

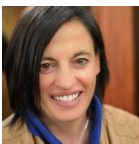
# SEMICON® EUROPA

NOV 15-18, 2022 | MUNICH, GERMANY



## ITF Beyond 5G

### Welcome



K. Marent  
EVP & Chief Marketing and Communications  
Officer  
imec, Brussels, Belgium



### Abstract

Coming Soon

### Biography

Katrien has an engineering degree in microelectronics. She joined imec in 1992 as analog design engineer and specialized in design of low-noise readout electronics for high-energy physics. In 1999, she became press responsible and scientific editor at imec's business development division and was responsible for authoring and editing the research organization's numerous company technical documents and publications. In 2001, she was appointed corporate communications director at imec. Her responsibilities expanded in August 2007, when she got the position of external communications director including corporate, marketing and outreach communications. In October 2016, she became VP corporate, marketing and outreach communication. Since April 2020 she is Executive Vice President & Chief Marketing and Communications Officer and member of the executive board of imec.

## Opening Talk: From Applications to Semiconductors or the other way Around: the Case for Technology-Push



M. Peeters  
VP of R&D for Connectivity  
imec, Brussels, Belgium



### Abstract

Coming Soon

### Biography

Michael Peeters is VP of R&D for Connectivity at imec. His previous experience as CTO for both the Wireline and Wireless business lines at (what is now) Nokia was built on the culture, enthusiasm, and love for technology and science that he got from his time at Bell Labs—and the principles of Free Inquiry bestowed on him by his Alma Mater, the Vrije Universiteit Brussel (VUB).

During his research career starting with a Ph.D. in Applied Physics and Photonics from the Vrije Universiteit Brussel, he has authored more than 100 peer-reviewed publications, many white papers and holds patents in the access and photonics domains. An electrotechnical engineer by training, he is a senior member of IEEE and a Fellow of the VUB.

Outside of work, his quest to discover the recipe for a perfect lasagna is balanced by bouts of long-distance running to offset the inherent caloric intake.

## Industry Talk: Advanced Engineered Substrates for RF Applications: from Silicon to Compound Materials



C. Maleville  
CTO, Executive VP Innovation Organization  
Soitec, Bernec, France



### Abstract

Within last decade, RFSOI has been established as standard engineered substrate for front-end module (FEM) of smartphones. Linearity provided by integration of trap-rich layer in RFSOI structure was decisive to bring device linearity in similar performance as III-V. Then, driven by PPAC (Power - Performance - Area - Cost) superiority over GaAs, RFSOI substrate became preferred platform for RF switch design and manufacturing. Then, remaining components of FEM have been designed on RFSOI to create a rather large module up to 50mm<sup>2</sup> at the age of 4G.

As need for fast data communication is calling for higher bands, pushing RF devices to higher frequencies is calling for advanced engineered substrates roadmap. Soitec developed and is enriching a comprehensive product portfolio to address 5G, mmWave 5G and 6G domains.

5G has reset power requirements for each device, which enabled using FDSOI has a high-frequency device for 5G transceiver and opportunity for designers to rethink FEM integration. In parallel, RFSOI is now used in more advanced nodes (28nm) to boost performance and meet mmW operations.

When 6G specifications are now considered, need for high mobility brings back interest for compound materials. To meet competitive die PPAC, thin film III-V on silicon appears as most compelling options for future. Soitec technologies are then used to propose best material as active layer on best base material for an efficient implementation in large volume.

### Biography

Christophe Maleville has been appointed senior vice president of Soitec's Innovation.

He joined Soitec in 1993 and was a driving force behind the company's joint research activities with CEA-Leti. For several years, he led new SOI process development, oversaw SOI technology transfer from R&D to production, and managed customer certifications. He also served as vice president, SOI Products Platform at Soitec, working closely with key customers worldwide.

Maleville has authored or co-authored more than 30 papers and also holds some 30 patents. He has a PhD in microelectronics from Grenoble Institute of Technology and obtained an executive MBA from INSEAD.

## Industry Talk: Opportunities for Innovation in Integrated Device Technologies



G. U'Ren  
Director RF Technologies  
X-FAB Group, Dresden, Germany



### Abstract

The evolution of communication standards with additional spectrum including mmW and higher order modulation schemes to improve spectral efficiency require advancements of integrated device technologies for the RFFE on a wide range of RF performance metrics such as linearity, gain, and noise. Incumbent technologies for switching, filtering, and signal amplification in receive and transmit paths have weaknesses particularly for mmW and create opportunities for alternatives. At X-FAB we anticipate a necessary evolution of RFFE technology solutions and are committed to meet these challenges pursuing a strategy of heterogeneous integration at wafer or transistor level. We approach these challenges and new opportunities with a holistic perspective striving to not only create and integrate high performance active devices but also to provide a technology solution complemented with foundational IP and a proven application-based demonstrators to validate the design flow and device technology. A perspective on potential next generation technology solutions will be discussed.

