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Electro Optics

The PHOTONICS 100

2026

The industry's most innovative people

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Welcome to the fourth annual Photonics100

It's extremely exciting for us to reveal the latest cohort to join the ever-growing community of peer-nominated R&D leaders in photonics. This year we had more than 300 nominations, making it the fiercest competition – and hardest to judge! – yet.

In spite of what has turned out to be a 'holding year' for photonics (and indeed many other manufacturing-related industries) in terms of growth, the pace of innovation has not slowed – and neither has the buying power of this year's 100. Collectively, the 2026 list has responsibility for purchasing more than £40m of photonic equipment a year.

Elsewhere, our Photonics Frontiers Award scheme, which focused on applied photonics – solutions for real-world applications – attracted more than 50 entries from fields as diverse as rocket ignition and autonomous vehicles through to brain injury diagnosis and cutting food waste. Indeed, some of the names behind those entries have made it into this year's Photonics100.

Similarly, the Laser World of Photonics Innovation Award, co-founded by the team here at Electro Optics, saw more than 70 cutting-edge technologies put forward as part of the Munich event. Again, representatives from leading entries in that competition are included in the list that follows in these pages.

So, how did we whittle down 300 compelling nominations to 100? We had to be disciplined and ask a few questions: are they having an effect on R&D, rather than at a product sales, marketing or non-technical executive level? Can they point to associated R&D projects that have matured in the past 12 months? Do those R&D projects have photonics technologies at their heart?

We've been overwhelmed by the number of nominations, proving there is plenty of talent out there. It bodes well for the future of the Photonics100 – we're clearly a long way from running out of new candidates to include. Please put your thinking caps on for next year's list – we'll be opening the nomination window in late spring 2026.

The list that follows features individuals that broadly fall into these categories:

- Photonics vendors – suppliers and integrators of photonics components and systems, such as optics, lasers, sensors, test and measurement equipment, optoelectronics, illumination and imaging.
- Original equipment manufacturers (OEMs) using photonics – integrators or manufacturers using photonics as an enabling technology in vertical markets such as life sciences, defence, automotive, aerospace, mechanical engineering, electronics, semiconductors and optical communications.
- Start-ups – companies under five years old, operating as either a photonics vendor or an OEM (as defined above).
- Academia/research – either those involved in photonics research itself or those using photonic technology to further research in a non-photonics field, such as physics, chemistry, biology, medicine, engineering and more.
- Outreach – those who, although not engaged in research personally, facilitate it through education or promotion initiatives.

My thanks go to our colleagues Fin O'Reilly and Paul Hamblin, who have shouldered most of the heavy lifting around corralling the content from our final 100 (as well as all the head-scratching that comes with making those tough decisions on inclusion), alongside Andrew Knight, who masterminded all the outreach required to get the nominations in the first place, all under the watchful eye of our COO, Mark Elliott.

As this community grows, we want to offer more and more opportunities for them to engage with each other – and we can't do that without wider commercial support from vendors.

In particular, we'd like to thank Chroma Technology for their unwavering support of The Photonics100. Not only have they stepped up to become the main sponsor of this year's list, but they have also partnered with us to host in-person meet-ups at both Photonics West and Laser World of Photonics this year, providing an invaluable opportunity for networking among our alumni.

If you're a vendor and would like to discuss how you can support the Photonics100 – and get the opportunity to mix with these R&D rock stars, please get in touch.

So, thank you to all those who took the time to complete a nomination form and, of course, congratulations to the Photonics100 class of 2026!

Warren Clark,
CEO
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Supporting this year's list

The fourth year of the Photonics100 would not have been possible without the support of its sponsors. Our sincere thanks to Chroma Technology for its leading partnership on this exciting project, which aims to showcase the very best in our industry. *Electro Optics* is proud to collaborate with all of its strategic partners, listed on these pages. Here is a mix of profiles and messages from our partners

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Edmund Optics is a leading provider of high-quality optical components and solutions. Since 1942, the company has served industries such as life sciences, biomedical, industrial inspection, semiconductor, and R&D. Today, Edmund Optics operates across 19 global locations and provides two specialised solutions:

Marketplace – A one-stop shop offering more than 34,000 off-the-shelf products with more than 40 top-tier brands and 3 million items in stock for fast, reliable delivery. Customers benefit from 24/7 support via chat, as well as technical assistance by phone or email.

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LASER WORLD OF PHOTONICS

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Held biennially in Munich, **The Laser World of Photonics** is the leading international photonics trade fair and congress. It attracts global experts, companies, and researchers, showcasing the latest technologies and innovations. Exhibitors benefit from high visibility, direct access to key decision-makers, and numerous networking opportunities. The fair provides excellent sales opportunities, allowing exhibitors to showcase their products to a targeted audience and generate new business leads. Visitors can explore cutting-edge products, attend expert-led sessions, and gain insights into industry trends. International editions in India and China offer additional global engagement and business growth opportunities.
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2026: a year of navigating disruption and opportunity

As the industry faces unprecedented challenges, the R&D leaders in this year's Photonics100 again show why innovation is their chosen route through uncertainty

Country	# of P100 honourees	Country	# of P100 honourees
UK	21	Australia	2
Germany	19	Finland	2
USA	17	China	1
Switzerland	5	Czechia	1
France	4	India	1
The Netherlands	4	Japan	1
Ireland	4	Poland	1
Spain	4	Portugal	1
Canada	3	South Korea	1
Italy	3	Sweden	1
Lithuania	3	Uruguay	1

The photonics industry stands at a critical inflection point. As artificial intelligence (AI) reshapes computing and data centre demands, geopolitical tensions disrupt global supply chains ever further, and emerging technologies from quantum communications to integrated photonics promise transformative breakthroughs, the sector's most influential figures are grappling with challenges that would have seemed unimaginable just five years ago.

From European research hubs to Silicon Valley, industry leaders are confronting a perfect storm of technical and economic pressures. The push toward longer operational wavelengths in ultrafast fibre lasers demands fundamental rethinking of available components. Photonic integrated circuits struggle with cost and scalability, particularly in the promising mid-infrared spectral range. Meanwhile, the deepening economic tensions between the West and China have exposed critical vulnerabilities in component supply chains, forcing many companies to completely reassess everything from sourcing strategies to manufacturing locations.

'Rising defence budgets are creating substantial additional demand for... specialist, high-performance, highly-resilient photonics'

Yet within these challenges lies unprecedented opportunity. The shift towards regional technological sovereignty is driving massive investments in domestic innovation ecosystems. Biomedical applications of mid-infrared photonics are opening pathways to non-invasive glucose monitoring and breath-based disease detection. The explosive growth of AI infrastructure is creating insatiable demand for optical interconnects and co-packaged optics.

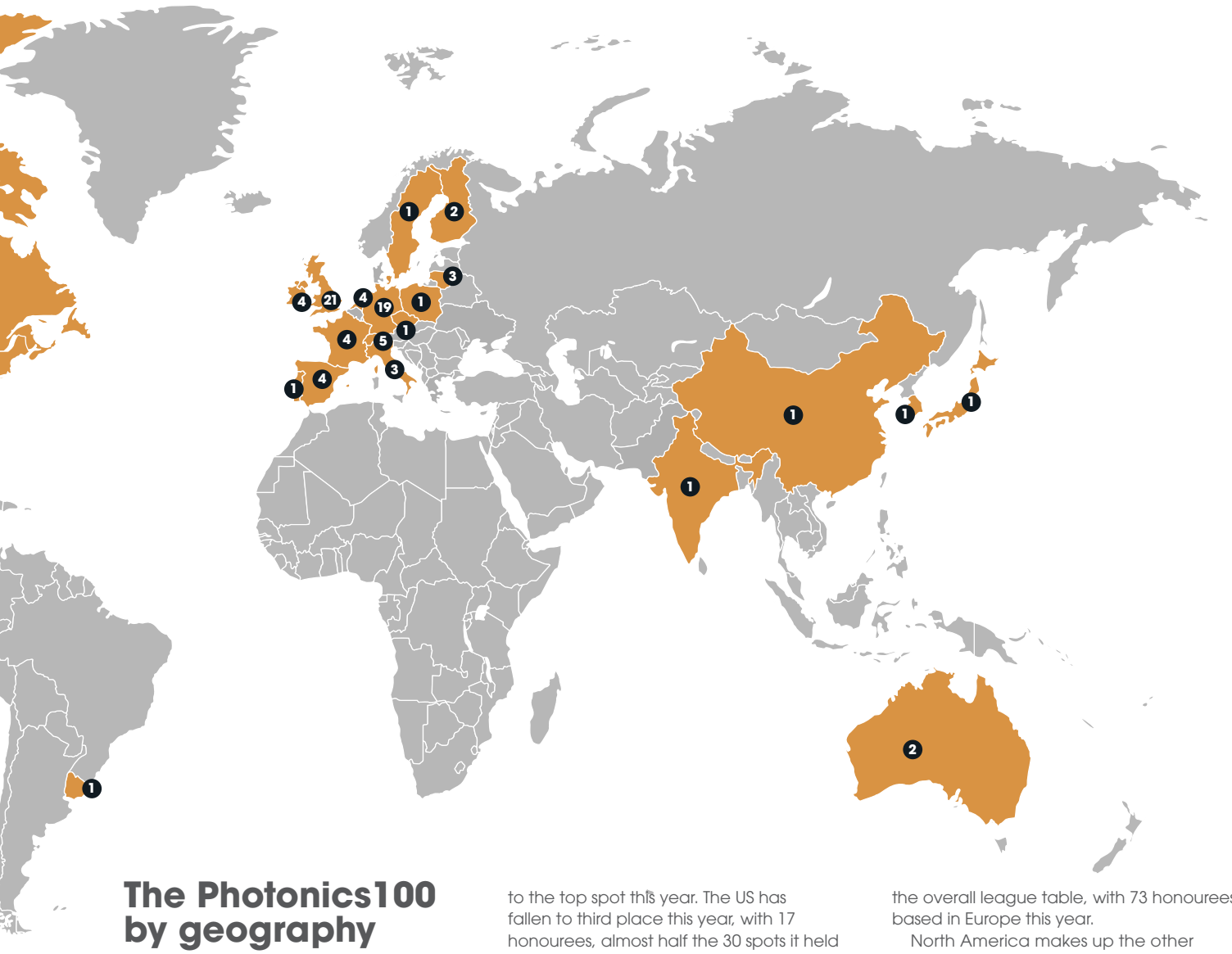
As one industry veteran noted, "We're at the point where we can really build photonic computing and sensing systems on a wafer – and opportunities will arise in the development of new system architectures leveraging these advances."

Challenges and opportunities in 2026

As in the past three editions of The Photonics100, we asked our honourees what they see as the biggest challenges and opportunities in the year ahead. They break down into five broad areas:

Scaling and manufacturing: Many of this year's honourees highlighted the difficulty of scaling innovations from lab prototypes to high-volume, cost-effective industrial production, particularly for integrated photonics, hollow-core fibre technology, UV lasers, and advanced optics. Issues include manufacturing cost reduction, process stability, design-tool maturity, packaging complexity, and low yield rates.

Geopolitical and economic uncertainty: Several respondents pointed to global trade tensions, tariffs, supply chain disruptions, R&D investment cuts (especially in the US), and shifting funding priorities (e.g.



The Photonics100 by geography

The biggest geographical change in this year's Photonics100 was the unseating of the US from its number one spot.

The country with most honorees this year was the UK, continuing its rise from third place in the 2024 cohort, to second place last year, and pipping Germany to the top spot this year. The US has fallen to third place this year, with 17 honourees, almost half the 30 spots it held in The Photonics100 2024. Is this perhaps a response to US President Donald Trump's erratic tariffs regime, or a reflection of the US administration's recent swingeing cuts to funding and grants for scientific research?

Given Electro Optics' focus on European photonics, it is perhaps not surprising that European R&D champions figure so large in the overall league table, with 73 honourees based in Europe this year.

North America makes up the other main photonics hub represented in The Photonics100, with 20 spots between the US and Canada, but there are also slight signs of growth in nominations from Asia and the southern hemisphere this year. Even more encouragingly, perhaps, there are also first-time places for China, Uruguay and South Korea.

towards defence in the EU) as significant challenges. These factors impact business planning, investment, and the ability to maintain innovation momentum.

Talent and workforce shortages: A recurring theme was the lack of skilled professionals, including scientists, engineers, and technicians, in the photonics sector. This is attributed to competition from other industries, limited training pathways, and a need for better incentives and public recognition of photonics careers.

Integration with AI and digital transformation: The integration of AI methods for process optimisation, data analysis, and automation was seen as both a challenge (e.g. ensuring practical solutions, handling high data rates, avoiding overcomplication) and a major opportunity to enhance productivity, quality control, and efficiency in various applications.

Application-specific opportunities: Opportunities were identified in diverse fields such as AI/ML infrastructure, data centre efficiency, quantum technologies (e.g. quantum enhanced PNT, quantum networks), biomedical diagnostics (e.g. photoacoustic imaging, optical health technologies), defence, aerospace, optical interconnects, and industrial laser processing (e.g. inline cleaning, material deposition).

What are this year's Photonics100 working on?

