Integrated Photonics

G. Kittler
Chief Executive Officer Site Erfurt
X-FAB Semiconductor Foundries GmbH, Erfurt, Germany

Biography
Coming Soon

VCSELs - Development - Production - Market

R. Koerner

Head of global R&D (CTO)
TRUMPF, Ulm, Germany

Abstract
In this presentation TRUMPF will sketch the latest technology of the worlds smallest and most commercialized light source - the VCSEL (vertical cavity surface emitting laser). With an annual volume of more than 2 billion devices, the production technology of III-V semiconductors on 6" has its own challenges and found ways beyond what is known in Silicon. The next generation of VCSEL devices will also require a more advanced production and packageing tool set to fullfill the demands of sensors and datacom applications in the future. If the Silicon-Industry goes 3D is the VCSEL industry ready to follow up this trend ?

Biography
Dr.-Ing. Roman Körner is the head of global R&D (CTO) and responsible for all VCSEL related technology.

Photonic IC Design: Innovation and Scalability

P. Dumon
CTO
Luceda Photonics, Dendermonde, Belgium

Abstract
Photonic integrated circuits are steadily growing in scale from just 5-10 integrated components to hundreds, as well as in number of process steps and materials. Because of the breadth of the application space, numerous material and process platforms serve different submarkets. To increase IC complexit, re-use and addressable markets, heterogenous integration of dies and chiplets of different optical materials is becoming a market reality.There is an equal diversity in the maturity level of the photonic IC technologies.
Device design, compact modeling, circuit analysis, placement and routing and verification all require tools and algorithms specific to the physics as well as application requirements of phtoonic ICs. We will discuss recent technology innovations in photonic design automation technology of photonic ICs to address the above scaling challenges.

Biography
Pieter Dumon is CTO of Luceda Photonics, which he co-founded in 2014 as a spin-off from Ghent University, imec and VUB. He obtained his EE MSc degree in 2002 and a PhD in photonics in 2007 with work on silicon photonic wavelength filters. Pieter coordinated ePIXfab, the first multi project wafer service for photonics from 2007 until 2014, where he extended the collaboration to include more technology providers as well as design and packaging providers. At Luceda Photonics, he is responsible for R&D and leads the PDK team that manages over 30 photonic design kits of more than 20 photonic foundries.

How PICs fit in a Heterogeneous World

F. Scheper
Supervisory Board Member PhotonDelta, Former President & General Manager EMEA Intel Corporation
PhotonDelta, Eindhoven, The Netherlands

Abstract
Photonic Integrated Circuits (PICs) use photons instead of electrons to sense, process and transmit data at unparalleled speed & sensitivity. In combination with electronics, these circuits enable the creation fast and energy-efficient devices, adding new functionalities that push the boundaries of innovation.

A combination of platforms is needed to unlock the full potential of photonic chip technology, as each platform has characteristics that in combination can unlock the desired functionality for new applications. Next to Silicon Photonics, Indium Phosphide and Silicon Nitride are gaining in popularity as Indium Phosphide (III/V) can integrate active components such as lasers, amplifiers and detectors on the wafer and Silicon Nitride can process visible light with very low losses.

To unlock the full potential of integrated photonics, the platforms need to work together. However, blending these different elements onto a chip can be challenging when producing in high volume. With strong support from the government and industry, PhotonDelta is looking for international collaboration to achieve the ambitions depicted in the National Growth Fund Programme – a €1,1 billion programme to accelerate the PIC industry.

This presentation will give an overview of the latest trends & developments and provide insights into the future of the European ecosystem for integrated photonics. It also points out the challenges and calls for collaboration with the semiconductor community to reach high volume production of photonic chip technology, creating new applications, opening the door to new markets.

Biography
Frans Scheper is a Member of the Supervisory Board of PhotonDelta, a growth accelerator for the photonic chip industry based in the Netherlands. Prior to joining PhotonDelta, Frans was Corporate Vice President and President for Europe, Middle East, and Africa (EMEA) for Intel Corporation. He was responsible for Intel's overall business in EMEA and also in charge of overseeing Intel's IDM 2.0 strategy across Europe, with research, design, leading-edge semiconductor manufacturing.
Prior to Intel, Frans was Chairman and Executive Vice President of Opto Semiconductors at ams OSRAM, and has also held executive board positions at WeEn Semiconductors, NXP Semiconductors, and was the CEO and President at Nexperia Semiconductors.

Germanium Substrates for Photonics: GaAs Replacement Advantages and New Production Possibilities through CMOS Integration

I. Zyulkov
Business Development Manager
Umicore, Electro-Optic Materials, Olen, Belgium

Abstract
Fast growth of consumer and automotive markets drives developments of new photonic devices such as micro-LEDs, multi-junction VCSELs and imagers both in the NIR and SWIR spectrum. While most of the photonics devices produced today are manufactured using GaAs substrates as a platform, there are more and more developments showing advantages of using Germanium (Ge) over GaAs. In this presentation we are focusing on technical advantages of using Ge, explain nuances of epitaxial growth on Ge substrates such as auto-doping effects and anti-phase domains and how to avoid them. In addition, we are going to discuss in more details the environmental and financial benefits of performing Ge substrate recycling for volume applications.
Another aspect of photonics device manufacturing is processing of epitaxially-grown wafers into functional devices. While most of the photonics devices are manufactured by traditional III-V IDMs and foundries, cutting edge photonic chips could be made in close collaboration between III-V companies and Silicon semiconductor / CMOS players in order to improve a form-factor, device performance and to drive down production costs. This possibility is currently limited by GaAs wafer size and CMOS fab contamination requirements. Umicore works on 8'' and 12'' Ge substrates that can serve as a bridge between III-V world and Semiconductor industry due to the size and Germanium material compatibility with CMOS specs. In this presentation we are going to present our roadmap to CMOS compatible Ge wafer development.

Biography
Ivan currently serves as a Business Development Manager at Umicore, where his focus lies in Germanium-based materials for the photonics market. He specializes in Vertical-Cavity Surface-Emitting Lasers (VCSELs), Light Detection and Ranging (LiDARs), and Augmented Reality/Virtual Reality (AR/VR) technologies.
Before joining Umicore, Ivan gained substantial experience in the field of microelectronics, having worked at multiple companies including ASM International and IMEC.
Ivan holds a PhD in Chemistry from KU Leuven in Belgium. His research, undertaken at IMEC, revolved around exploring various techniques for metal deposition in microelectronics.

PhotonixFAB – The EU-funded Pilot Line to Empower Photonics Innovations

J. Mellin
BL manager photonics
XFAB AG, Erfurt, Germany

Abstract
photonixFAB project aims to empower photonics innovation by SMEs and large entities by providing low barrier access to both low-loss silicon nitride (SiN) and silicon-oninsulator (SOI) based photonics platforms with indium phosphide (InP) and lithium niobate (LNO) heterogenous integration capabilities. Project objective is to establish a European photonics device value chain and initial industrial manufacturing capabilities. Thus, providing a path to scalable high-volume manufacturing for innovative product developers. This will strengthen the continent's manufacturing capabilities in key emerging areas.

Biography
Joni Mellin has acted as Photonics product marketing / business line manager at X-Fab since 2022. He joined X-FAB from ams OSRAM, where he held Engineering director and other positions in the Full Service Foundry division since 2014. Prior to that, he held managerial and R&D positions at Microsoft, Nokia, Micro Analog Systems and VTI technologies. Joni Mellin helds Licentiate of Science and Master of Science degrees in semiconductor technology from the Aalto University and a dual Global Executive MBA degree from WU Vienna and University of Minnesota