MEMS & Imaging Sensors Summit

When the physical world meets AI: ST intelligent sensing at the core

L. Trollo
Marketing and Communication manager, MEMS Sensors Subgroup
STMicroelectronics, Agrate Brianza, Italy

Abstract
The next wave of AI is not confined to the cloud or the screen — it is becoming physical, embedded in the objects, machines and environments that surround us. This is where **ST's intelligent sensing** sits at the core, transforming raw signals from the real world into actionable insights in real time.
Sensors enable a new class of **physical AI** applications: from predictive maintenance and smart mobility to robotics, industrial automation, and consumer devices that understand context and intention. Combining high-performance, low-power sensing with on-device AI and secure connectivity allows customers to move from data collection to local decision-making at the edge.

Biography
After joining ST in 2012, Lisa contributed to several success stories in consumer, automotive and industrial markets, such as the massive Inertial Measurement Unit (IMU) product deployment in the smartphone industry. Always working to help developers find the best solution for their applications, Lisa is currently in charge of our MEMS Ecosystem as well as Marketing Communication where she plays a key role in defining ST's Artificial Intelligence strategy for MEMS and sensors.

Lisa graduated with a Master's degree in Telecommunication Engineering in 2006 from The University of Trento, Italy.

References

Breaking the Volume Barrier in Mid-IR Photonics: From Specialized Sensors to Scalable Semiconductor Integration

A. Piotrowski
CEO
VIGO Photonics S.A., Ożarów Mazowiecki, Poland

Abstract
The Mid-Infrared (Mid-IR, 2–20 μm) spectral range holds immense promise for high-precision gas sensing, semiconductor metrology, environmental monitoring, and industrial IoT due to the distinct molecular "fingerprint" absorption bands located in this region. Despite its transformative potential, widespread commercial adoption of Mid-IR photonic devices has historically been constrained by fundamental industry barriers: high manufacturing costs, complex III-V and II-VI compound material engineering, the need for bulky cryogenic cooling, and a lack of standardized Photonic Integrated Circuit (PIC) platforms and micro-optical packaging.
This presentation outlines the key technological and manufacturing breakthroughs required to scale Mid-IR photonics from niche, high-cost applications to high-volume semiconductor manufacturing. We explore advances in High Operating Temperature (HOT) detector architectures, plasmonic-enhanced absorbers, and wafer-level epitaxy (MBE/MOCVD) transition to 4-inch and 6-inch fabrication lines. Furthermore, we address strategies for heterogeneous integration with CMOS platforms and scalable packaging methods aimed at reducing Size, Weight, and Power (SWaP). By bridging the gap between complex compound optoelectronics and mainstream semiconductor manufacturing workflows.

Biography
A graduate of Warsaw University of Technology in 2002 with a master's degree in electronics engineering. Holder of a Ph.D. degree in technical sciences obtained at the Military University of Technology in 2008. Since 2002, Adam Piotrowski has been working at VIGO Photonics S.A., introducing novel semiconductor production technologies to the company and managing its production. Since 2015, he has been acting as the President of the Board of VIGO Photonics S.A. and the President of the Polish Technological Platform on Photonics, being an Employer Association.
Since 2017, he has been a member of the Board of Stakeholders of the Photonics21 Partnership, taking an active participation in the European technological development of photonics and microelectronics.
He is the author of many publications on the methods of manufacture and application of the infrared detectors. He is responsible for the application development of novel sensor systems, especially laser-based, affordable gas detectors and analyzers. He took part in multiple national, European and pure industrial projects.

References

Opening Remarks by Session Chair

P. D. Berger
MEMS Business Development Manager
CEA-Leti, Grenoble, France

Abstract
Coming Soon

Biography
Coming Soon

References

Chip-scale, Software-Defined Spectral Intelligence

A. C. Liapis
CTO
Agate Sensors, Espoo, Finland

Abstract
Coming Soon

Biography
Coming Soon

References

Boosting MEMS through technological development: from improved transduction to optomechanics

M. Sansa
Project Manager in Optomechanics
CEA, Leti, Grenoble, France

Abstract
Electrical microsensors (MEMS) have been gaining maturity and performance over the last 40 years, and they are nowadays ubiquitous in our everyday life. Recently, the integration of MEMS with silicon photonics gave birth to optomechanical MEMS (optically transduced microsensors), enabling a jump in performance in terms of readout sensitivity and frequency of operation. This combination opens the door to new sensing paradigms across various fields, and is rapidly maturing in terms of integration.