The areas of research being undertaken by this year's Photonics100 also fall into five broad categories:

Next-gen optical communication and networking: Development of high-capacity

'This year has been challenging, with some of the major shocks in geo-politics. The uncertainty of tariffs ...(have made)... export of equipment and the import of raw materials and components somewhat delayed and suffering from price fluctuations'

optical engines for AI/ML clusters and data centres, optical interconnects for 5G/6G, quantum-enhanced position, navigation and timing (PNT), and fibre sensing for network reliability and new services.

Advanced laser systems and material processing: A focus on ultra-short pulse lasers for semiconductor and advanced materials processing, laser surface nano-structuring, high-power lasers for industrial applications such as welding and additive manufacturing, and improving the lifespan of UV lasers.

Integrated photonics and chip-scale devices: Significant work on photonic integrated circuits (PICs) across various platforms (silicon nitride, III-V, TFLN) for quantum computing, bio-sensing, lidar, and compact diagnostic tools, along with efforts in scalable photonic packaging and fabrication foundries.

Novel sensing and imaging technologies: Development of multispectral sensors for agriculture, low-cost photoacoustic imaging for stroke prevention, nanophotonic sensors for bioprocessing, and advanced bioimaging techniques, such as fluorescence-lifetime imaging microscopy (FLIM) and hyperspectral imaging.

Quantum technologies: Research on scalable quantum systems, quantum random number generators, quantum mirrors, and the development of quantum communication networks and computational infrastructure.

Photonics in the UK

Ahead of this year's PhotonicsUK event in London, John Lincoln, the CEO of the Photonics Leadership Group, and himself an early Photonics100 honouree, said photonics in the UK was "booming. Annual revenues now exceed £18.5bn, growing by more than 20% from 2022 to 2024. The future looks brighter still."

He said the photonics industry in the UK has been outperforming the rest of the economy, with profits up by more than 30% over the past two years.

So where is this growth coming from? The Photonics Leadership Group's analysis found there was not one single source, "rather the diversity of photonics impact means growth is being driven across all applications".

"The global boom in AI is driving unprecedented demand for data centre networking and data storage – the latest solution that heavily leverages integrated photonics, which is a great UK strength," said Lincoln.

"The UK's thriving life science research sector drives demand for the latest photonics tools; from cell counters to 3D microscopy – all of which leverage photonics. Laser processing continues to thrive globally, driving demand for those specialist lasers in which the UK excels.

"While it may be unfortunate that global uncertainty is necessitating an increase in defence spending, rising defence budgets are also creating substantial additional demand for the specialist, high-performance, highly-resilient photonics in which the UK excels."

This view was echoed by Dave MacLellan, the Executive Director of the Association of Industrial Laser Users, who said: "While some sectors are down (automotive), there are compensating markets such as semiconductors, defence and aerospace where the markets are experiencing strong growth. In the energy sector, there is both strong growth in renewables and also steady growth in oil and gas due to the overall increases in energy requirements (in spite of Net Zero targets). Many sectors are expected to grow by 10-20% compound annual growth rate (CAGR) in the UK, in spite of business confidence uncertainty over the past 12 months."

The view from continental Europe

At Laser World of Photonics in June, representatives of Germany's photonics industry said it is anticipating a downturn in domestic orders this year, but does expect international activity to compensate somewhat for the decline.

In terms of domestic order intake vs 2024, Sven Breitung, the Managing Director of the VDMA Working Group Lasers and Laser Systems for Material Processing, told attendees in Munich that the VDMA's poll had shown 47% of members expected orders to remain stagnant versus 2024, with 34%

Photonics research budgets

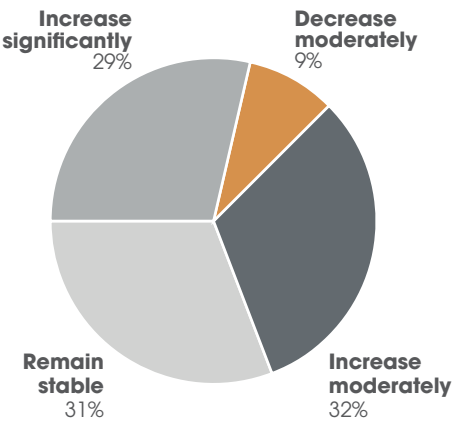
This year, for the first time, we asked respondents to answer some questions that would give us a snapshot of their R&D budget projections and spending intentions. The results made for interesting reading – as Warren Clark already pointed out in his introduction to this edition, this year's cohort is collectively responsible for purchasing more than £40m worth of photonic equipment a year, so its collective opinion is definitely worth recording here.

The good news is that a majority (61%) of respondents who expressed an opinion believe that R&D budgets will increase in the next 12 months.

Of that majority, just under half believe the increase will be significant (more than 20%) and just more than half believe the increase will be moderate (up to 20%).

A further 31% of respondents said they expect spending on photonics research and development to stay stable (+/- 5%) based on the previous year's spending.

Just 9% said that they believed budgets would decline moderately (5-20%) and no one predicted significant budget declines (>20%).



expecting orders to decrease. Some 22% of respondents also expected domestic orders to decrease by 11% or more. Just under one in five respondents (19%) expected orders to grow.

In orders coming from abroad, 38% of German VDMA members expected orders to remain flat in 2025, with 21% expecting a decrease. However, 40% expected international orders to improve in 2025.

As German photonics activity is often a bellwether for wider European activity, it is significant that Breitung said geopolitical risk was the biggest challenge identified by manufacturers.

"The top priority is now the increasing geopolitical risk," he said. He also reported respondents had identified the economic policy of US President Donald Trump specifically, including tariffs, as problematic. "This is the first time a single person is a challenge for the industry," said Breitung.

The VDMA's poll identified the USA (70%) and China (63%) as the most difficult markets in 2025.

Breitung said high wage and non-wage labour costs and the declining competitiveness of the industrial location of Germany also played a large role in VDMA members' outlook, but pointed out that skills issues had fallen significantly as a concern, dropping from first place in 2024 to ninth place in 2025. Breitung said this was not an indication that the skills issue had been solved, but "it's just another indicator of the problems we are facing at the moment".

The VDMA's view was supported by Wenko Süptitz from Spectaris, the German industry association for optics, photonics, analytical, and medical technologies, who said its latest member survey (in June 2025) had forecast revenue growth of 3% for 2025, but again predicted a decline in domestic sales (-4%) and a 2.1% increase in international sales. ■

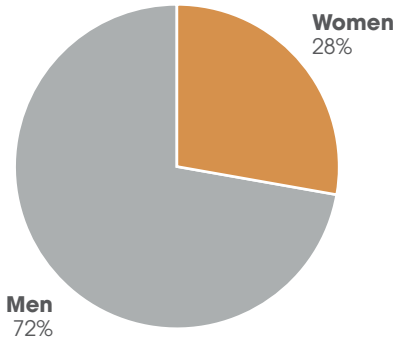
The Photonics100 by gender

The 2026 cohort of The Photonics100 had its highest representation of women among photonics innovators so far, with 28 women making it onto the final list this year.

This was up considerably from 20% in the 2025 cohort, 23% in the 2024 list and 26% in the first year of The Photonics100 in 2023, an encouraging trend and a reversal of last year's decline.

According to the latest SPIE salary survey, from 2024, women made up 24% of respondents, up from 23.3% in 2023, and 21% in 2022, so this year, at least, The Photonics100 is trending slightly ahead of the overall ratio of women in photonics.

While 28% is the highest figure yet for The Photonics100, we would still like to see more women next year joining the likes of Ligentec's Dr Mariam Aamer Benelfaquih; Prof Sarah Bohndiek, from Cambridge University; Edmund Optics' Dr Jessica DeGroote Nelson; Dr Annika Möslein, from Quantum Dice; Karen Hall, from G&H (Gooch & Housego); and Madison Rilling, from Optonique, to name but a few.



Photonics job market trends in 2025

EPIC
EUROPEAN PHOTONICS INDUSTRY CONSORTIUM

The photonics jobs market is complex and fast-changing. **Elisenda Lara,** Talent Attraction Lead for photonics at EPIC, looks at the vacancies posted on jobs-in-photonics.com across the first half of 2025

Between January and June 2025, based on the job offers submitted by EPIC members and published on the **jobs-in-photonics.com** website, the global photonics job market showed a clear trend: Europe and the US remain the core regions where the industry is expanding. Germany alone offered nearly 900 positions, more than any other country. The US followed closely with 685 vacancies, while France and the Netherlands, each with just over 300, consolidated their role as secondary but essential hubs. This distribution shows the dual dominance of Europe and North America in attracting and creating talent in the sector.

The industry's demand is driven above all by R&D and manufacturing roles

Research and development (R&D) roles are the most in demand. More than 330 vacancies were published in the first half of the year, confirming that innovation remains the backbone of competitiveness in photonics. Finland and the US led in this area, each surpassing 30 positions, while the UK, Spain, and Germany maintained strong figures with more than 20 openings. Belgium, France, and Switzerland were also prominent, proving that R&D specialists are needed across the whole region.

After R&D, the strongest demand comes from production and operations. Process engineers and production managers accumulated more than 200 vacancies each, with Germany, the US, France, and Switzerland consistently topping the list of recruiting countries. The pattern highlights how the photonics sector is now reinforcing its production capacity to meet growing global demand. Project management also appeared as a strategic role, with more than 200 openings, showing that companies surveyed are not only scaling up production but also professionalising how projects and industrial processes are executed.

On the digital front, software engineers stand out. Germany led the demand for this role, with almost 50 offers, while the US, France and the UK followed at a distance. This imbalance reflects Europe's push to integrate digital skills

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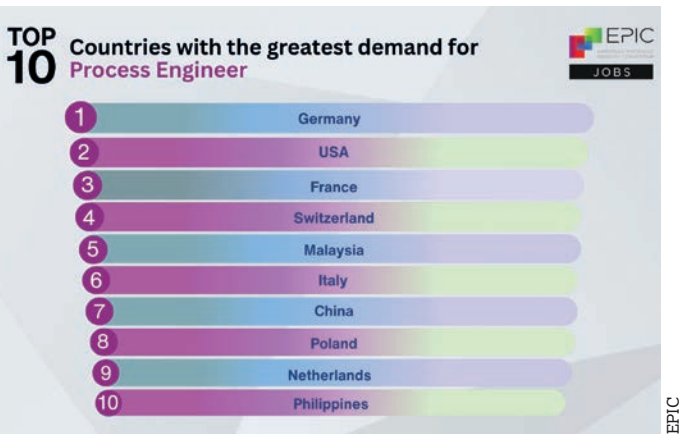

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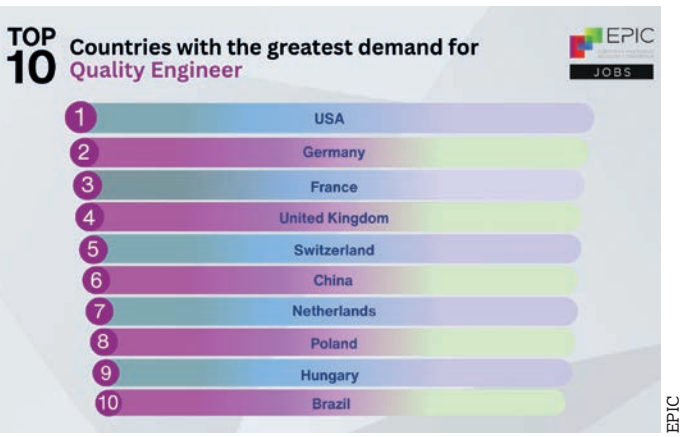


EPIC

into photonics, a sector that is increasingly shaped by artificial intelligence (AI), automation, and advanced simulation.

Quality specialists find most opportunities in the US, Germany and France

Another key area is quality assurance. The US posted more than 30 'quality engineer' jobs, and both Germany and France had more than 10 each. Test engineers also remain in demand, especially in Germany, the US and France. This growing emphasis on quality reflects how photonics, which is embedded in critical applications from healthcare to defence, must consistently uphold the highest standards of reliability and compliance.

Sales and business development roles complete the picture. Germany once again leads, offering more than 30 vacancies for sales engineers, applications engineers, and business developers. Switzerland and the US followed at a distance. These positions, often at the crossroads between technical expertise and customer engagement, show how photonics companies are reinforcing their global reach and market presence. The growing prominence of applications engineers highlights the importance of roles that can bridge complex technologies with real-world customer needs.

Overall, the first half of 2025, based on the job offers submitted by EPIC members and published on jobs-in-photonics.com, confirms that the photonics industry is consolidating a two-pronged strategy: strengthening its innovation base through R&D, while simultaneously expanding its production capacity and global market reach. Germany emerges as the main European hub, while the US maintains its position as the leading global competitor. ■

EPIC

"The growing prominence of applications engineers highlights the importance of roles that can bridge complex technologies with real-world customer needs"

Mariam Aamer Benelfaquih

Organisation: Ligentec
Role: PDK/PCM Team Lead
Based in: Spain
Education: PhD Photonics, Valencia Nanophotonics Technology Centre

"Creating an environment where women and all talents can thrive, lead, and innovate is a core value for me," says Mariam Aamer Benelfaquih. The inspiration derives from her mother, who fought obstacles to win a scholarship to study medicine at Valencia, eventually becoming Morocco's first female gynaecologist – at a time when women were not even permitted to study engineering.

