III-V Summit

BTO-enhanced Silicon Photonics for Next-Generation Optical Transceivers

F. Mohn
Reliability and Packaging Lead
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Abstract
As global data traffic continues to surge, the demand for faster, more energy-efficient, and scalable optical communication systems is driving the need for innovation in photonic integration. Traditional silicon photonics, while mature, faces limitations in speed, power consumption, and footprint.
Lumiphase addresses these challenges by developing and manufacturing photonic integrated circuits based on a proprietary barium titanate (BTO) technology. This technology uses the Pockels effect and enables true electro-optic modulation, offering significant advantages over conventional silicon-based solutions.
In this presentation, we will introduce our BTO-based photonic integration technology, highlight its advantages for optical data communication, and discuss key challenges and ongoing developments in bringing this technology to scale.

Biography
Fabian Mohn is a Staff Engineer and team lead of the Reliability & Packaging team at Lumiphase. The team is responsible for wafer-to-chip singulation processes, the design and assembly of test vehicles for chip-level performance and reliability evaluation, and the development and execution of accelerated reliability and robustness qualification protocols for Lumiphase's BTO-based silicon photonics devices.
Fabian holds a PhD in Physics, which he earned in 2012 while working at IBM Research – Zurich. Before joining Lumiphase in 2022, he worked on the development of silicon and silicon carbide power semiconductor modules, gaining extensive experience in packaging and reliability engineering.

References

Silicon Carbide in AC Motor Drives

J. Puukko
Senior Field Application Engineer
Semikron Danfoss, Helsinki, Finland

Abstract
With recent technological advancements, silicon carbide is becoming the first choice for enabling energy savings and increasing power density. However, motor drives and silicon carbide MOSFETS are two topics that seemed impossible to combine: high costs, fast switching transitions, lack of short circuit capability, and reliability concerns were all persistent roadblocks, preventing a tangible return on investment. But it is time to rethink. By merging state of the art packaging technology with the latest generation of SiC MOSFETs, we provide a totally new degree of design freedom to motor drive design engineers.

Biography
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References

Strategic advances in III-V RF Technologies for energy-efficient 5G infrastructure

G. U'Ren
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United Monolithic Semiconductors (UMS),
Villebon-sur-Yvette, France

Abstract

III-V semiconductor technologies, including GaAs and GaN/SiC, are at the core an effort lead by UMS to strengthen European sovereignty in advanced rf components for terrestrial and non-terrestrial 5G due to their unrivaled performance in high-frequency, high-power, and high-linearity applications. This talk will highlight the strategic role of III-V technologies in enabling energy-efficient RF front-ends and system-in-package (SiP) solutions, addressing the growing demands of 5G and SATCOM networks. By combining advancements in MIMC device technology, innovative device architectures, and heterogeneous integration, the ambition is to realize a 40% reduction in power consumption across the full radio link. Efficiency gains in the network reduce operating costs from the combination of reduced energy consumption and reduced thermal management.

Biography

Dr. Gregory U'Ren is presently with United Monolithic Semiconductors (UMS) leading strategic innovation initiatives. 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. He is a senior member of IEEE, presently also serving on the advisory board at the Fraunhofer Institute for Applied Solid State Physics, a member of American Physics Society, and holds over 30 patents. He completed his Ph.D. and MS at the University of California Los Angeles.

References

JePPIX: The joint European platform for photonic integrated components and circuits

K. Williams
Professor
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Abstract
Integrated photonics offers us the way to a faster, more precise and more energy efficient future. The sustained growth of the internet is already critically dependent on photonic integrated circuits. Photonic integrated circuits (PICs) are now emerging in industry labs for imaging and metrology with precision, size, and they are showing efficiencies which can be orders of magnitude beyond non-integrated technologies. Supply chains are now aligning to support product developments across many market sectors.

JePPIX - the Joint European Platform for Photonic Integrated Components and Circuits - is a vibrant community of foundries, software vendors, testing experts, packaging companies, technology innovators, equipment suppliers and PIC-enabled module developers. Together they play a key role in defining the road to commercialization in new and emerging sectors. JePPIX is a pioneer of the open-access foundry model for integrated photonics - specifically indium phosphide but also heterogeneous approaches - enabling the end-user to drive product development. Companies and researchers have already been prototyping using commercial JePPIX services for more than a decade. Product developers are focussing on metrics critical to quality, reproducibility, reliability and the seamless interconnection of accelerated design-fab-test cycles which are required to prepare a design for production.

Going forwards, strategies are being developed to accelerate design through the delivery of manufacturing excellence within sustainable commercial value chains. The telecommunications sector has already shown how premium PIC technology can be delivered. The next wave of product innovation is more diverse in terms of platforms, components, and circuits. Foundry manufacturing offers a compelling route to accelerated deployment of products across multiple sectors. We will elaborate the future challenges and perspectives for research and innovation for PIC technologies.

Biography
Kevin Williams is full professor and chair of the Photonic Integration research group at Eindhoven University of Technology (TU/e). He has extensive experience in the design, fabrication and measurement of InP based photonic devices and integrated circuits, including semiconductor lasers, amplifiers, high speed modulators and photonic switches. Kevin was coordinator for the EC JePPIX Pilot Line which matured the full supply chain from software, design, production and test for foundry based PIC manufacturing. The team has played a key role in establishing the Photonic Integration Technology Centre and plays an active role in the Chips JU PIXEurope project.

References