In this talk I will present the advantages of optomechanics for high-efficiency sensing, and showcase how CEA-Leti's developments have enabled novel applications in fields such as biosensing, environmental and biological monitoring, high-speed atomic-force microscopy (AFM) and precision timing with clocks.

Biography
Marc Sansa received his M.Sc. in Micro and Nanotechnologies from the Universitat Autònoma de Barcelona in 2009 and his Ph.D. in Electronic Engineering from the same institution in 2013. He joined CEA-LETI in 2014 as a research engineer and currently serves as a project manager at the Sensors and Actuators Laboratory. He is an expert in microelectromechanical systems (MEMS) and optomechanics, he has authored over 65 publications and holds more than 18 patents. His research focuses on developing novel MEMS technologies by leveraging multiphysical approaches and collaborative efforts among multidisciplinary teams and experts from diverse fields.

References

Organic Image Sensors for Smart Rings and Medical Devices

J. Joimel
CEO
VSTech Sensors, Grenoble, France

Abstract
Wearable health monitoring and SWIR-based imaging share a common bottleneck: today's photoplethysmography (PPG) and image sensors are built on rigid silicon or III-V substrates that constrain form factor, cost, and spectral coverage. This talk presents organic photodiode (OPD) technology as a route past that bottleneck and shows how a single thin-film sensor platform is being developed across two applications — a flexible PPG sensor for smart rings, and a low-cost SWIR camera originally developed for drone vision that also opens a path toward SWIR fluorescence imaging in medical devices.

Technology
Organic photodiodes rely on a solution-processed, coatable active layer — a blended donor/acceptor bulk heterojunction sandwiched between hole- and electron-transport layers, an anode and a cathode, and a barrier encapsulation. This active layer can be deposited directly onto thin-film-transistor (TFT) backplanes on glass or polyimide, or onto CMOS read-out circuits, using standard coating equipment already used in the display and semiconductor industries. Because the photoactive stack is only a few hundred nanometers thick, the resulting sensor is sub-millimeter and mechanically flexible down to single-digit-millimeter bend radii. By tuning the absorber chemistry across three organic formulations, the same architecture covers the visible (380–700 nm), near-infrared (700–900 nm) and short-wave infrared (900–2500 nm, SWIR) bands without changing the backplane or camera design. VSTech holds an IP portfolio of 75 patents across 33 families covering the photoactive materials, device architecture and integration processes.

Application 1 — Smart rings
Continuous PPG monitoring inside a ring is limited by available surface area and by the rigidity of conventional silicon-photodiode-plus-LED packages, which push most rings on the market today toward an 8 mm width. VSTech's OPD sensor strip integrates three photodiode channels (4.75 mm² each) tuned to green, red and near-infrared wavelengths (530/660/940 nm) alongside an embedded LED, on a single flexible substrate only 3.3 mm wide and conformable down to a 6 mm bend radius. The multi-channel, multi-wavelength architecture is designed to improve measurement robustness, while the flexible thin-film substrate follows the ring's curvature without the mechanical stack-up of rigid dies. This sensor has been introduced as a demonstration of how organic photodiodes can reduce ring width while keeping three independent PPG channels.

Application 2 — SWIR camera: from drone vision to fluorescence imaging
The same coatable active layer, tuned into the SWIR band (1100–1500 nm), is being developed for a low-cost, cooling-free camera for drones, where SWIR vision improves usability in fog, rain and low-visibility conditions but has so far been limited by the cost of InGaAs sensors (commonly above $10k per unit). By replacing the InGaAs detector with an OPD active layer coated onto a CMOS read-out circuit, the same pixel architecture can be produced at a fraction of the cost per unit area, at the expense of some performance relative to cooled InGaAs — a trade-off acceptable for single-mission or high-volume deployment.
This drone-vision camera architecture is directly relevant to a second, medical use case: SWIR fluorescence imaging. Fluorescence agents such as indocyanine green (ICG) emit into the SWIR/NIR-II window (roughly 1000–1300 nm), where reduced tissue scattering and autofluorescence give sharper contrast and deeper penetration than the NIR-I (700–900 nm) window used by most current fluorescence-guided surgery cameras. A low-cost, uncooled SWIR sensor built on the same OPD-on-CMOS architecture developed for drone vision could lower the barrier to adopting SWIR fluorescence imaging in surgical and diagnostic instruments, an application VSTech is now exploring as an extension of its drone camera work.

Manufacturing and scale-up
Both applications rely on the same manufacturing logic: OPD active layers are applied by standard coating processes compatible with existing TFT and CMOS supply chains, allowing the same core sensor architecture to move from pilot-line production toward higher-volume manufacturing without requalifying the underlying device stack for each substrate or application.