As PDK/PCM team lead at Ligentec, Dr Aamer focuses on developing and managing silicon nitride photonic design kits (PDKs) and Electronic-Photonic Design Automation (EPDA) flow. Her responsibilities cover the entire lifecycle of PDK releases, from design and simulation to validation and documentation, ensuring seamless compatibility with industry-standard tools. The team also collaborates closely with process and yield engineering teams to design and characterise new building blocks optimised for manufacturability and testability on Ligentec's 200mm platform.

Dr Aamer's efforts have significantly improved design iteration speeds, increased first-pass success rates, and enhanced all-round usability of the platform for academia and industry.

Nicolás Abadía

Organisation: Cardiff University
Role: Senior Lecturer
Based in: Cardiff, UK
Education: PhD, Physics and Electrical and Electronic Engineering, Paris-Sud University; post-doc at Trinity College, Dublin and McGill University

Nicolás Abadía plays a central role in efforts to establish the role of photonic integrated circuits (PICs) in the next generation of aerospace systems. A senior lecturer and researcher at Cardiff University and the Institute for Compound Semiconductors, Dr Abadía is starting a new group – the first in the UK to do so – to develop photonic integrated devices and systems for deployment in satellite communications and space instruments. He has recently started an EPSRC New Investigator Award (EP/X011917/1) to develop the technology in collaboration with leading names in the UK space sector, including Airbus, ALTER Technology, and Bay Photonics. He has also been awarded an EPSRC International Collaboration Grant (EP/Y00082X/1) to develop and test hardware for satellites and space applications. This second grant partners with Carleton University, Colorado State University, Telecom ParisTech, Tyndall National Institute, and University College Cork. Abadía's currently focused on developing quantum dot-based modulators and testing them with temperature and radiation, as there are few studies on the effects of radiation on photonics.

Marwan Abdou Ahmed

Organisation: Institut für Strahlwerkzeuge (IFSW), University of Stuttgart
Role: Head of Laser Development and Optics Department
Based in: Stuttgart, Germany
Education: PhD, University of St Etienne, France

Marwan Abdou Ahmed has enjoyed a long and distinguished career in advanced laser and optics development at IFSW, Stuttgart.

His group's core activities revolve around the development of high-power lasers operating across a wide range of regimes – from continuous-wave (CW) to femtosecond pulses – for applications in light–matter interaction, particularly in material processing. Dr Abdou Ahmed was a particularly significant figure in the EU-funded HiPERDIAS project, in which the team first demonstrated material processing using 1kW, sub-picosecond pulses with 2mJ energy directly on silicon and diamond workpieces. Among many current research lines, an example focuses on high-power (kW-class), ultra-short pulse (USP) thin-disk lasers emitting at 1µm. These lasers are tailored for industrial applications such as surface texturing, precision drilling, and microstructuring. He views the laser as a universal, enabling tool. Future developments are geared toward creating systems capable of switchable operation modes (CW, ps, ns, fs). The goal is to empower users with a single laser platform capable of supporting multiple processes.

Lutz Aschke

Organisation: Photonics21
Role: President
Based in: Germany
Education: PhD in Physics, Ruhr University, Bochum

Lutz Aschke is a key voice in the European photonics community, combining profound and broad technical knowledge with outstanding understanding of market trends and needs. He is the honourary president and chair of the executive board of Photonics21, a public-private partnership that advocates for the industry within the European Commission. Its aim is to promote the visibility of both industry and academia to the wider public. Dr Aschke brings broad experience in several optic- and laser-based fields. He was a very early player in EUV lithography and has been delighted by the success of the technology. Indeed, the first EUV mask blanks were based on his own work. With a passion for transforming ideas into industry, he served as the CTO at LIMO, transforming the company to leadership in microlens arrays for DUV lithography illumination systems and also developing the first beam-shaping systems for solid state laser-based flexible display production.

This experience portfolio has led to consultancy and other current roles, including as supervisory board member of Light Conversions UAB in Lithuania and Tecinvest Holding in Germany.

Sarah Bohndiek

Organisation: University of Cambridge
Role: Professor of Biomedical Physics
Based in: Cambridge, UK
Education: PhD, UCL; Research Fellow University of Cambridge; Postdoctoral work at Stanford

Sarah Bohndiek of Cambridge University is a leader in biomedical photonics and is Programme Director for the UK's Advanced Research and Invention Agency (ARIA). She is renowned for groundbreaking work in advanced optical endoscopy and photoacoustics for cancer detection.

Her team is pushing the boundaries of optical imaging technology to address the major unmet clinical need for earlier cancer detection. The group works closely with clinicians to enable first-in-human clinical trials of emerging technologies. Prof Bohndiek points to their success in delivering a state-of-the-art endoscopy system into a human clinical trial for the first time. She explains multispectral imaging represents a new frontier in medical physics that enhances colour vision and enables measurement of local concentrations of key biomarkers. For example, the distinct spectral properties of oxy- and deoxy-haemoglobin can be exploited to infer local blood concentration and oxygenation. The cellular ecosystem of a growing tumour mass requires a vascular network to obtain oxygen and nutrients, leading to marked changes in vascular structures during the early evolution of cancer; these can be exploited for disease detection.

Ruy Sebastian Bonilla

Organisation: University of Oxford, Department of Materials
Role: Associate Professor of Materials
Based in: Oxford, UK
Education: PhD, Materials, University of Oxford

Ruy Sebastian Bonilla's proudest moment was demonstrating, for the first time, that it is possible to controllably embed ionic charge in dielectric nanolayers to engineer surface and interface properties in silicon devices. This discovery, later patented, opened a new research field around 'charged dielectrics' that has since influenced solar photovoltaics, nanoelectronics, and even emerging quantum devices.

The achievement was special for Bonilla because it solved a decades-old challenge in semiconductor physics: how to harness field-effect passivation in a reproducible and tunable way. Dr Bonilla continues to break boundaries in his Oxford research, where he leads the Electronic and Interface Materials Laboratory. His current research is focused on advancing solar energy technologies through the design and control of functional thin films and semiconductor interfaces. He leads efforts to engineer dielectric nanolayers, novel transparent electrodes and multifunctional oxide interconnects for silicon and perovskite-on-silicon tandem solar cells. These architectures promise efficiencies exceeding the 30% practical ceiling of conventional silicon.

Dermot Brabazon

Organisation: Dublin City University
Role: Full Professor, Director of the DCU Institute of Advanced Processing Technology

Based in: Dublin, Ireland
Education: PhD, University College, Dublin

Dermot Brabazon recently celebrated over a quarter of a century of research and innovation at Dublin City University, after completing his studies at University College Dublin on the other side of the same city.

His more than 450 peer-reviewed journal publications have received 12,656 citations, with over €20m from regional funding agencies and companies in support. He has presented more than 50 keynotes at leading international conferences and has a world patent on an innovative method for laser texturing interference fit joints which enables improved material bonding efficiency, tolerance and quality control (WO2017060531). He says there are many good moments in photonics: from securing a research grant award, to establishing a new laser working for the first time in the lab, to achieving real-time control of a complex laser system, to dissemination of the related results. Best of all? "Seeing my researchers achieving first-in-the-world breakthroughs as part of their project and going on to lead successful careers of their own," he says. His current research aims to develop and establish systems for laser surface nano-structuring and nano-particle generation.

Rimantas Budriūnas

Organisation: Light Conversion
Role: R&D Engineer, OPA and OPCPA Research Programme Manager

Based in: Vilnius, Lithuania
Education: PhD, Physics, University of Vilnius

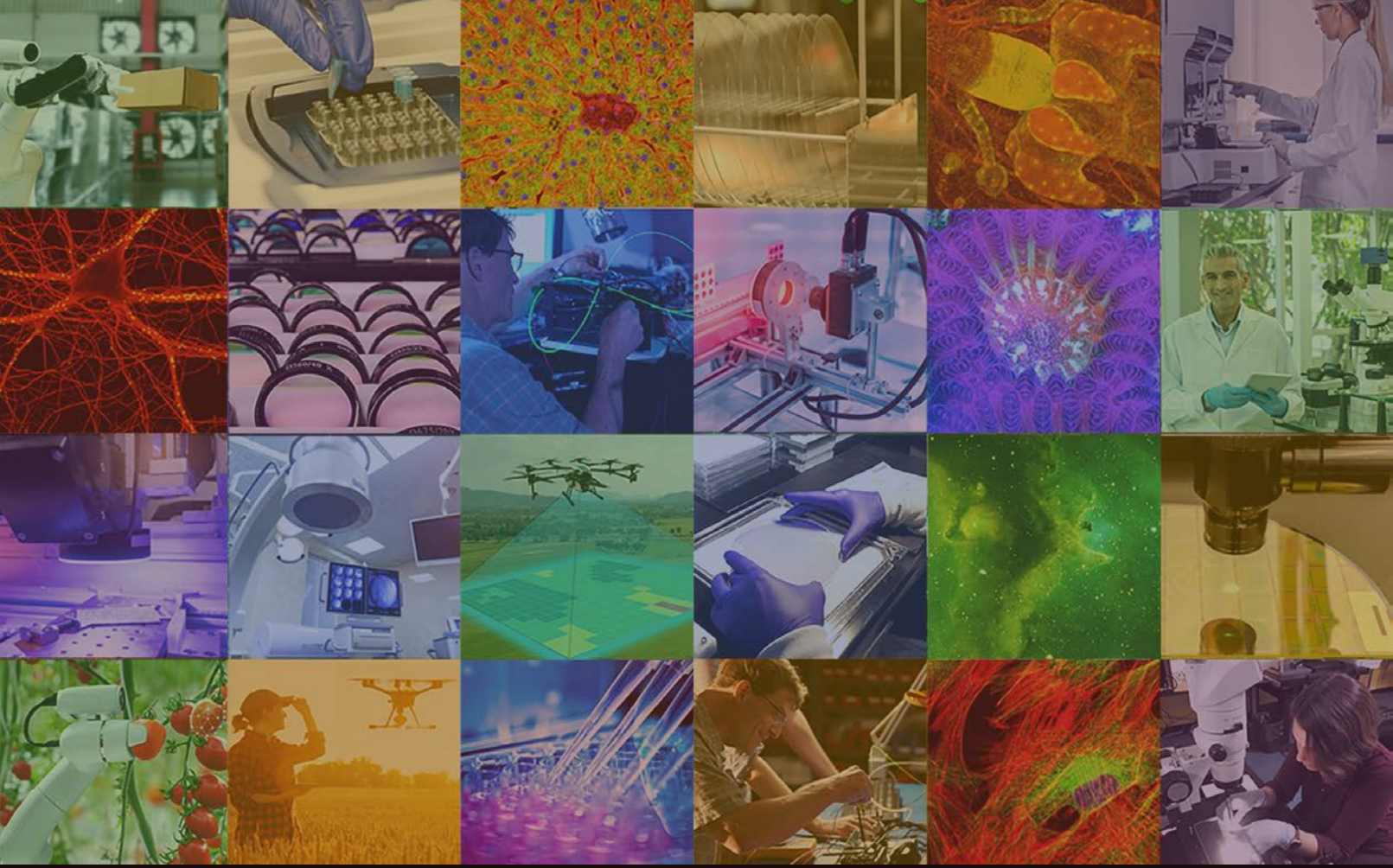
Focused primarily on nonlinear optics, Rimantas Budriūnas develops optical parametric amplification (OPA) and optical parametric chirped pulse amplification (OPCPA) systems. He is expanding boundaries in parametric ultrashort light sources based on $\chi(2)$ nonlinear optics. The work includes adapting existing concepts to new operating conditions formed by the ever-improving palette of pump lasers, but also trying new regimes of wavelengths, pulse durations, and tunability requirements, in attempting to attain new heights of efficiency. This is in addition to taking a deeper look at the finer parameters of light pulses, such as the carrier-envelope phase and temporal contrast to ensure these parameters are adequate for cutting-edge applications. Parametric light sources are used in fields from nonlinear microscopy to strong-field laser physics. Solutions Dr Budriūnas has worked on have brought new levels of reliability and ease to large, complex OPCPA systems (Light Conversion's OPCPA-HE), enabling users to take advantage of the short pulse duration, high peak power and excellent temporal pulse contrast, to a level of operational simplicity claimed to surpass previous-generation titanium sapphire systems.

Paul Buske

Organisation: RWTH Aachen University
Role: Scientific Researcher

Based in: Aachen, Germany
Education: MSc, Aachen

Paul Buske is described as a rising star in the field of photonics research, dealing with the development of phase masks for laser beam shaping. His publications have won numerous conference awards, including at IODC 2023. His research focuses on the development of optical neural networks for three-dimensional laser beam shaping. Leveraging recent AI-oriented hardware development, Buske's approach exploits mathematical parallels between conventional neural networks and optical systems containing multiple cascaded phase masks to extend beam shaping from the conventional two-dimensional limit to the third dimension. He believes it enables huge potential for laser materials processing, such as for processing transparent materials or drastically increasing the depth-of-field of the desired beam shape. Three-dimensional beam shapes can benefit USP processing because they enable novel design freedoms that would not have been possible in the past. The bold approach is best, he advises. "Conducting 'safe' research, meaning making incremental advancements based on previous work, may be easier and more comfortable, but I always recommend exploring novel ideas that carry both higher risks and greater rewards."



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Augusto Carimatto

Organisation: Pi Imaging
Role: Head of Integrated Circuit Design
Based in: Lausanne, Switzerland
Education: PhD, Electrical and Electronics Engineering, Delft University of Technology, the Netherlands

CMOS image sensors have traditionally been the undisputed technology in the field – but Augusto Carimatto of Pi Imaging argues that this will soon change.