### Biography

Dr. Gregory U'Ren is the Director of RF Technologies at X-FAB responsible for incubating and subsequently delivering integrated device technology solutions including reference designs and foundational design IP. During his career, he has held both leadership and individual roles contributing to the advancement of a broad range of specialty technologies including SiGe BiCMOS, RF-SOI, MEMS, and GaN. Current activities are focused on the RF front end for 5G or 6G systems engaging various collaborations with academic and industrial partners on a wide range of topics including materials, process, RF/mmW characterization, advanced modeling, and EDA tooling enhancements to support several program initiatives at X-FAB.

He is a senior member of IEEE, a member of the American Physics Society, and holds over 30 patents. He completed his PhD and MS at the University of California Los Angeles.

# How Heterogeneous Integration Will Shape the Future of Wireless Communications



N. Collaert  
Program Director High-Speed Analog/RF  
imec, Brussels, Belgium



## Abstract

CMOS has been the technology of choice for many applications because it is easy to manufacture and offers a good balance between performance and cost. However, as we move into the mm-wave and sub-THz frequency spectrum for wireless communications, it is becoming clear that CMOS might not be the best option for all use cases.

At these higher frequencies CMOS struggles to deliver the power and efficiency needed, which is where compound semiconductors like GaN and InP come in, especially for the transmit side of the RF Front-End Module (RF FEM).

Compound semiconductors have the potential to revolutionize the world of wireless communication, but there are still many challenges that need to be addressed. These technologies are still lacking in maturity. That is why today's research is focused on scaling them up to make them ready for mass volume production. Next to that, they will need to be combined with CMOS delivering the control and calibration for the beamforming architectures. The design of heterogeneous platforms enabling this co-integration will therefore be essential to enable the full potential of these solutions for beyond 5G applications. This also calls for EDA tools and methodologies to efficiently partition the system. In this talk we will highlight the current progress towards enabling these hybrid technologies with a focus on 2.5D and 3D integration.

## Biography

Dr. Nadine Collaert is program director at imec. She is currently responsible for the analog/RF program looking at heterogeneous integration of III-V/III-N devices with advanced CMOS to tackle the challenges of next generation mobile communication. Before that she was program director of the LOGIC Beyond Si program focused on the research on novel CMOS devices and new material-enabled device and system approaches to increase functionality. She has been involved in the theory, design, and technology of FinFET devices, emerging memories, transducers for biomedical applications and the integration and characterization of biocompatible materials. She has a PhD in electrical engineering from the KU Leuven and she holds more than 400 publications and more than 10 patents in the field of device design and process technology.

## Industry Talk: THz Frequencies and Mobile Networks – a Good Blend?

F. Tillman  
Head of Integrated Radio Systems  
Ericsson Research, Brussels, Denmark



# ERICSSON

### **Abstract**

In the quest for more network capacity beyond 5G, sub-THz frequencies have started to climb the hype curve. But will this research green field become applicable to the mobile network industry in the future? Is it enough having radio frontend components available, or must the network deployment as we know it today be redefined? This talk will elaborate on predicted use cases for 6G and how the cellular radio roadmap tries to meet assumed requirements. Will sub-THz frequencies be part of this journey or simply remain as a hype?

### **Biography**

Fredrik Tillman received the Msc and PhD degrees in Circuit Design from Lund University in 2000 and 2005 respectively. After graduation he joined Ericsson Mobile Platforms and participated in the first cellular modem CMOS radio development before moving on to the research branch of the company. Today Fredrik is heading a department at Ericsson Research with focus on integrated radio circuit design for both cellular infrastructure and device connectivity. Besides being responsible for internal R&D activities, Fredrik is active in the European research community and has been the Ericsson driver for multiple collaboration projects within the Horizon 2020 framework.

## How Advanced Epitaxy is Critical to making the Semiconductors for Next-Gen Mobile Connectivity

R. Pelzel  
CTO  
IQE plc, Dresden, Germany



### Abstract

The epitaxy process is the most critical and demanding step in the RF semiconductor manufacturing chain. In this presentation, we'll discuss the role of advanced epitaxy for RF to 5G and beyond, including higher frequencies up to 300 MHz, and highlight different materials (III-V, silicon, and germanium). We'll look at how IQE sees the market trends and needs, which applications are the most demanding, and how IQE is innovating – for example, how the development of InP epiwafer HBT and HEMT structures has enabled our customers to develop transceiver chipsets with world-class performance. We'll look ahead at how IQE sees its role in the future ecosystem, what are the biggest challenges, and where technology innovation in epitaxy will take us.

### Biography

Dr. Rodney Pelzel has over 20 years of experience in the semiconductor industry, with deep expertise in semiconductor materials engineering and the epitaxial growth of compound semiconductors. Dr. Pelzel joined IQE as a Production Engineer in 2000. For the first twelve years of his career with IQE, Dr. Pelzel held various engineering and operational management roles focusing on scaling leading-edge epitaxial technology for volume manufacturing for wireless applications. In 2012, Dr. Pelzel was appointed as the head of R&D for the IQE Group and was tasked with creating unique materials solutions that enable IQE's customers and provide them with a competitive edge. Throughout his career, Dr. Pelzel has been involved in numerous new product introductions, the most recent being IQE's highly successful launch of 6" VCSELs for consumer applications. Dr. Pelzel is a chemical engineer by training, holding a BS (High Distinction) from the University of Colorado (1995) and a Ph.D. from the University of California, Santa Barbara (2000). He is a Chartered Engineer and a Chartered Scientist, and a Fellow of the Institution of Chemical Engineers. Dr. Pelzel's work has been widely published and he is the co-inventor of 30+ patents.