What attendees will take away
This talk will cover the device physics and layer stack that give OPDs their spectral tunability, the design choices behind the smart ring and drone-vision SWIR camera described above, and the technical rationale for extending the same SWIR sensor toward fluorescence imaging applications.

Biography
Jerome Joimel is CEO and co-founder of VSTech Sensors, a French deep-tech company developing organic photodiode (OPD) sensors for smart rings, medical imaging, and low-cost SWIR cameras. He has spent more than 20 years in high-tech industries, taking technology from lab to pilot line to mass production and building international technical and operational teams.
Before co-founding VSTech in 2024, Jerome spent a decade at Isorg, the pioneer of OPD-based image sensors, where he held four successive roles: R&D Process Manager, Chief Technology Officer, VP Strategic Partnerships, and Chief Operating Officer. He built Isorg's OPD process and IP strategy from the ground up, co-authored seven patents on OPD processes and applications, led its Series C fundraising with two major Japanese investors, set up its China business development office in Shenzhen, and directed production and quality through the launch of the first OPD-based wearable sensor.
Earlier in his career, Jerome led development of the first fully flexible OTFT/OPD photodetector at Plastic Logic (Cambridge, UK) and worked on the technology transfer from its pilot line to mass production in Dresden, Germany. He began his career at Hewlett Packard's Printed Electronics Group in Ireland, working on thin-film testing and characterization on plastic substrates.
Jerome holds an Engineering degree (Master's level) in Electronics and Industrial Computing, from IFITEP / Université Pierre et Marie Curie – Paris 6. He has spoken at CES, SID Display Week, SEMI FLEX, LOPE-C, IDTechEx and other leading industry events.

References

Ultra miniaturized rechargeable solid-state micro battery technology for new generation of implantable medical devices

P. Andreucci
Chief Executive Officer
Injectpower, Moirans, France

Abstract

Powering the Future of Digital Health: Ultra-Miniaturized All-Solid-State Microbatteries for Next-Generation Implantable Medical Devices

The rise of digital health and personalized medicine has fueled an unprecedented demand for autonomous, smart implantable medical devices (IMDs). Monitoring and treating chronic pathologies—such as glaucoma in ophthalmology, intracranial pressure in neurosurgery, or arrhythmia in cardiology—require continuous, highly reliable physiological data tracking. However, traditional battery technologies represent a critical bottleneck, as their size, rigid form factors, and chemical leakage risks severely limit the miniaturization and safety of long-term implants.

This paper introduces INJECTPOWER's breakthrough energy solutions based on wireless rechargeable, all-solid-state microbatteries tailored specifically for high-density, ultra-miniaturized IMDs. Leveraging over 20 years of foundational R&D at CEA-Leti and protected by a robust portfolio of more than 40 patents, these microbatteries achieve dimensions as thin as a human hair while delivering unrivaled volumetric energy density and hermetic safety.

By eliminating liquid electrolytes, this all-solid-state chemistry eliminates the risk of toxic leakage, ensuring high biocompatibility and excellent thermal stability during wireless charging cycles (such as RF or inductive powering). This technology enables a new paradigm of completely autonomous, micro-scaled implants capable of providing continuous, representative medical data over years of implantation.

We will present the electrochemical performance, cycling stability, and integration architecture of these microbatteries. Finally, we will discuss the scaling-up strategy and industrial roadmap within the framework of the European IPCEI Health (Tech4Cure) program, leading toward a first certified commercial product on the market by 2029.

Biography

Philippe Andreucci

Co-founder & CEO of INJECTPOWER | Deep Tech Entrepreneur & Board Member

Biography

Philippe Andreucci is a seasoned deep-tech entrepreneur and executive leader with over 25 years of experience driving breakthrough innovations from laboratory research to global markets. Throughout his career, he has successfully operated at the intersection of micro-technologies, nanosystems, and life sciences, combining strong technical expertise with a proven track record in fundraising, corporate governance, and international business development.

Philippe began his leadership journey at **CEA-Leti**, a world-renowned microelectronics research institute, where he served as **Head of Nanosystems Programs**. During this tenure, he co-founded the **Alliance for Nanosystems VLSI**—a prestigious, multi-year international research collaboration between the **CEA** and the **California Institute of Technology (Caltech)**, established alongside **Professor Michael Roukes**.

Driven by an entrepreneurial vision, Philippe transitioned from institutional leadership to venture creation. He co-founded and led **APIX Analytics**, a company specializing in miniaturized gas chromatography systems for industrial and environmental applications. Under his leadership as CEO, APIX successfully industrialized its technology, raised significant venture capital and additional fundings, and established a strong international footprint.