SPADs are photodiodes working in Geiger mode that have high Photon Detection Probability (PDP) with zero read-out noise; thus making Signal to Noise Ratio (SNR) higher than CMOS-based image sensors, resulting in higher quality for low-light conditions. SPADs are also well known for their highly accurate time resolution, making them invaluable for applications (low-light cameras, space) where the time of arrival of the photons carries fundamental information. At Pi Imaging, Dr Carimatto is the lead designer of SPAD Alpha, which won the Innovation Award at Laser World of Photonics 2025 for its groundbreaking advances in SPAD technology. Under his technical leadership, SPAD Alpha was developed as a 1,024×1,024 resolution fast-gated SPAD camera with optional RGB colour support, capable of delivering up to 73,000 binary frames per second at full resolution. The system features 17ps timing resolution and tunable resolution, enabling frame rates of up to one million fps.

Antonio Castelo

Organisation: EPIC
Role: Technology Manager
Based in: Madrid, Spain
Education: PhD, University of Santiago de Compostela, Spain

As EPIC's Technology Manager for the laser and biomedical sectors, Antonio Castelo is a significant figure in supporting and enabling European photonics. "We give companies the opportunity to describe and promote their new developments, and users and integrators the opportunity to share challenges and future needs for their manufacturing processes. We connect the right people to help them to improve their products and businesses," he says.

From a neutral perspective, he is able to offer an objective voice on industry talking points. "The important challenge is to deal with the situation in the US; collaboration and discussion between companies is needed to find a solution," says Castelo, who was also a judge in this year's Photonics Frontiers Awards.

"From a technology point of view, the development of new beam-shaping and process monitoring solutions will help to improve manufacturing processes using laser sources. In bio-medical, imaging solutions based on spectral technologies will be important in the near future, but there is a challenge in using AI effectively to improve image quality and resolution."

Bill Choi

Organisation: nanoLambda
Role: Founder & CEO
Based in: South Korea
Education: BSc, Physics, Seoul University; MBA Carnegie Mellon University

Bill Choi has spent more than 15 years in tenacious attempts to transform spectrometry, transitioning the 300-year-old technology from analogue to digital. His Korea-based company nanoLambda has established mass spectrometer production processes and claims to reduce size and cost to less than 1% of conventional systems, creating the smallest optical spectrometer via digital nanotechnology. It enables on-site, real-time, continuous, non-invasive material analysis in everyday life. Capabilities include human health monitoring (glucose, blood pressure, heart rate checks), as well as agri-food, water, air, and light surveillance. In photonics terms, nanoLambda miniaturises the optical spectrometer using patented computational spectrum reconstruction and plasmonic nano-optics filter array technologies, with no conventional bulky optical component, prism or grating and no required light dispersing distance. The plasmonic filter array is a single layer, fabricated on top of the pixels of the photo detector array using standard wafer processes.

The technology is mass-producible at affordable cost at compact size, but also scalable at almost the same cost and size, and therefore suitable across markets.

Maria Chernysheva

Organisation: Leibniz Institute of Photonic Technology
Role: Junior Research Group Leader
Based in: Jena, Germany
Education: PhD in Laser Physics

Maria Chernysheva is certainly resourceful... According to those nominators who put her forward for the Photonics100, she "might be the only person who ever strapped a laser set-up to a bike wheel for rotation sensing and published a solid paper on gyroscopy out of it".

It's typical of a can-do, proactive attitude highlighted by colleagues. "In nearly all her publications, she is either the first or last author, actively driving or guiding the work," they say. "Overall, Maria builds lasers, codes, supervises students, writes and reviews papers, teaches, organises conferences, and somehow finds time every year to explain lasers to school kids, and makes it all look easy."

Dr Chernysheva's research targets development of novel ultrashort pulse laser systems at short-wave and mid-infrared wavelength bands with tailored spectral and temporal properties. She does this by shaping the generation process through internal nonlinear and dispersive phenomena, while also exploring the full spectrum of available optical fibre materials and geometries. The ultimate goal is to stretch the reach of fibre lasers far beyond their traditional limits, making them extremely powerful tools for science, medicine, and industry.

Her conviction is rooted in experience. Midway through her PhD on 2µm ultrafast fibre lasers, she began collaborating with several major manufacturers. At the time, the idea of extending fibre laser operation into longer wavelengths and generating ultrashort pulses was often met with scepticism. Despite doubts, she persisted, convinced of the potential benefits, and, today, 2µm fibre laser systems are standard products for many companies. The achievement is one of her proudest career moments and fuels her belief that mid-infrared fibre lasers will follow the same trajectory in the coming years.

Dr Chernysheva says the move into longer operational wavelengths represents the ultrafast fibre laser industry's greatest challenge. Extending fibre lasers beyond the well established telecom window introduces a host of technical difficulties. Dispersion and nonlinearity must be carefully managed, for example, as researchers aim to scale pulse energy while reducing pulse duration. Meeting these goals in tandem is far from straightforward. Yet the potential impact is enormous. Longer-wavelength ultrafast lasers could enable important advances in medical diagnostics, minimally invasive surgery, spectroscopy, and gas sensing – applications that demand both precision and reliability.

"Networking gives you access to missing expertise, infrastructure and resources... it allows you to approach challenges from different perspectives..."

A persistent obstacle lies, of course, in the infrastructure surrounding the field. Specialty fibres, compatible components, and advanced fibre-processing equipment have not kept pace with the demand for new systems. Manufacturers often hesitate to invest in novel product lines without strong market signals, leaving many researchers dependent on in-house fabrication or creative repurposing of existing technologies. This slows down the transition from laboratory demonstration to deployable system.

For Chernysheva, the way forward is through closer collaboration between academia, industry, and end users. Stronger ties can de-risk development, accelerate adoption, and ensure that new platforms meet practical needs. She also stresses the importance of funding for mid-TRL (technology readiness level) research – the stage where ideas are proven in principle, but not yet robust enough for industry uptake. Without support at this level, too many promising concepts remain confined to academic papers rather than becoming real-world tools.

Her colleagues often point to her energy and drive, but Chernysheva is also quick to share advice for those coming up in the field. Networking, she says, is more than just a career strategy – it is a practical tool for solving hard problems.

"Networking gives you access to missing expertise, infrastructure and resources," she says. "It allows you to approach challenges from multiple perspectives, sharpens critical thinking, and keeps you grounded in real-world applications." In a research area that is inherently interdisciplinary, those connections often make the difference between incremental progress and breakthrough advances.

Max Coppers

Organisation: Admesy
Role: Optical Engineer
Based in: Ittervoort, Limburg, the Netherlands
Education: BSc, Engineering Physics, Fontys University of Applied Science

Founded in 2006 by former Philips engineers, Dutch-based photonics vendor Admesy says it "stuffs black boxes with measurement power". Its products include spectrometers, colorimeters, and light meters and 2D imaging devices.

Max Coppers is responsible for the thin-film coating department, evaluating application requirements, designing coatings, implementing innovative process improvements and integrating these coatings into the company's products. Coppers' colleagues highlight that he set up and improved the IBS coating machine, also identifying ways to improve the coating process, including both hardware and software. The machine hardware was updated according to his suggestions, while he developed an iterative software algorithm to improve the coating process. His contributions have led to the highest possible filter accuracy, also extending the uniform filter area. A major focus of development has been to improve the performance of spectral shape matching filters. This enables Admesy's colorimeters to match a desired colour standard to unprecedented levels of precision.

Mateus Corato Zanarella

Organisation: Toptica Photonics
Role: Senior Photonic R&D Scientist
Based in: USA
Education: PhD, Columbia University

Mateus Corato Zanarella leads Toptica's efforts in chip-scale miniaturisation of narrow-linewidth and tunable visible wavelength lasers. This requires the design and fabrication of robust PICs as well as creative, practical packaging solutions.

He says his work represents a paradigm shift from existing solutions, which rely on bulky and expensive lasers and optical components. "Leveraging the scalability and chip-scale integration of integrated photonics, my work is enabling high-performance lasers and optical devices to finally leave research laboratories and be deployed in the real world," he argues. He believes the biggest challenge preventing optical technologies from becoming more widespread is their size, weight, power and cost (SWaP-C). Traditionally, optical components have been bulky and expensive. While fibre optics has profoundly changed the technological landscape by confining light to microscopic scales and enabling it to propagate for extremely long distances, fibre components are still too big. In his view, PICs are the only way to reduce the SWaP-C of optical technologies while also enabling unique functionalities due to their high level of integration combining multiple optical materials into a small chip.

Tom Darras

Organisation: Welinq
Role: CEO & Co-founder
Based in: Paris, France
Education: PhD, Laboratoire Kastler Brossel, Paris

Tom Darras worked on his PhD in Quantum Physics at Laboratoire Kastler Brossel in Paris under the tutelage of Prof Julien Laurat, conducting research into quantum networks. They demonstrated the world's first quantum teleportation protocols based on hybrid entanglement to interconnect quantum devices in heterogeneous architectures. Soon after completing this work, in 2022 Dr Darras teamed up with Prof Laurat and two others to co-found Welinq, a company set up to provide the networking solutions that will build the infrastructure of the quantum revolution: scalable quantum computing and secure quantum information networks. They aim to deliver a full-stack, multi-platform solution to interconnect all types of quantum computers. Welinq's purpose is to equip quantum-augmented data centres with all the required networking capabilities. As the backbone of these next-generation facilities, Welinq enables new levels of computational power and security, operating globally to advance the connected quantum ecosystem. Data centres are already integrating quantum, therefore they need interconnected machines at a previously unreachable level.

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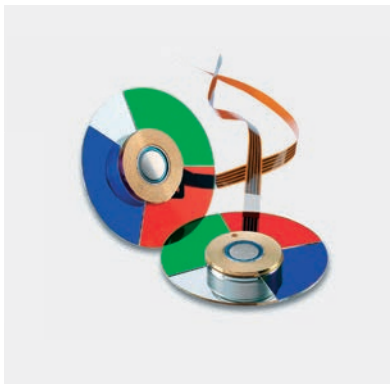

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Jessica DeGroote Nelson

Organisation: Edmund Optics
Role: Vice President, Precision Optics and Technology Development
Based in: Rochester, USA
Education: PhD, Optics, University of Rochester

Jessica DeGroote Nelson is as dedicated to education and mentorship of the next generation as she is to her role at Edmund Optics, driving innovation and strategic growth. As Vice President of Precision Optics and Technology Development, she oversees Edmund's global engineering and design initiatives, driving the development of advanced optical manufacturing and precision photonics. Under her leadership, Edmund has expanded its capabilities in cutting-edge optical components and coatings, enabling critical applications across life sciences, semiconductor manufacturing, defence, and industrial automation. She has also played a central role in building design and metrology expertise within the company. At the University of Rochester, she teaches courses in optical fabrication and testing. At RIT's Executive MBA programme, she teaches a graduate course on technology and innovation management strategy. As Educational Outreach Chair for the Optica Rochester Section, she broadens access to photonics through initiatives such as the Optics Suitcase programme – bringing optical concepts to life for young people.

Amol Delmade

Organisation: Pilot Photonics
Role: Senior Photonics Engineer and Product Strategist
Based in: Dublin, Ireland
Education: PhD, Dublin City University

Amol Delmade's work sits at the critical intersection of innovation, technical depth and strategic foresight. "The proudest moments in my photonics career are not tied to a single event, but are built upon a journey that began in a remote village in India and led to advanced research and an industrial position in Ireland," he reflects.

At Dublin-based Pilot Photonics, he is working on the development of a chip-scale optical frequency generation and conversion unit (O-FGCU). It will use an integrated comb laser assembly (iCLA) with an optical heterodyne technique, to generate an extremely stable, low phase noise, wide range and tunable frequency RF carrier spanning microwave (<30GHz), mm-wave (30-100GHz) and sub-THz (100-300GHz) bands. A single device capable of generating such a wide range of frequencies helps to reduce the cost, footprint, and power consumption of 5G/6G wireless systems.

The O-FGCU goes one step further in integrating optics in wireless networks, by providing an efficient alternative for RF carrier generation and signal conversion to the higher frequency mm-wave and sub-THz bands for 5G/6G systems.

Benjamin Eggleton

Organisation: University of Sydney
Role: Pro Vice Chancellor (Research), Professor
Based in: Sydney, Australia
Education: PhD, University of Sydney

Benjamin Eggleton is a global leader in integrated nonlinear photonics, with a research focus on stimulated Brillouin scattering (SBS), smart sensing, and photonic signal processing. His contributions have redefined the field of on-chip nonlinear optics, enabling significant breakthroughs in chip-based delay lines, filters, and non-reciprocal devices – laying the foundation for on-chip light storage, optical isolation, and microwave photonics.

Eggleton's research departs from conventional optical systems by leveraging third-order nonlinearities, especially SBS, in chip-scale architectures. His group's world-firsts and technical milestones include:

- Brillouin lasers and tunable filters in hybrid silicon–chalcogenide platforms
- Integration of surface acoustic wave (SAW) devices for on-chip acousto-optic control
- Reconfigurable microwave photonic filters for advanced electromagnetic spectrum management.

These technologies aim to offer high-performance alternatives to bulky or power-hungry conventional systems, achieving compact, low-loss, high-coherence functionality with unprecedented tunability and integration potential.

