can relax depending on the Ge content, growth parameters and layer thickness. Relaxation of the EPI layers could generate misfit dislocations (MD) and threading dislocations (TD) in the structure. These defects can reach the surface, causing cross-hatch patterns, but most of the defects are remain below surface, buried under the EPI layers. Photoluminescence (PL) imaging technique is a non-contact and non-destructive method for detect these defects below surface and characterize the semiconductor sample goodness for later device production. Semilab's room temperature PL tool, En-Vision, is capable of measuring samples with high resolution, thus creating an opportunity for process optimization and defect characterisation.

Biography
Tamás Sipőcz is the team leader of semi PL imaging team at optics division in Semilab and joined the company 6 years ago, in 2020. He holds a Diploma in Pharmaceutical and Synthetic Chemistry from Eötvös Loránd University and has contributed to multiple publications and conferences.
With his knowledge in optical metrologies, he supervises various metrology developments and research in the fields of room temperature photoluminescence imgaing.

References

Enabling tomorrow’s memory and logic through materials innovation



A. Leonhardt
Manager, Process Engineering
ASM, Helsinki, Finland

Abstract
As memory and logic technologies continue to scale and diversify, progress increasingly depends on discovering new materials and engineering them at the atomic level. This talk will explore how materials science, process engineering, and device physics can connect fundamental materials understanding with device requirements and manufacturable processes, accelerating innovations in gate stacks, engineered interfaces, and emerging functional materials from discovery to application. These advances can unlock new pathways for improved performance, power efficiency, reliability, and continued scaling in next-generation memory and logic devices.

Biography
Dr. Alessandra Leonhardt is an R&D Program Manager at ASM, specializing in advanced materials and process technologies for semiconductor applications. Her expertise spans atomic layer deposition (ALD) of oxide semiconductors, high-k and ultra-high-k dielectrics, and metal gate stacks, with a strong focus on translating materials innovation into device performance improvements aligned with industry roadmaps. After completing her PhD at imec in 2020, Alessandra joined ASM, where her work has focused on materials discovery and the development of advanced semiconductor technologies. Since 2024, she has led programs within ASM’s Corporate R&D organization focused on advanced technologies for next-generation logic and memory applications.

References