Following this success, Philippe co-founded **INJECTPOWER** in 2020, a pioneering deep-tech company disrupting the implantable medical device sector. The company manufactures ultra-miniaturized, wireless rechargeable all-solid-state microbatteries that provide autonomy to a new generation of monitoring and treatment solutions for chronic diseases (such as glaucoma, cardiovascular, and neurological disorders). Under his guidance, INJECTPOWER secured a strategic position within the prestigious **European IPCEI Health (Tech4Cure)** program, established key commercial partnerships in the US, and is currently on track for its first product certification by 2029.

An active figure in the tech ecosystem, Philippe serves as a **Board Member for several high-growth startups**, where he provides strategic counsel on corporate scaling, venture financing, and intellectual property management.

Core Expertise

Deep Tech Entrepreneurship & Leadership: Proven ability to build, fund, and scale companies with highly complex, hardware-and-software integrated technologies.

International Ecosystem Building: Established track record of forging high-level academic and industrial alliances between Europe and the United States (e.g., Caltech, US clinical partners).

Venture Capital & Corporate Finance: Expert in structuring mixed financing strategies, combining multi-million dollar equity rounds (VC) with non-dilutive sovereign funding (IPCEI, state grants).

Governance & Advisory: Experienced board member guiding early-stage and scaling startups through critical pivots, IP valorization, and growth phases.

Vision Statement: *"Miniaturized, reliable energy is the true gateway to tomorrow's digital health. By giving implantable devices the power to monitor chronic conditions autonomously, we are shifting medicine from reactive treatments to proactive, life-saving data intelligence."*

References

Dynamically tunable metamaterials on CMOS: an optical tensorcore for AI inference

A. Traverso
Chief Scientist
Neurophos Inc., Austin, United States of America

Abstract

The computational cost of large-language-model inference is dominated by matrix multiplication, and in digital hardware every one of the N^2 multiply-accumulates in a matrix-vector product pays for both the arithmetic and the delivery of its operands. Optical vector-matrix multiplication changes that scaling: the multiply-accumulates occur passively in free space, and energy is spent only on modulating N inputs and digitizing N outputs, so cost per operation falls as 1/N. First demonstrated by Joseph Goodman in 1978, the approach never saw widespread adoption: digital CMOS scaled too quickly to compete with, few applications tolerated low-bit precision, and no modulator array existed that could hold a large matrix and update it quickly. Now, with production models moving to 4-bit precision and the maturation of high-speed telecom photonics, there is an opportunity for a step change in computational capability for AI inference. The last key enabling technology is Neurophos's dense metasurface modulator array with millions of fast, individually tunable pixels. This device, fabricated in a CMOS back-end process on active-matrix drive silicon, provides the dense compute platform for highly parallelized throughput in optical vector-matrix multiplication. When combined with telecom data rates for vector input and readout, it is capable of achieving upwards of 100 POPS of dense 4-bit compute with efficiencies up to 100 TOPS/W, an order of magnitude beyond current GPUs.

Biography

Coming Soon

References

Opening Remarks by Session Chair

H. Holmberg
R&D Director
Okmetic, Helsinki, Finland

OKMETIC

Abstract
Coming Soon

Biography
Coming Soon

References

Innovation in MEMS-industry, where do we come from and where are we going

T. Vilenius
Senior Manager, Business Development
Automotive
Murata Electronics Oy, Vantaa, Finland

Abstract
Small reflexion on how has innovation in MEMS business changed over the past 30 years. Starting from innovating how to realize a function on silicon, then how to make it for less than $100 and miniaturizing the sensors to fit inside a smartphone.
What is MEMS innovation today and how we need to innovate in future to create value for the whole supply chain & industry.

Biography
Tommi Vilenius has been working in Automotive MEMS business for 30 years in various roles from R&D, Quality, Testing and Customer interface. Currently Mr Vilenius is focusing on new automotive applications for inertial MEMS and fitting together physical MEMS devices to ever improving capabilities of data processing & AI.

References

NEMS-Based Inertial Sensors: Enabling Navigation-Grade Performance for High-Volume Autonomous Applications

P. Robert
CEO
INGAGE, Grenoble, France

Abstract

Reliable navigation remains a critical challenge for autonomous systems operating in environments where GNSS signals are unavailable or degraded. From autonomous vehicles and drones to industrial robots, accurate positioning requires inertial sensors capable of maintaining navigation performance during extended GNSS outages.