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June 22-25, 2027

Florian Emaury

Organisation: Menhir Photonics
Role: CEO
Based in: Zürich, Switzerland
Education: PhD, Physics, Zürich

After his MSc in Photonics/Physics at the Institute d'Optique Graduate School in Paris, Florian Emaury's career started with intern experiences at specialist laser companies Fianium (UK) and Coherent (CA, USA). He then spent five months as a patent engineer in France. These experiences taught Emaury that there were significant opportunities out there in the world for the right ultrafast laser technology, but that he would need first-class technical knowledge to exploit the potential to the maximum.

To that end, Emaury then undertook his PhD at ETH Zürich under the renowned group of Prof Ursula Keller (herself a Photonics100 honouree in 2023). He researched the development of high-repetition-rate XUV sources based on thin disk oscillators. His post-doctoral work with Prof Keller focused on applications of short-pulse semiconductor lasers. In October 2018, Dr Emaury co-founded Menhir Photonics, the Zürich-based ultrafast laser specialist of which he is CEO. The team offers cutting-edge femtosecond laser solutions in diverse applications.

The company says it has developed femtosecond laser systems reaching a repetition rate of 2.5Ghz with unprecedented reliability and noise performance.

Peter Fendel

Organisation: Thorlabs
Role: Chief Technology Officer
Based in: New Jersey, USA
Education: PhD, LMU Munich

Operating at the interface between academia and industry, Peter Fendel oversees several strategic initiatives at Thorlabs focused on advancing optical and quantum technologies, all aimed at bridging the gap between scientific research and scalable product development. His next-generation photonics platforms aim to address unmet needs in fields such as precision metrology, quantum computing, and life sciences.

His collaborative work has directly benefitted end users by enabling higher precision in atomic clocks, improved signal-to-noise ratios in quantum systems, and better imaging performance in advanced microscopy. Collaboration with research institutions has fostered experimental set-ups that push the frontier of quantum entanglement and timekeeping accuracy.

Dr Fendel believes that the biggest opportunity for the industry in the immediate future lies in advancing photonics integration and miniaturisation. He points out that while PICs are gaining significant traction in data and telecom sectors, broader potential lies in enabling next-generation applications – ranging from precision agriculture and autonomous sensing to industrial-scale quantum computing. Micro-optic solutions, compact, scalable platforms and cross-sector collaboration will all be key, he says.

Jonathan Förste

Organisation: Linque
Role: CTO & Co-Founder
Based in: Munich, Germany
Education: PhD, Physics, LMU Munich

A co-founder at Linque, a recent Bavaria-based start-up, Jonathan Förste's overarching mission is to build cloud and AI-infrastructure using photonic integrated circuits. The team is currently working on the frontier of what is possible in PIC design with regard to size and complexity of individual chips.

Dr Förste has demonstrated a large-scale heterogeneous system including a photonic chip with millions of passive components and more than 100 active components; he has also led the development of proprietary photonic component designs, and filed multiple patents (including two in the past year). The first product available from Linque will be a PIC-based system for optical circuit switching (OCS). This system will allow data centres to drastically reduce the power requirement of the data centre network while offering much faster reconfiguration than conventional OCS technologies such as MEMS or robotics. Because of the radix requirements in the communication-dense environment of data-centres, OCS requires the deployment of the largest and most complex PIC architectures in use today. Dr Förste says the next step for the company is a PIC that allows for purely photonic data processing and computing.

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Jamie Francis-Jones

Organisation: ORCA Computing
Role: Head of Hardware
Based in: Bath, UK
Education: PhD, Quantum Optics and Single Photon Sources, University of Bath

Among the first employees back in 2019, Jamie Francis-Jones has been at the heart of ORCA Computing's success as a leading supplier of photonic quantum computers. He began as part of the team that built ORCA's PT Series. This was a photonic time bin boson sampler which used high-quality single photons, generated through down conversion sources, which Dr Francis-Jones had built during his PhD, combined with a series of reconfigurable time-based interferometer loops. Based on this leading research and product vision, ORCA sold its first PT-1 to the UK's Ministry of Defence in 2022. ORCA has since gone on to supply 10 of these systems worldwide, with Dr Francis-Jones behind every system delivery. He worked within his own team to complete the delivery and testing of these very technically demanding optical/electronic, hardware/software systems but also coordinated engineering efforts to make sure they were stable and worked well once onsite with the customer. Dr Francis-Jones and his team have since delivered ORCA's first PT-2 system, achieving record-breaking quantum light source efficiencies, and very low-loss fibre interferometers and detection.

Goëry Genty

Organisation: Tampere University
Role: Professor, Head of Ultrafast Photonics Research Group
Based in: Tampere, Finland
Education: PhD, Helsinki University of Technology (now Aalto)

A pioneer in his field, Goëry Genty has advanced several concepts for advanced supercontinuum and frequency comb generation, and characterisation of ultrashort pulses and coherent structures evolution in real time. The latter allowed phenomena to be observed that previously had only been theorised. The work gave a push to deepening the understanding of – and furthering new applications in – real-time spectroscopy, imaging, and sensing. His latest work develops broadband structured light sources based on nonlinear effects in multimode optical fibres, covering wavelengths from the UV to the mid-IR. By using tailored fibre designs and controlling intermodal nonlinearities, the team generates high-brightness supercontinuum beams with spatial structure – including broadband Bessel beams and beams carrying orbital angular momentum. Unlike single-mode systems, multimode fibres offer higher energy handling and access to rich spatial-spectral dynamics. In parallel, Prof Genty is exploring how these nonlinear multimode interactions can be used for analogue optical computing. Prof Genty is also renowned as an excellent educator and supervisor for PhD students and postdocs, as well as a mentor for junior professors.

Åsa Haglund

Organisation: Chalmers University of Technology
Role: Full Professor, Photonics, Microtechnology and Nanoscience
Based in: Gothenburg, Sweden
Education: PhD, Electrical Engineering, Chalmers University of Technology

Åsa Haglund develops future semiconductor-based surface-emitting lasers at short wavelengths (blue and ultraviolet). Recent contributions are the world's first UVB (280-320nm) vertical-cavity surface-emitting laser (VCSEL), the first UVB resonant-cavity LED, the first UVC (<280nm) vertical-cavity surface-emitting laser with accurate cavity length control and the first UVB and UVC photonic crystal surface-emitting laser (PCSEL). The VCSELs and RCLEDs are enabled by a technology Prof Haglund's team has developed for substrate removal for UV devices that yields accurate cavity length control (thickness deviation <1%) combined with high reflectivity dielectric mirrors (since epitaxial mirrors are not good enough at these wavelengths). The RCLEDs are electrically driven, the next step in the group's development of both VCSELs and PCSELs.

Today's commercial UVB and UVC lasers are excimer and frequency-converted solid-state lasers. Prof Haglund argues that a semiconductor laser can offer a compact, power-efficient and low-cost light source. PCSELs offer outstanding beam quality with beam divergence of less than one degree.

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Karen Hall

Organisation: G&H (Gooch & Housego)
Role: Production Operator
Based in: Torquay, UK

You don't need a PhD and years of university research to make a difference in photonics – Karen Hall demonstrates clear evidence. As a Production Operator who has worked her way up through dedication and skill, she exemplifies the spirit of innovation and drive central to the photonics landscape.

With more than two decades of experience at G&H Torquay, she has become a cornerstone of photonics craftsmanship, consistently pushing the boundaries of what's possible in fibre optic engineering. Her recent work on the JAXA LUCAS project – a milestone achievement in satellite communications – demonstrates her technical expertise, dedication and collaborative spirit.

Hall played a pivotal role in enabling the world's first optical inter-satellite transmission at 1.55µm and 1.8Gbps between two satellites 40,000km apart. Colleagues point out that her hands-on work – ranging from precision soldering to splicing the entire fibre network, and assembling critical laser and photodiode modules – was central to the project's success. Her holistic approach and deep understanding of how each component contributes to the whole system reflect her mastery of the photonics craft.

Frank Heine

Organisation: Tesat-Spacecom
Role: Chief Developer for Laser Systems
Based in: Stuttgart, Germany
Education: PhD, University of Hamburg

Frank Heine leads the laser systems engineering and development department at Tesat-Spacecom, a fully independent subsidiary of Airbus that develops, produces and tests telecommunications payloads for satellites and is a leader in laser communications technology.

After completing his PhD at the University of Hamburg in 1995, which focused on upconversion and single-frequency lasers, Dr Heine joined Tesat, with responsibility for space laser development. He then spent five years from 2006 bringing to fruition the TAU laser communication terminal. Heine has led the systems engineering team since 2011. As well as providing conference papers with updates of laser communication activities at Tesat-Spacecom, Dr Heine's publication topics include free-space optical communications, binary phase shift keying, adaptive optics, atmospheric turbulence, earth observation, and heterodyne and homodyne detection.

Dr Heine has published more than 140 papers, with 2,500 citations. Most recently he contributed 'Demonstration of an Intradyne BPSK Communication System with a GEO Space Ground Link to the T-AOGS'.

In July, it was announced that, together with Fraunhofer IOF and SPACEOPTIX, Tesat had developed a transmitting and receiving telescope for satellite-based laser communication, which could form the basis for such a network as a series product.

The first flight models were delivered to Tesat in June 2025. Heine said the telescope is a key component for Tesat's SCOT135 system and that the collaboration "has brought us a big step closer to our goal of becoming a central enabler for European laser communication, not only for near-Earth laser-based satellite networks but also in medium and geostationary orbits".

Yves Hernandez

Organisation: Multitel
Role: Head of Applied Photonics Department
Based in: Mons, Belgium
Education: PhD, Optoelectronics, IEMN, France

Multitel is a 70-strong Belgium-based non-profit independent research centre with close links to the University of Mons. Having joined Multitel in 2003, Yves Hernandez has led the Applied Photonics department since 2013, and offers extensive experience in the development of laser sources, processes and monitoring systems. His multi-domain versatility stretches from fibre laser and fibre optic sensors to biosensors and biophotonics systems, imaging and metrology. Dr Hernandez coordinates and participates in many research projects. Key examples include the ESSIAL project (Electrical Steel Structuring, Insulating and Assembling by Means of Laser Technologies). The objective is to use laser surface texturing to improve the performance and functionalities of laminated magnetic circuits.

Dr Hernandez's team developed laser processes for optimal magnetic domains refinement, exploring all possibilities from femtosecond pulses to continuous wave technologies. Another project, Laser4Surf, explored how laser structuring can alter and improve the properties or performance of metals, giving his team the opportunity to learn more about Laser-Induced Periodic Surface Structures (LIPSS).

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Barmak Heshmat

Organisation: Brelyon
Role: CEO
Based in: San Mateo, USA
Education: Research Scientist, MIT

Barmak Heshmat is an exciting innovator in the field of immersive digital experiences. Recognising the limitations and discomforts of traditional VR and AR headsets, Dr Heshmat foresaw a future where immersive, panoramic visuals could be delivered without the need for wearables.

Heshmat's forward-thinking approach led to the creation of Brelyon's flagship product, Ultra Reality, a forerunner of immersive technology, offering a 4K, 122-inch panoramic virtual screen that fills up to 110 degrees of your field of vision – all without the need for a headset. Previously Head of Optics at Meta AR and Research Scientist at MIT Media Lab, Heshmat has dozens of patents, academic publications, and invited talks, including several TED Conferences. He also won the Paul Forman Award from OSA/Optica as the best optics team in the world in 2023. Heshmat recently unveiled Ultra Reality Extend, the world's first generative display system with two layers of depth, including autogenerated augmented-reality style overlays. By translating advanced photonics research into practical, frictionless user experiences, Heshmat has addressed longstanding challenges in immersive technology and also raised the bar in setting user expectations.

Jens Hofrichter

Organisation: Lightium AG
Role: VP Engineering
Based in: Zürich, Switzerland
Education: PhD, Photonics, TU Eindhoven

With a track record of more than 15 years in bringing technology from initial concept to practical use in the wider world, Jens Hofrichter is a great example of a 'can-do' industry professional, well versed in leading successful multinational teams and projects. He describes his background as semiconductors, integrated photonics and imaging sensors, but says his speciality is managing high-risk, high-impact technology development projects. Dr Hofrichter's nominators praise his in-depth understanding of photonics, manufacturing techniques and the physics behind them, in addition to his visionary thinking; these qualities enable the development and selection of subsystems for photonics-driven systems of the highest complexity.

Recent examples include his work at Liom Health on the development of glucose-sensing devices culminating in the world's first calibration-free measurement of glucose through skin. Hofrichter is now at Lightium and bringing thin-film lithium niobate (TFLN) technology – in his own neat turn of phrase – "from the lab to the fab". Lightium is a pure-play foundry enabling foundry access for high-volume production of TFLN designs for next-generation transceivers deployed in data centres.

Qian Hu

Organisation: Nokia Bell Labs
Role: Senior Scientist
Based in: New Jersey, USA
Education: PhD, Optical Fibre Communications, University of Melbourne, Australia

Qian Hu is a pioneer in the field of optical transmission, seeking ways to overcome the limits of analogue bandwidth. Her work has led to a number of record-throughput optical transmission experimental demonstrations.