M. Peeters  
VP of R&D for Connectivity  
imec, Brussels, Belgium



### Biography

Michael Peeters is VP of R&D for Connectivity at imec. His previous experience as CTO for both the Wireline and Wireless business lines at (what is now) Nokia was built on the culture, enthusiasm, and love for technology and science that he got from his time at Bell Labs—and the principles of Free Inquiry bestowed on him by his Alma Mater, the Vrije Universiteit Brussel (VUB).

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and a Fellow of the VUB.

Outside of work, his quest to discover the recipe for a perfect lasagna is balanced by bouts of long-distance running to offset the inherent caloric intake.



## Panelist



V. Ziegler  
Senior Technology Advisor & Chief Architect  
Strategy & Technology  
Nokia, Helsinki, Finland

**NOKIA**

## Abstract

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## Biography

Volker is an energetic leader with 25+ years of broad and international experience in the telecommunications industry. He currently serves as Senior Technology Advisor and Chief Architect in Nokia Strategy and Technology unit. Previously, Volker has exercised a leadership role with Nokia Bell Labs in 6G research and ecosystem and has served as Head of 5G Leadership and Chief Architect of Nokia Mobile Networks. Prior to this, Volker has been active in the Head of Strategy role of Nokia Siemens Networks where he had also served as the Head of the North East Region. In his 10+ year career with Siemens, Volker has held business unit leadership, finance, sales and marketing, services and R&D global roles and senior positions. He has worked as Information Technology Specialist with the World Bank / IFC in the mid-90s. Volker has started his career as a research scientist with German Aerospace Research / DLR. Volker holds a Dr.-Ing. (PhD) degree in Electrical Engineering from Technische Hochschule (TH) Karlsruhe in Germany and is a graduate of the Executive Development Program at Harvard Business School.

## Panelist



M. Alexander  
Partner Advanced Technology Center Industrial  
Platform  
Roland Berger, Brussels, Belgium



## Abstract

Not applicable

## Biography

Dr. Michael Alexander joined Roland Berger in 2014 as a Partner in our Industrial platform. He is an industry expert in the electronics and semiconductor business and founded Roland Berger's Advanced Technology Center. His recent consulting work has centered on strategy, business development and R&D management, with a special focus on electronic component industries. He has carried out successful projects for international electronics, semiconductor, renewables and machinery groups in Europe, Japan, Southeast Asia and the US.

Michael brings more than 15 years of management experience in Europe and Asia to Roland Berger. He holds several Advisory Board seats in the B2B industry and science community. He also spent five years with another large international consultancy.

Prior to his work in industry and consulting, he pursued an academic career at the Max-Planck-Institute of Solid State Research and as a Post-Doc at the Industrial Research Institute (IRI) in Yokohama, Japan. In 1991, he received the "Young Scientist Award" from the Werner-von-Siemens-Ring Foundation. Michael holds a Master's degree in Physics from the University of Munich (LMU) and a PhD from the University of Stuttgart in Semiconductor Physics. Prior to his academic education he also received vocational training in banking.

## Panelist



R. Stuhlfauth  
Technology Manager Wireless  
Rohde & Schwarz, Dresden, Germany



## Abstract

Not applicable

## Biography

Reiner Stuhlfauth is a technology manager wireless from the Test & Measurement Division of Rohde & Schwarz in Munich. Before that he worked as trainer and has more than 20 years experience in teaching and promoting mobile communication technologies in the background of cellular standards and non-cellular technologies. He is involved in several projects concerning 5G, 5G advanced and 6G research activities. Reiner has published several technical documents, webinars and he is one of the authors of the R&S technology book "5G New Radio – fundamentals, procedures, testing aspects". He holds the academic degree of engineer in telecommunications (Dipl.-Ing) issued by the Technical University of Kaiserslautern.

## Panelist



A. Mueller  
Chief Expert and Head of 6G  
Robert Bosch GmbH, Munich, Germany



## Abstract

Coming Soon

## Biography

Dr. Andreas Mueller is Bosch's Chief Expert for Communication Technologies for the IoT and leading the Bosch 6G program. In addition to that, he has been coordinating and driving the Industrial 5G activities of Bosch over the last couple of years. Andreas also serves as General Chair of the "5G Alliance for Connected Industries and Automation" (5G-ACIA), the globally leading initiative for driving and shaping Industrial 5G. He has a strong background in both telecommunications and vertical industry applications and is therefore well-positioned to drive the 5G/6G-enabled transformation in different vertical industries.