While MEMS inertial sensors have become ubiquitous thanks to their compact size, low power consumption and low manufacturing cost, their performance remains insufficient for many navigation-grade applications. Conversely, existing high-end inertial solutions deliver the required accuracy but are often too bulky and expensive for deployment in high-volume markets.

This presentation introduces a new generation of MEMS inertial sensors based on ultra-sensitive nano-strain-gauge transduction technology. Developed over more than 15 years of research at CEA-Leti and protected by an extensive patent portfolio, this breakthrough sensing approach significantly enhances the detection of mechanical motion and enables performance levels beyond the limits of conventional capacitive MEMS technologies.

The talk will present the fundamental principles of nano-strain-gauge sensing, its integration into MEMS accelerometers and gyroscopes, and the expected benefits in terms of bias stability, noise performance, scale-factor stability and overall inertial navigation accuracy. Particular attention will be given to the challenges associated with transferring advanced laboratory technology into a manufacturable industrial solution compatible with high-volume semiconductor processes.

The presentation will also provide an overview of the technology industrialization roadmap pursued by iNGage, a fabless Deeptech company founded in 2025 to bring this innovation to market. By combining navigation-grade performance with MEMS scalability, nano-strain-gauge inertial sensors have the potential to unlock a new generation of cost-effective navigation systems for autonomous mobility, robotics and other demanding positioning applications.

Biography

Philippe Robert is CEO and co-founder of iNGage, a deeptech startup developing a new generation of high-performance MEMS sensors. He holds a PhD in Microtechnologies and began his career at the startup SILMAG, developing advanced magnetic sensor technologies for data storage, before joining THALES to work on high-end MEMS inertial sensors for aerospace and defense applications.

He joined CEA-Leti in 2001, where he held successive leadership roles, including Head of the MEMS Sensors Laboratory and Head of the Microsystems Department (120+ people), before leading Business Development for Microsystems.

In 2025, he founded iNGage as CEO & CTO, leading corporate strategy, fundraising, and execution.

He has authored over 50 scientific publications and holds more than 60 patents, including more than 20 related to the M&NEMS architecture at the core of iNGage's innovation.

Philippe also contributes to the international MEMS community through expert evaluations (HCERES, EIC) and leadership roles in major conferences such as IEEE MEMS, IEEE Transducers, and Eurosensors.

References

Advanced Packaging: From Sensor Die to Physical AI

C. Zinck
Director of Technical Program Management
ASE, Berlin, Germany

Abstract
Physical AI begins with sensing, but a sensor die is not yet a sensor. Unlike logic, a sensor package must let the outside world in while protecting the die. It has to isolate inertial sensors from stress, open a controlled path to the environment, and give LiDAR and optical sensors a clean light path, all at high volume.

During his talk, Dr. Christophe Zinck will take an OSAT's view of how advanced packaging makes sensor manufacturing scalable. It covers low-stress cavity architectures, open-cavity molding, optical and wafer-level optics integration, and heterogeneous integration for LiDAR and silicon photonics, with qualification up to automotive Grade 0.

Biography
Dr. Christophe Zinck is Director of Technical Program Management at ASE Europe. He leads technology teams developing advanced assembly processes for high-performance digital, power, RF, and MEMS and sensor devices.

Christophe has more than 20 years of experience in semiconductors. He began his career in Grenoble, France, at CEA-Leti and STMicroelectronics, where he specialized in lithography process development. He then moved to TriQuint Semiconductor in the United States to drive advanced packaging innovation for RF devices. After returning to France, he worked at Yole Développement and later managed silicon sourcing at Soitec.

He has co-authored more than 50 publications, holds several U.S. patents, and speaks regularly at international industry conferences. He holds a Ph.D. from INSA Lyon (Institut National des Sciences Appliquées).

References

Single Photon Avalanche Diode (SPAD) technology: from the lab to the industry

A. Carimatto
Head of IC Design
Pi Imaging Technology - a ZEISS company,
Lausanne, Switzerland

Abstract

Our work traces the chronological evolution of single-photon avalanche diode (SPAD) technology from laboratory research to industrially available sensor platforms. We begin with individual SPAD devices, followed by SPADs integrated with time-to-digital converters (TDCs), then progressively larger SPAD arrays with integrated timing capabilities, and finally 3D-integrated architectures. Advances in device design, semiconductor processing, pixel architecture, system integration, and microlens technology have progressively improved performance, sensitivity, and scalability. We also highlight technology demonstrations in demanding time-resolved applications, including LiDAR and positron emission tomography (PET), illustrating the path toward high-sensitivity imaging systems.

The presentation covers three main SPAD sensor product lines: point sensors, linear sensors, and image sensors based on front-side illuminated (FSI) technology. These platforms address different application requirements while leveraging the sensitivity, timing performance, and scalability of SPAD technology.