Optical and electronic components have limited analogue bandwidths, which make symbol rate growth insignificant using existing technologies. At Nokia Bell Labs, Dr Hu devises solutions for scaling optical transmission symbol rate to enable future high-speed optical interconnects. She looks at both the hardware and the signal processing side. For the latter, Dr Hu works on advanced digital signal processing (DSP) schemes that enable efficient use of available bandwidth, such as bandwidth-limitation-tolerant partial response signalling using simplified DSP. From the hardware side, her team develops the capability of novel ultrahigh-speed electronic components – analogue multiplexers and demultiplexers – designed to allow for analogue bandwidth extension, as well as new broadband optical modulators and photodetectors. The goal is to enable 400G/lane or faster optical interconnects. Her team recently demonstrated the first beyond-500-Gbit/s optical link based on IM/DD in a single optical lane.

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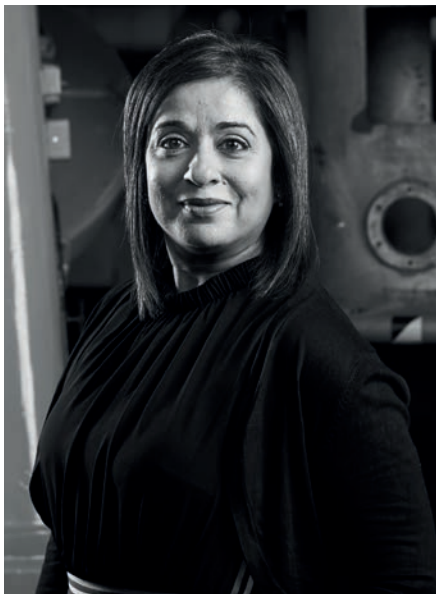


Shahida Imani

Organisation: Singular Photonics
Role: CEO and Co-Founder
Based in: Edinburgh, UK
Education: BA, Accountancy and Finance, Heriot-Watt University, Scotland; MIT Sloan School of Management

Shahida Imani's career proves that there is more than one way to forge a career in deep tech and photonics. Without formal science qualifications, she has built a deep understanding of the industry, working for a number of companies, raising capital, scaling up and expanding businesses. She is also a board director at EPIC and currently chair of the Photonics Leadership Group. "An unconventional background can bring fresh perspectives, diverse skills, and a more resilient mindset," she reflects. "What matters most is not how you got started, but how committed you are to where you're going." Imani is now CEO and Co-Founder of Singular Photonics (2024), a fabless semiconductor company that brings next-generation Single Photon Avalanche Diodes (SPADs) to market. Efforts are centred on unleashing the computational potential of SPADs.

The core focus is to redefine SPAD capabilities through embedded, real-time processing and adaptive signal analysis – directly on-chip. This intelligence integrates cutting-edge signal processing and computational imaging techniques within the sensor architecture itself, going beyond raw photon detection to enable real-time, meaningful data extraction.

Chennupati Jagadish

Organisation: Australian National University
Role: Distinguished Professor Emeritus, Head of Semiconductor Optoelectronics and Nanotechnology Group
Based in: Canberra, Australia
Education: PhD, Delhi University

Based at the Australian National University (ANU) in Canberra for more than 35 years, Chennupati Jagadish is an acknowledged leader in the research field of semiconductor optoelectronics. He has pioneered novel delta doping and wavelength-shifting processes in III-V compound semiconductors that have led to innovative quantum well, quantum wire and quantum dot lasers. These achievements have been predicated on a deep understanding of the underlaying solid state physics including defects and diffusion processing. His work on quantum dots is particularly noteworthy: his group has established several firsts in the growth of new structures by metal organic chemical vapour deposition coupled with novel processing that has led to several world records for device performance

He has published more than 750 journal papers; given more than 230 plenary/keynote and invited talks and trained 60+ PhD students and 50+ post-doctoral fellows and research fellows. Prof Jagadish created 'The Chennupati and Vidya Jagadish Endowment' to support the next generation of scientists from the developing world to study and gain research experience at ANU.

Aleksandra Kaszubowska-Anandarajah

Organisation: Trinity College Dublin
Role: Assistant Professor, Electrical and Electronic Engineering
Based in: Dublin, Ireland
Education: PhD, Optical Communication, Dublin City University

Aleksandra Kaszubowska-Anandarajah is coordinator of the Horizon Europe project, leading the work on creating a pathway for fibre sensing to become an integral service in optical transmission systems. The result will be an Intent and Context-aware Optical Network (ICON) – a new optical network built and operated using the joint communication and sensing concept (JC&S). This work looks at a portfolio of flexible sensing technologies that could be deployed to serve multiple applications simultaneously. It enables the correlation of data gathered from multiple locations to create a comprehensive picture of the fibre infrastructure and surrounding area for critical infrastructure protection. It also integrates sensing into the network management system, allowing sensing signals to be controlled and routed through the network like data channels. Network operators will be able to deploy the various or most appropriate fibre sensing technologies in different parts of the network at different times, providing balance between the cost, environmental impact and performance.

Francis Kalloor Joseph

Organisation: Erasmus Medical Centre

Role: Assistant Professor

Based in: Enschede, the Netherlands

Education: PhD, Indian Institute of Technology, Hyderabad; Fulbright Scholar and Fellow, University of Rochester, NY

Holder of a Fulbright Fellowship, Francis Kalloor Joseph is a notable rising talent in the field of biomedical optics and photoacoustics. His work aims to make a significant impact in the field of vascular health. Dr Kalloor Joseph's current work at the Erasmus Medical Centre in The Netherlands focuses on developing and translating low-cost photoacoustic imaging systems for clinical use, specifically in the area of stroke prevention. He has developed a compact, multi-wavelength photoacoustic system that uses diode lasers instead of traditional high-energy lasers, which he says are both bulky and expensive. This approach reduces cost and system complexity, making photoacoustic imaging more accessible for clinical use.

A key application he is targeting is carotid plaque imaging to identify vulnerable plaques as critical indicators of stroke risk, rather than the current clinical method, which assesses the degree of stenosis [narrowing of a blood vessel]. Existing imaging methods cannot reliably assess plaque composition. Kalloor Joseph's system has demonstrated, for the first time, in vivo imaging of the carotid artery using laser diode-based photoacoustics, offering a practical system towards plaque quantification imaging.

Another major contribution of his work is a novel method for quantifying plaque composition. A known challenge in carotid photoacoustic imaging is spectral colouring, where overlying tissue alters the wavelength-dependent photoacoustic signal from the plaque, reducing accuracy. For the first time, he has addressed this by using blood inside the arterial lumen as a reference chromophore, allowing for more accurate interpretation of the plaque signal. He claims this method is not only more accurate but also far more practical than existing inversion-based approaches, which are computationally intensive and less feasible in an in vivo setting.

His team is currently conducting clinical studies among patients undergoing carotid surgery, comparing imaging results with extracted plaques. This ongoing validation brings the world closer to a real-world diagnostic tool that can improve stroke risk assessment and reduce unnecessary interventions. Dr Kalloor Joseph points out that future potential extends beyond stroke prevention. The same platform could be adapted for other deep-tissue vascular and oncology applications, offering a versatile and cost-effective tool for non-invasive diagnostics across multiple specialisms.

"If we can demonstrate robust clinical results and overcome these limitations, photoacoustics has a real chance to move beyond research labs"

Multiple challenges remain, of course, including clinical validation of photoacoustic imaging technologies in real-world healthcare settings. While research has shown promise, translating these systems into consistent, reproducible clinical tools remains a major hurdle.

In his work on carotid plaque imaging, two technical barriers stand out. First, achieving sufficient imaging depth across a broad patient population is essential. In many patients, especially those with higher BMI, the carotid arteries lie deeper than the imaging range of current photoacoustic systems. Improving signal strength while staying within safety limits will be critical for adoption. Kalloor Joseph is working on optimising the probe design to achieve deeper tissue imaging and developing signal processing and deep learning techniques to enhance signals from deep targets.

Second, skin tone remains a significant limitation. Patients with darker skin absorb more of the incoming light, reducing the energy that reaches deeper tissues. This can impact the clinical usability of photoacoustics in diverse populations. To address this, improved illumination strategies and more sensitive detectors are needed. Integration into clinical workflows is also often overlooked. Even with strong imaging performance, systems must be fast, intuitive, and compatible with existing diagnostic routines. His approach is to combine photoacoustic imaging with conventional ultrasound, creating a clinically attractive add-on that fits naturally into existing workflows.

He has momentum. "If we can demonstrate robust clinical results and overcome these limitations, photoacoustics has a real chance to move beyond research labs and into routine patient care," he predicts. "Over the next 12 months, my focus is on closing that gap."

Building a better business together: exploring Chroma Technology's employee-owned culture

How the Vermont-based manufacturer recruits smartly and has built an enviable culture that is based on respect, support and shared ownership

In an era where companies grapple with attracting and retaining talent, Chroma Technology has built a workplace model that many organisations aspire to but few achieve. The Vermont-based manufacturer of precision optical filters is not only a global leader in its field, but also a pioneer in redefining what it means to be both successful and equitable.

At Chroma, every employee is also an owner – and that makes all the difference.

Electro Optics spoke to Nicholas Day, Engineering Manager; Jennifer Lee, Director of Marketing; and Sarah Sanctuary, HR Generalist from Human Resources, about what makes Chroma a great place to work. Ask almost anyone this about their employment, and the answer is almost always consistent: the people, but there's a difference at Chroma. "Everyone gets shares here," explains Day. "The company was founded by six people, and when they went to hire the seventh person, they decided they didn't want just an employee – they wanted another co-owner. So, they established that shares are distributed freely and evenly among emplyees annually. The company purchases the shares on behalf of employees – they don't have to buy in themselves. This is quite different from most employee-owned companies where people either need to buy in or receive different amounts based on stock option incentives."

"Ultimate power rests with the employee body"

Nicholas Day, Engineering Manager

This has helped create a culture built on sincerity, collaboration, and a shared sense of responsibility. Colleagues support one another both at work and in the community, creating an environment where kindness is the norm and success is collective. Unlike traditional corporations where decision-making is concentrated at the top, Chroma's 100% employee-owned and governed model ensures that business choices benefit both the organisation and the people that power it. That sense of ownership instills pride and accountability, but also fosters something harder to quantify: a genuine feeling of family. "At Chroma, you don't just work with colleagues – you work with co-owners who want you to succeed," says Lee.

Ownership that empowers

"On our share distribution day, we had a barbecue, and an ice cream food truck, and everyone got their share certificates along with some Chroma swag," says Day. "We're trying to make it more of a celebration now. We even have special branded binders for people to keep their share certificates in!"

The number of shares distributed is decided in board meetings, which are open to all employees, so there's complete transparency in the process. Governance of the company, which was launched in 1991, is equally distinctive: the Board is composed entirely of elected employee-owners alongside the CEO and one of the founders. This structure – intentionally designed by Chroma's founders – ensures that power remains with those who actively contribute. By relinquishing personal wealth and control, the founders empowered employees to shape the future of the company. The results have been profound: financial security, genuine accountability, and a workplace where every employee literally owns a piece of the success they help create.

"You work with co-owners who want you to succeed"

Jennifer Lee, Director of Marketing

"Our board meetings are open to all," says Day, who has served on it. "There are closed sessions for privacy and confidentiality reasons, but the main meetings are open. Our board of directors is made up entirely of current employee-owners, elected by the employee-owners. The only people making decisions about what happens at the company are ourselves – your co-workers. Sometimes it takes new employees a while to realise that the person making board decisions is the same person working right next to them. You voted them onto the board, and you can vote them off. The ultimate power rests with the employee body."

The benefits are impressive too:

- Cash profit sharing (with the same dollar amount going to all)
- Stock profit sharing (same share to all)

- 401k contributions (same % of total to all, with no matching needed)
- Generous paid time off, including two weeks of flexible sick/personal time
- Very generous healthcare, with very low copays and premiums (to help control costs, Chroma Technology is self-insured for the first several tens of thousands of dollars of costs)
- Employee Assistance Plan (EAP)
- Business travel accident and assistance plan
- Education assistance
- Professional memberships assistance
- An onsite nurse, onsite chiropractor, onsite massage, health coaching services, and wellness benefits
- Sabbatical leave, parental leave, and other leaves of absence
- Relocation assistance
- Flu shots
- Paid volunteer time and matching donation ($5/hr of employee service donated to the organisation)
- Financial advisor services

Employees expand their skills through education assistance, conferences, and industry memberships. Internal mobility is common, with team members advancing into new roles thanks to both formal learning and peer mentorship. Collaboration and mastery are part of everyday life, with coworkers teaching and supporting each other.

Values that guide daily work

Chroma's core values – employee ownership; equity; lasting relationships (where enduring relationships with its customers and employees, based on respect, honesty, and fulfilling its commitments by providing exceptional customer service, delivering products of the highest quality, and investing in itself, are valued); community, and mastery, are not abstract ideals. They shape daily experiences and long-term career development. "The core values weren't set up by the founders 30 years ago – they're relatively recent," says Day.

"We started with company-wide surveys and conversations because people talked a lot about 'Chroma culture' but it wasn't documented. We gathered broad feedback on what people thought defined our culture, then the board of directors worked with executives and HR to distill this down. We also worked with the original founders to ensure alignment with what they were trying to create."

Sanctuary explains that this diligence of approach follows through into the assessment of how they are working. "Those values are not something we rate people on in performance reviews – they're lived out naturally," she says. "However, they do come up in board meetings as guideposts for tough decisions. Having them stated and agreed upon gives us something concrete to refer to rather than just saying something is 'against Chroma values'."

The company's commitment to the community is equally strong. Internally, social events and celebrations build connections. Externally, Chroma actively supports Vermont communities through charitable donations, volunteerism, and direct response in times of crisis. When recent flooding left residents stranded, Chroma opened its facility as a safe refuge – demonstrating that its values extend beyond the factory floor.

Chroma's values are reinforced by its Certified B Corporation status, a designation reserved for businesses meeting the highest standards of social and environmental performance. For Chroma, certification is not a marketing badge but a framework for accountability. It sets clear expectations that the company will operate as a better business – not just a profitable one. The certification process has also broadened Chroma's perspective, identifying new ways to improve and ensuring the company continues to balance purpose and profit.

Recruitment and the 'Chroma Person'

Hiring at Chroma is as intentional as its governance. Employee-owner teams participate directly in recruitment, ensuring that new hires are not only technically capable but also aligned with Chroma's values. A 'Chroma person' may be new to employee ownership, but they must naturally embody qualities of fairness, collaboration, and community. Once hired, employees are then supported through cross-department tours, job shadowing, and professional development – fostering strong relationships and broad understanding. "In truth, we don't track KPIs for issues such as retention because it's never really been an issue," says Sanctuary.

"Of our 173 employees, 65 have been here over 10 years and 23 over 20 years. We recently had a group of retirees, and one benefit of being employee-owned is that people can sometimes retire early if they want to, while others choose to stay longer because they love it.

"A 'Chroma person' is someone who demonstrates through their past actions that they share our core values," says Day. "Our interview process focuses on what people have actually done, not hypothetical 'what would you do' questions.

"We look for that alignment with core values. Many people who we interview don't know what employee ownership is, but if they show dedication and commitment in how they have approached past responsibilities, it's easier to see them as a future fellow employee-owner."

"We need people who are self-driven, because we have a lot of autonomy here," says Lee. "We also look for people who demonstrate responsibility and a degree of entrepreneurialism – we don't want people just fulfilling tasks without engagement."

"Core values ... are lived out naturally"

Sarah Sanctuary, HR Generalist

Shared recognition, and a demonstrable sense of shared pride

For Chroma's employee-owners, industry recognition carries deep meaning. Being honoured as a global leader in precision optical filters validates the technical excellence and dedication of the entire workforce. Partnerships, such as with the Photonics100, which celebrates innovators in the field, reinforce Chroma's reputation for innovation while highlighting the talent within its own teams.

Chroma's ownership model creates a workplace dynamic distinct from most organisations. Decision-making often requires balancing personal and company-wide interests, encouraging a culture of responsibility and long-term thinking.

While shared ownership might sometimes lead to caution, Chroma counters this with entrepreneurial agility and a structure that rewards both prudence and progress. The impact is visible: high retention, deep engagement, and a workforce motivated by both financial and cultural rewards.

At its core, Chroma is more than a manufacturer of world-class optical filters. It is a living example of how employee ownership, equitable practices, and strong values can redefine corporate success. For employees, it means financial security, professional growth, and the pride of working for a company that reflects their values. For customers and communities, it means trusted relationships, social impact, and uncompromising quality.

In a business landscape often dominated by short-term gains and shareholder primacy, Chroma offers a truly different path – one where purpose and profit move in lockstep, and where ownership is not a privilege for the few but a shared responsibility for the many. ■

www.chroma.com

Richard Kim

Organisation: Laser Components Detector Group
Role: Director of R&D
Based in: Arizona, USA
Education: PhD, Materials Sciences and Engineering, UCLA

With more than 60 papers published and dozens of US and Korean patents, Richard Kim has been an integral part of the photonics industry, solving real-world challenges through dedicated engineering.

Before joining Laser Components, Dr Kim held other senior positions in California. During this time, he was responsible for developments in various semiconductor material technologies, including in mid-wave infrared (MWIR) detectors based on InAsSb, InAs/GaSb Type-II Superlattice (T2SL) structures, and MWIR ICLEDs. These projects have led to advancements in several industries such as aerospace, defence and industrial imaging. His research has also delved into enhancements for a variety of semiconductors, such as silicon UV detectors and photonic integrated waveguide circuits based on III-V and $LiNbO_3$ materials.

Since joining Laser Components in 2023, Dr Kim has made significant contributions to its global portfolio of photodetectors and infrared (IR) technologies and has been responsible for designing the latest in several product lines, including avalanche photodiodes, and photoconductive and pyroelectric detectors.

Shin-Sung Kim

Organisation: Ansys
Role: Senior Principal Application Engineer
Based in: UK
Education: PhD, Electrical and Electronics Engineering, University of Glasgow

After more than a decade at simulation software specialist Ansys, Shin-Sung Kim is renowned for his contributions to hybrid-scale optical simulations and multiphysics workflow development.

Dr Kim leads a team at Ansys focused on developing workflows for multi-scale multiphysics optical applications. His efforts have been instrumental in creating automated, multiplatform solutions that facilitate seamless integration and accurate modelling across various platforms. These innovations are crucial to addressing the complexities of modern photonic system design, including applications such as co-packaged optics. Graduating with an MSc at Seoul National University before progressing to a PhD in Electrical and Electronics Engineering from the University of Glasgow, Dr Kim's research encompasses high-power semiconductor lasers, quantum well intermixing, photonic wires and novel e-beam lithography techniques. Dr Kim has spoken at prominent events such as the Optica Advanced Manufacturing Alliance. His presentations, including 'Bridging the Gap in Hybrid-Scale Optics Simulations to Enable Innovation', highlight his commitment to advancing the field through collaboration and knowledge sharing.

Tobias Kippenberg

Organisation: École Polytechnique Fédérale de Lausanne (EPFL)
Role: Full Professor
Based in: Lausanne, Switzerland
Education: PhD, Caltech

Tobias Kippenberg leads the Laboratory of Photonics and Quantum Measurements at EPFL. He is an acknowledged leader in innovative microfabrication techniques, both in crystalline microresonators and through his introduction and perfection of the photonic damascene process in the silicon nitride platform. His research highlights include the science and applications of ultra-high-Q microcavities; specifically, with his research group, he discovered chip-scale Kerr frequency comb generation (Nature 2007, Science 2011) and observed radiation pressure backaction effects in microresonators that have now developed into the field of cavity optomechanics.

Prof Kippenberg has won many awards, including the Swiss Latsis Prize (2014), the Fellowship of the APS (2016) and the ZEISS Research Award (2018). He received several 'young scientist' prizes, including First Prize in Physics at the German National Science Contest in 1996. He has been published in more than 70 peer-reviewed journals, including Cavity Optomechanics (2014) with over 6,700 citations, and Ultra-High Q Toroid Microcavity on a Chip (2003) with almost 3,000 citations.

Sanathana Konugolu Venkata Sekar

Organisation: Tyndall National Institute

Role: Head of FAST Biophotonics, Tyndall National Institute; Associate Professor, School of Physics; CEO, BioPixS

Based in: Cork, Ireland

Education: PhD, Polytechnic of Milan

Sanathana Konugolu Venkata Sekar leads transformative work at the intersection of biophotonics, health equity, photonic integration, and technology standardisation. His research integrates cutting-edge optical science with real-world impact, addressing urgent global challenges in healthcare accessibility, diagnostic reliability, and inclusive innovation.

In 2024, Prof Konugolu Venkata Sekar was awarded a prestigious European Research Council (ERC) Grant for his groundbreaking project, NOBIAS, which directly tackles racial bias in non-invasive optical health monitoring. This project utilises time-domain diffuse optical spectroscopy (TD-DOS) – a technology covered by four of his patents – to enable accurate and equitable physiological sensing across all skin tones. He explains that conventional optical sensing systems often struggle with melanin-related absorption variability, resulting in biased diagnostics. NOBIAS advances this field by developing inherently inclusive measurement systems, thereby improving accuracy for underserved populations and exemplifying responsible technology development. Complementing this, he is also the Co-Founder and CEO of BioPixS, the world's first spin-out dedicated to standardisation in biophotonics. His team designs and globally distributes optical tissue phantoms that replicate a wide range of tissue types and skin tones. These phantoms fill a critical gap in the clinical translation pipeline by providing a benchmark for validating wearable and medical optical devices. The company's products – distributed through partners such as Edmund Optics – are now used by manufacturers and researchers worldwide to ensure device performance is robust, unbiased, and clinically relevant.

Another emerging area of his work focuses on PICs for biophotonics applications. By miniaturising complex optical systems onto chip-scale platforms, his team is helping to pave the way for portable, low-cost, and high-performance diagnostics. Prof Konugolu Venkata Sekar's group is exploring how to integrate TD-DOS and other optical modalities onto PICs, unlocking new capabilities for wearable diagnostics and personalised healthcare technologies. This integration represents a convergence of the scalability, functionality, and affordability deemed crucial for the future of global health technologies. The potential impact of his work ranges from chip-based diagnostics and standardised clinical validation tools to equitable sensing algorithms and open-science frameworks. In essence, he says his work bridges fundamental photonics, translational research, and global leadership, driving a future where biophotonics technologies are not only advanced but also equitable, scalable, and universally accessible. He says a key obstacle in the implementation of such advances for the photonics industry in the medium-term is the lack of standardisation and regulatory readiness for emerging optical health technologies. At the same time, he argues that there is a major opportunity to develop benchmarking tools and validation protocols that are essential for clinical translation. He points out that the industry must invest in interdisciplinary collaboration, pilot manufacturing, and the integration of optical modalities into PICs. "Regulatory alignment and the adoption of open-science practices will be critical for widespread adoption. Cross-sector efforts should focus on translating laboratory innovations into real-world solutions. This is a pivotal moment to build photonics technologies that are not only advanced, but also impactful and globally accessible," he argues. In addition to his research portfolio, Prof Konugolu Venkata Sekar contributes to international standards development as part of the IEC working group on oximeter standards, helping ensure that device regulations are grounded in scientific rigour and inclusivity. He also serves on the Board of Meetings at OPTICA, where he helps guide the strategic direction of photonics conferences and community engagement. He is committed to mentoring the next generation of interdisciplinary researchers, currently supervising 12 PhD students and organising global panels on skin-tone bias, standardisation, and responsible innovation.

He has co-authored 83 publications, with 11,900 reads and 878 citations to date (ResearchGate, August 2025).

"This is a pivotal moment to build photonic technologies that are not only advanced, but also impactful and globally accessible"

Olga Korotkova

Organisation: University of Miami
Role: Professor of Physics
Based in: Miami, USA
Education: PhD, Mathematics, University of Central Florida

For several years, Olga Korotkova's work at the University of Miami has been dedicated to research in the field of orbital angular momentum (OAM) of light and its mode-to-mode characterisation in deterministic and random fields.

Such a characterisation plays a pivotal role in designing and optimising OAM-based optical systems, including imaging, sensing, and communications, operating in free space and in the presence of random media, such as atmospheric and oceanic turbulence and bio-tissues. The field of structured optical coherence originated in 2012 with her team's first models illustrating complete control of light intensity. She has published two monographs and more than 200 peer-reviewed papers on these subjects. She has co-authored more than 360 publications, with over 43,000 reads and 11,500 citations. Prof Korotkova has served for Optica (formerly OSA) for more than 15 years, both as the topical editor of Optics Letters and the Founding Associate Editor of OSA Continuum, and chairing conferences on 3D optical turbulence. She has also chaired SPIE conferences on atmospheric and oceanic light propagation.

Johannes Kriegler

Organisation: BMW Group
Role: Subject Area Lead Electrode Development All-Solid-State Battery
Based in: Munich, Germany
Education: BEng, Technical University of Munich

Johannes Kriegler is a specialist in the research, development, and production of next-generation batteries; he is nominated for the Photonics100 for his work in laser material processing.

All-solid-state battery (ASSB) technology is seen as an exciting opportunity to increase driving range in electric vehicles, thanks to its vast capacity provision and enhanced capability for fast charging.

Besides his excellent all-round battery knowledge, Kriegler is a highly regarded expert and researcher in ultra-short pulsed laser material processing. His research addresses issues in the manufacture of sulphuric and ceramic ASSBs. He developed cathodes using porous LATP/LLZO frameworks with surfaces modified by ultra-short pulsed laser radiation to infiltrate them with the active material. As a result, solid–solid resistance was reduced significantly and ionic conductivity was boosted by nearly 50%. Assessing different manufacturing strategies for tailoring a porous structure, he paved the way for enhanced electrode properties and for mass production. Kriegler also established a micro-environment for laser processing of pure lithium metal which is necessary to the manufacturing process chain of ASSBs.

Michael Kues

Organisation: Leibniz University Hannover
Role: University Professor
Based in: Hannover, Germany
Education: PhD, University of Münster, Germany

"Explore the unconventional," advises Michael Kues, a rising star in photonics thanks to his expertise in photonic quantum technology. His own explorations focus on methods to combine the conventional internet with the quantum internet in order to create compact and powerful photonic systems for quantum key exchange.

Prof Kues asserts that scalable photonic quantum systems are essential for the future of quantum computing, sensing, and secure communication. His team is currently working on developing compact fully laser-integrated quantum light sources, as well as a new way of encoding quantum information using light frequencies. Benefits include enabling users to share secure quantum connections and reducing hardware overheads. This will facilitate a powerful platform to scalable employment of quantum networks, supporting everything from next-gen computing to ultra-sensitive measurement tools. His next challenge is robust systems involving the standardisation of chip component fabrication and the development of interfaces to electronic chip systems, laying the foundation for a new era of photonic-based quantum technologies.