For point-sensor applications, we will present a reconfigurable 17 × 9 microlensed SPAD array optimized for red wavelengths and designed for microscopy and fluorescence lifetime imaging microscopy (FLIM). The readout provides direct access to 95 SPADs in either a 9 × 9 square or a 9 × 17 rhomboid configuration; the latter incorporates shifted SPAD groups to support multi-wavelength super-resolution microscopy. A skew-free gating module enables FLIM without dedicated time-tagging hardware, using external clock phases to achieve programmable gate widths down to 150 ps with balanced 100 ps rising and falling edges. The sensor delivers 50% photon-detection efficiency at 650 nm, 120 ps timing jitter, a 10 kcps dark-count rate, and count-rate capability up to 10 Gcounts/s.

For linear-sensor applications, we will present a 512 × 12-pixel SPAD array combining high-speed photon counting with time-resolved detection. The sensor is organized into 32 × 6-pixel clusters, each incorporating a dedicated timing line, while a flexible masking architecture determines which pixels contribute to timing information. In counting mode, the array supports either per-pixel readout or column-wise total-count readout, enabling efficient operation as a linear detector at frame rates of up to 2 million frames per second.

For image-sensor applications, we will present a 1024 × 1024 RGB SPAD camera based on FSI technology, designed for FLIM, high-speed imaging, and low-light applications. The sensor combines an RGGB color-filter array with microlenses that increase pixel fill factor by up to four times compared with pixels without microlenses, enabling full-resolution color imaging with improved sensitivity. Its flexible readout architecture supports asynchronous and concurrent photon detection and data readout, configurable regions and resolutions, and data transfer at 1.2 Gbit/s per lane. This enables up to 100,000 full-resolution 1-bit frames per second and more than 1 million frames per second at reduced resolution. Precise time-domain imaging is enabled through a global gating mechanism with external synchronization, a minimum gate width of 7 ns, and rising and falling edges as fast as 150 ps. Programmable gating, low-skew signal distribution, a dedicated start input for synchronization with lasers and external triggers, and selective power-management modes support demanding scientific and industrial measurement setups.

Biography

Dr. Augusto José Carimatto is Head of the IC Department at Pi Imaging Technology. He holds a degree in Electronics Engineering from the National Technological University (UTN) in Buenos Aires, Argentina, an M.Sc. from the University of Troyes, France, and a Ph.D. from Delft University of Technology (TU Delft), The Netherlands, where he specialized in single-photon avalanche diode (SPAD) sensors and ASIC design. With more than 15 years of experience in microelectronics, he develops advanced integrated circuits for demanding scientific and industrial imaging applications.

His work spans positron emission tomography (PET), LiDAR, high-speed imaging, artificial intelligence, robotics, and machine-learning techniques. During his doctoral research and subsequent work, Dr. Carimatto contributed to the development of SPAD image-sensor architectures for LiDAR, PET, and high-speed imaging, encompassing sensor and pixel design, neural-network-based processing, high-performance bus

and memory architectures, specialized image-sensor processors, and custom back-end compilers. At Pi Imaging Technology, he leads IC development for scalable, time-resolved SPAD sensor platforms. The company's SPAD Alpha camera received the **2025 Innovation Award at LASER World of PHOTONICS**, recognizing its single-photon imaging capabilities. In 2026, he was selected for the **Photonics100**, recognizing his contribution to the design and development of SPAD image-sensor technology.

References

Design and Manufacturing by NIL of a Meta-Optics Camera

B. Kamino
Manager Business Development and Strategy
NIL Technology, Horgen, Switzerland

Abstract

Meta-optics are emerging as a powerful technology platform for next-generation imaging and sensing systems, enabling optical performance and form factors that are difficult to achieve with conventional refractive optics. By controlling light through engineered nanoscale structures, meta-optics offer new opportunities for applications such as augmented reality, eye tracking, machine vision, and advanced optical sensing. However, translating these high-performance designs into scalable, manufacturable products still remains an open challenge.

This presentation will describe how NIL Technology (NILT) addresses this challenge through meta-optics lens architectures and a manufacturing platform built for industrial-scale production. As a dedicated meta-optics foundry, NILT provides a complete pathway from prototyping to high-volume manufacturing, supported by vertically integrated capabilities including electron beam lithography, nanoimprint lithography, etch processing, metrology, testing, and optical integration.

The presentation will examine the relationship between design, manufacturing, and optical performance, demonstrating how mature design-for-manufacturing methodologies enable close agreement between simulation, prototype results, and volume production. NILT's nanoimprint-based manufacturing approach is critical to achieving state-of-the-art performance in scalable meta-optics products. Using this unique manufacturing process, NILT has demonstrated excellent process stability, wafer-to-wafer reproducibility, and scalability to production volumes in the millions of units.

A case study of the commercially available metaEye™ ultra-compact eye-tracking camera will highlight how meta-optics can reduce system size, improve thermal stability, simplify optical assemblies, and deliver robust imaging performance in demanding real-world environments.

Finally, the presentation will outline NILT's foundry model for commercializing meta-optics. NILT's mature and proven design rules for meta-optical elements ensure predictable optical performance from initial design through prototyping to high-volume production. Adding to this are NILT’s open-access module architectures, which enable customers to build custom meta-optic modules based on proven designs. Whether customers bring their own designs, want to customize module solutions based on NILT’s architectures, or seek a complete custom solution, NILT provides the infrastructure and manufacturing expertise required to take meta-optical products from concept to volume production.

Biography

Brett Kamino is Manager, Business Development and Strategy at NILT, where he works on commercializing meta-optics technology. Brett has a background in thin-film semiconductors, next-generation solar cells, and nanophotonics, and has spent his career working across both the technical and commercial sides of emerging technology, first developing the underlying technology and now focusing on the business strategy, partnerships, and market positioning needed to bring it from the lab to commercial products.

References

Latest developments in MVD® Anti-Stiction Coatings for MEMS Manufacturing

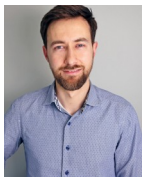
P. Hammond
Senior Director & General Manager Release Etch Division
KLA, Wales, United Kingdom

Abstract
Coming Soon

Biography
Paul Hammond has been Sr Director and GM of the Release Etch Division since 2005, with responsibility for the etch release (Primaxx HF & XACTIX XeF_2) and MVD product lines. Prior to the acquisition of Primaxx in 2005 by SPTS, Mr Hammond was VP Sales and Marketing, having joined the company in 2002. Prior to SPTS, from 1995 to 2002 Paul was President of American Tech Manufacturing Corp, a manufacturer of high-speed IC inspection and conditioning equipment. Previous roles also included Director of Sales and Marketing at Sono-Tek Corporation, selling ultrasonic coating equipment for many different process applications into a variety of industries. Paul started his career in the semiconductor industry with Cambridge Instruments Group where he held a number of positions including Business Unit Manager for the Crystal Growth and MOCVD division.
Educated in the United Kingdom, Paul graduated with a BS in Applied Physics from Brunel University in London. He is currently based out of the company's Allentown, PA facility.

References

Sensor-integrated meta-optics for imaging beyond intensity: manufacturing at foundry scale



P. Latawiec
CTO
Metalenz, Berlin, Germany

Abstract
As robotic systems become faster, more ubiquitous, and more capable, their perception stacks are pushed toward lower latency, smaller form factor, and broader sensing functionality. Physical-AI sensing platforms built on sensor fusion face a steep tradeoff: each module added to extract deeper scene information adds to the size, weight, power, and compute budget. In this talk we present an alternative in sensor-integrated meta-optics, which move the encoding of scene degrees of freedom into the optical layer itself, before the light reaches the pixel. We show full 300 mm wafer-scale fabrication on a CMOS foundry line and integration with commercial image sensors, demonstrating how perception systems that peer beyond intensity and into polarization, depth, and spectrum can be manufactured at volume with semiconductor precision.

Biography
Pawel Latawiec is CTO at Metalenz, where he leads metasurface design and engineering efforts. He holds a B.S. in physics from the California Institute of Technology and a PhD in applied physics from Harvard University. His team is focused on constructing novel architectures for metasurface imaging and illumination and developing computational techniques for scalable objective-first design and fabrication.

References

Beyond Perception: How MEMS Sensors Redefine Our Experience

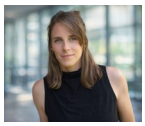
D. Domdey
Director Sensor Development
Bosch Sensortec, Reutlingen, Germany

Abstract
What if sensors could not only perceive the world but help define how humans and machines experience it? From wearables and smart devices to next-generation robotics and immersive digital realities, MEMS technology is emerging as a key enabler of future innovation. This presentation discover how Bosch Sensortec's diverse sensing roadmap combines breakthrough hardware, software, and AI to create tailored solutions for an ever-expanding universe of applications, featuring the latest generation of high-performance IMUs that push the boundaries of motion perception and contextual intelligence. Together, we will explore how tiny silicon structures are becoming the foundation of tomorrow's connected, intelligent, and increasingly autonomous world.

Biography
Desislava Domdey is Director of MEMS Consumer Sensor Development at Bosch Sensortec, where she leads global teams developing and bringing to scale next-generation Inertial Measurement Units (IMUs). She began her career at Bosch in 2008 as a MEMS design engineer, specializing in modeling and system simulation, and quickly progressed through leadership roles spanning customer projects, application support, and product management in the automotive sector. Today, she combines deep technical expertise with a strong business perspective to drive innovation from concept to high-volume production.
Her work focuses on translating cutting-edge MEMS technologies into scalable solutions for real-world applications. A recent highlight is the successful 2024 launch of the world's smallest accelerometer.
Originally from Sofia, Bulgaria, Desislava has lived in Germany since 2001 and resides with her family in Reutlingen.

References

The Optical Interface Between Human and AI: Rethinking the Power Problem for AI Eyewear.



T. Koch
Chief Business Officer
AlphaLum SA, Lausanne, Switzerland

Abstract
Every smart glasses maker is fighting the same battle: power. A display drains the battery. Running AI to understand what the user wants drains it further, typically through power-hungry cameras and inference pipelines that can't realistically stay on all day, and even when they do run continuously, low frame rates miss the fast, subtle signals that actually carry intent. Most solutions optimize one side of this equation, a more efficient display, or a lower-power sensor, but treat the other as someone else's problem. AlphaLum optimizes both, on a single optical platform.
Our holographic combiner architecture delivers a step-change in display efficiency, easing the power cost of getting information in front of the eye. At the same time, our optical micromotion sensing platform reads subtle eye and skin signals directly, combining always-on operation with high temporal resolution, capturing fast micromotions continuously rather than trading one for the other, at a fraction of the power of camera-based AI interaction. The result is a combiner that cuts power on both the output and the input side of the human-AI loop, without forcing a choice between staying on and seeing enough.
This talk covers why power has to be solved on both sides of the interaction, not just the display, why the combination of always-on and high temporal resolution is the precondition for genuinely useful AI interaction on the face, and what that means for how AR glasses get designed, built, and scaled toward true all-day wear.

Biography
Tanja Koch is the co-founder and Chief Business Officer of AlphaLum, a deep-tech photonics startup based in Lausanne developing next-generation optical systems for smart glasses. She brings over nine years of experience across startup founding, venture capital, and innovation strategy, with a particular focus on the AR hardware space.
Before AlphaLum, Tanja served as Senior Product Manager at ams OSRAM, one of the world's leading optical semiconductor companies, where she gained direct experience bringing complex photonic and sensing technologies from R&D to market. That industry grounding, combined with her background as both a founder and a venture capitalist, gives her an unusual vantage point: she understands what it takes to build deep-tech products from the inside, and what it takes to scale and commercialize them.
Tanja holds a Master of Science in Management from the Technical University of Munich (TUM) and has continued her education at Stanford University. Her academic foundation in design thinking and user-driven innovation shapes how AlphaLum approaches product development: starting from real user constraints, including power, form factor, and all-day wearability, rather than from technology capabilities alone.
At AlphaLum, she leads business development, partnerships, and go-to-market strategy as the company advances its two core platforms: an ultra-efficient holographic waveguide display and an always-on optical micromotion sensing system, together forming a bidirectional interface layer between humans and AI.

References

From Seeing to Understanding: Optical Sensing for the Age of Physical AI

J. Stübinger
Global Head of Product Marketing
ams-OSRAM, Dresden, Germany

Abstract
As AI moves into the physical world, devices need to understand more than images – they need to perceive light, color and space. At the same time, sensors are becoming smaller, more integrated, and increasingly hidden behind displays and cover glass.
This talk explores how advanced spectral sensing and multi-zone Time-of-Flight address these challenges, enabling devices to understand ambient light, reproduce colors more naturally and add depth and spatial awareness. From smartphones and wearables to AR glasses, these technologies are helping optical sensing evolve from simply measuring the world to enabling devices to better understand it.

Biography
Julia Stübinger is Global Head of Product Marketing for the Integrated Optical Sensors (IOS) business at ams OSRAM. She leads global marketing activities for ams OSRAM's optical sensing portfolio, spanning applications in smartphones, wearables, smart glasses and other consumer devices.
Julia has held several leadership roles at ams OSRAM across strategy, product marketing and business development, with a strong focus on bringing advanced sensing technologies to market.
Prior to joining ams OSRAM, she worked in management consulting at Kearney. She holds a strong passion for translating complex technologies into market opportunities and tangible customer value.

References