Sabina Kuprenaite

Organisation: OPTOMAN
Role: Senior Research Engineer
Based in: Vilnius, Lithuania
Education: PhD

Sabina Kuprenaite works at OPTOMAN on the important development of non-degrading optical coatings for high-power laser systems, with a strong focus on UV and ultrafast applications. Her team is currently pushing the limits of ion beam sputtering (IBS) technology to deliver optics that not only withstand extreme laser environments but also maintain their performance over time, resisting the laser-induced degradation that can commonly impact system stability and uptime.

One of Kuprenaite's key projects is the development of UV optics with stable performance under prolonged irradiation, a common pain point for system integrators working with deep-UV wavelengths. While many conventional coatings demonstrate good initial laser-induced damage threshold (LIDT) values, they deteriorate rapidly due to photochemical damage and contamination-driven instabilities.

Enhanced performance is achieved through a combination of IBS technology and application-specific coating designs. These coatings are now in use in industrial micromachining systems and scientific beamlines, helping users avoid costly re-alignments and downtime.

Under her guidance as Senior Research Engineer, OPTOMAN's coatings won an Innovation Award at Laser World of Photonics 2025. The award recognised years of focused R&D into making coatings truly "non-degrading" in regimes where lasers are harshest on optics – high-power ultrafast pulses and deep UV wavelengths. For Kuprenaite, this recognition stands as one of her proudest professional moments, both for the technical achievement and for the teamwork it represented.

What makes the achievement so significant is the gap between lab metrics and real-world reliability. In laser optics, coatings are often benchmarked by their LIDT. While many products score well in controlled tests, their performance degrades quickly with continuous operation – especially under UV irradiation – leading to instability, re-alignments, and downtime. By refining IBS processes and tailoring coatings to specific applications, Kuprenaite's team at OPTOMAN developed optics that maintain stability across thousands of hours of operation. According to their research, no other market player has publicly demonstrated lifetime non-degrading optics measurement data to the same extent, making the work both pioneering and commercially disruptive. For customers, this translates directly into value: more reliable systems with less risk of failure during demanding operations equals lower maintenance costs, longer system lifetimes and, ultimately, lower total cost of ownership (TCO). Looking ahead, Kuprenaite sees the industry entering a phase of intensifying power scaling. Ultrafast lasers, deep-UV sources, and compact high-energy systems are pushing optics closer to their physical material limits. The trend, however, as Kuprenaite points out, presents both an opportunity and a challenge. On one hand, it creates demand for coatings that are more resilient, stable, and sustainable than ever before. On the other, it forces suppliers to balance technical innovation with economic viability.

"What really sets you apart is the ability to connect fundamental science with real-world applications. That means asking 'why' and 'what if'..."

Kuprenaite's perspective is informed not only by her technical expertise but also by her broader outlook on innovation. When asked what advice she would give to others, she highlights curiosity. "Working in high-performance laser optics demands a strong technical foundation," she says, "but what really sets you apart is the ability to connect fundamental science with real-world applications. That means asking 'why?' and 'what if?, then having the patience to experiment, test and refine."

She also stresses the importance of speaking the two languages of photonics: materials and lasers. Understanding how coatings behave is not enough in isolation; one must also appreciate how those coatings behave within a full system, and how design decisions ripple outward into performance, stability, and wider customer outcomes, she says. Just as crucial is surrounding yourself with people who are smarter in different ways, creating the kind of environment where shared expertise drives breakthroughs.

Vladislav Lang

Organisation: New Technologies Research Centre, University of West Bohemia
Role: Senior Researcher
Based in: Pilsen, Czechia
Education: PhD, University of West Bohemia, Czechia

Vladislav Lang is recognised for his sustained contributions to the field of photonics education and innovation, particularly in the development and dissemination of infrared (IR) camera technology. Over the past six years, Dr Lang has led the visionary development of IR cameras tailored for education, notably as part of the LabIR EDU project.

His work has empowered more than 30,000 students across Czechia – and increasingly internationally – to experiment with thermal imaging in chemistry, physics, environmental studies, and interdisciplinary science projects. This initiative has fundamentally changed how thermal imaging is perceived and used in schools.

Dr Lang has led the building of a nationwide ecosystem of borrowing centres, allowing schools to access infrared imaging cameras. This democratisation of high-end photonic tools in education has provided equitable access to cutting-edge technology. His team is now working to expand this model abroad. Further amplifying his impact, Dr Lang co-founded Timi Creation, a start-up that designs and manufactures IR cameras optimised for classroom use.

Matthias Lauermann

Organisation: Vanguard Automation
Role: Head of R&D
Based in: Karlsruhe, Germany
Education: PhD, Electrical Engineering and Communication Technology, Karlsruhe Institute of Technology (KIT)

Matthias Lauermann's work at Vanguard Automation is key to turning advanced photonic packaging into scalable industrial technology. His R&D team works on materials, fabrication processes, control software, optical systems, and machines driving the development of additive micro-3D printing processes for photonic packaging. These innovations enable new integrated device concepts, such as easy multi-channel laser array integration and compact, photonic packaging without active alignment. Lauermann's team ensures that the solutions meet industrial requirements in speed, precision, and material performance, paving the way for next-gen photonic systems. The integration of tunable laser light sources within compact photonic circuits is crucial to advancing applications in point-of-care diagnostics. He has led research initiatives on 3D-printed facet-attached microlenses (FaML), which facilitate low-loss coupling between vertical-cavity surface-emitting lasers (VCSELs) and fibre arrays. These microlenses, fabricated using high-resolution multi-photon lithography, achieve coupling losses as low as 0.35dB and alignment tolerances exceeding 10µm, significantly improving the efficiency of optical interconnects.

Martin Lavery

Organisation: University of Glasgow
Role: Professor of Optics
Based in: Glasgow, UK
Education: PhD, Physics, University of Glasgow

Martin Lavery says he has always been motivated by the boundary between research fields; his Royal Academy of Engineering (RAEng) Research Fellowship transitioned into pioneering the development of geometric optical transformation via early multiple plane light converters for quantum and classical communications. Prof Lavery's Structured Photonics Research Group at Glasgow University has a track record in successfully applying physics developments to industry-inspired engineering challenges. It currently focuses on using structured light for communication and sensing in the environment. Structured light is where the intensity and phase of optical beams are spatially shaped, achieved using spatial light modulators, bespoke passive-multiplexers, or active-multiplexers. The fusion of high-capacity communications and sensing is at the heart of Optical Geophysical Sensors Networks for Ocean Monitoring, his project developing optical recognition and communication antennas for connections to ocean-mapping drones, providing oceanographic measurements for support modellers predicting future environmental tipping points.

Son Thai Le

Organisation: Nubis Communications

Role: Director of System Integration and Testing

Based in: New Jersey, USA

Education: PhD, Aston University, UK

Son Thai Le brings a glittering reputation to the Photonics100. One university professor describes him as "one of the best students of my professorial career". Another lecturer says,"he is the best student with the highest mathematical skills that I have ever dealt with". He went on to be named 'Innovator of the Year Germany 2018' and 'European Innovator under 35' by MIT Technology Review. After joining start-up Nubis Communications in 2022, Dr Le built up an advanced co-packaged optics (CPO) system testing lab from scratch. He is now working on the development and commercialisation of high-capacity, high-density, low-power optical engines (OEs) for next-generation AI/ML clusters and data centres.

According to Dr Le, "optical I/O and photonics sit at the heart of next-generation computing, AI infrastructure, and quantum technologies. I believe this is an incredible time to be working in the field – opportunities are expanding rapidly, and innovation is accelerating across both academia and industry.

"Stay curious, be interdisciplinary, and don't be afraid to dive deep. Optical I/O sits at the convergence of physics, engineering, and computing – your ability to bridge these domains will set you apart."

Nikolay Ledentsov

Organisation: VI Systems

Role: CEO

Based in: Berlin, Germany

Education: PhD, AF Ioffe Institute, St Petersburg, Russia

Nikolay Ledentsov is among the world's most influential semiconductor researchers and photonics innovators. With more than 35 years of experience, he is primarily known for pioneering work on the initial concept, creation and development of quantum dot lasers. His contribution in this field is supported by his publications and citations: Quantum Dot Heterostructures, has almost 5,000 citations. It is one of nearly 900 papers of which Ledentsov is co-author, boasting nearly 25,000 citations. Prof Ledentsov's work has led to notable commercial successes, principally as founder of NL Nanosemicondutors (now Innolume) and VI Systems. The latter has a 20-year track record of breaking new ground in data communication, demonstrating first 25G, 50G, 100G and 200G VCSELs, high-speed photo detectors, QD VCSELs with extreme temperature stability and VCSELs for record freespace communication. His advice to researchers? "Imagination and inspiration as a starting point, and then a long way to implementation with 100% confidence in success and overcoming all difficulties," he says. "Nature is so rich that each specific obstacle is surmountable."

Stewart Leitch

Organisation: Skylark Lasers

Role: Senior Laser Engineer

Based in: Edinburgh, UK

Education: BSc, Heriot-Watt University, Scotland

UV light is notoriously difficult to generate efficiently, at a high power, and for any length of time. Stewart Leitch's current work improves the lifespan of high-power single-frequency ultraviolet lasers. He does it by changing the way light propagates from the frequency doubling crystal to mitigate damage to optics and coatings that have UV laser light incident on them. This reduction in damage and contamination enables higher output powers to be achieved and sustained. Customers benefit from long lifetime, stable performance at 320nm, and 349nm without experiencing the untimely power drop-offs that photonics market users may have experienced.

Skylark says Leitch's innovations have unlocked 1W of output power at 320nm. The UV laser systems created by Skylark Lasers have benefitted end users working in areas as diverse as flow cytometry, holography, and Raman spectroscopy. Leitch believes that incoming improvements to reach even higher output powers will be beneficial for many applications, including semiconductor inspection. Higher powers will reduce the time taken to scan large area wafers down to a few seconds, he predicts.

Oliver Lischtschenko

Organisation: Coher Sense
Role: Founder and CEO

Based in: Lübeck, Germany
Education: PhD, Physics, University of Greifswald, Germany

"Don't wait for permission," cautions Oliver Lischtschenko. "If you see a need – technical, practical or strategic – and no one is solving it yet, that might be the starting point for your own journey." It's a philosophy he has followed in his own career as a freelance physicist, research professor, and applications engineer. He is now founder and CEO of Coher Sense, focused on developing compact, easy-to-use diagnostic tools for lasers that deliver high-resolution results without the complexity of traditional lab set-ups. The mission is to make advanced photonics tools as accessible and intuitive as an electrical multimeter – enabling researchers and engineers to characterise lasers and optical sources quickly, accurately, and on-site.

Coher Sense's approach is modular, portable and tailored to real-world use cases. One area of particular interest is helping teams working on quantum technologies – such as laser cooling of atoms or ions – and gas sensing applications, where precise control and characterisation of laser parameters are critical.

Lischtschenko won the Hamamatsu Photonics Innovation Award in 2025.

Sumeet Mahajan

Organisation: University of Southampton
Role: Professor of Molecular Biophotonics & Imaging

Based in: Southampton, UK
Education: PhD, University of Southampton

The molecular photonics research carried out by Sumeet Mahajan and his team at the University of Southampton underpins visionary and translational research in biology and medicine. The group researches Raman spectroscopy and chemical imaging methods to achieve new insight into medical problems, including therapies for osteoarthritis, rapid detection of anti-microbial resistance and early diagnosis of dementia. The team's work on detection and distinction of different dementias, including at early-stage, using a simple five-minute laser-based test, has been widely covered in UK national media. Prof Mahajan is Co-founder and CEO of BrainAlyze, a spin-out from the university. A cornerstone of the team's research lies in Prof Mahajan's ability to bring together diverse teams, identifying unique perspectives to drive research and innovation while integrating in-house chemical and photonics expertise. Examples include working with mathematicians to incorporate advanced topological methods for spectral data analysis, as well as leveraging laser technologies to push the boundaries of deeply penetrating precision chemical imaging.

Leonel Malacrida

Organisation: Universidad de la República & Institut Pasteur de Montevideo
Role: Associate Professor, Universidad de la República; Principal Investigator, Institut Pasteur de Montevideo

Based in: Montevideo, Uruguay
Education: PhD, Biophysics, Universidad de la República, Uruguay

A biophysicist by training, Uruguay-based Leonel Malacrida has been a driving force in the development of the phasor approach to fluorescence lifetime imaging microscopy (FLIM) and hyperspectral imaging (HSI). His contributions have been foundational in establishing a powerful framework for multidimensional imaging. His efforts intersect bioimaging, biophotonics, and biomedical research, developing and applying novel imaging technologies across multiple domains such as label-free metabolic imaging, quantitative imaging for diagnostics, and spectroscopic characterisation of the biophysical properties of cells and tissues.

A key pillar of Dr Malacrida's work is the development of robust open-source tools, such as PhasorPy – a Python-based library for phasor analysis of FLIM and HSI data – and the implementation of advanced imaging pipelines tailored for tissue analysis, biomedical diagnostics, and translational applications. Phasor-based HSI has been successful in dermatopathology, where Malacrida's team developed an unbiased and quantitative method to distinguish malignant melanoma.

Yvette Mattley

Organisation: Ocean Optics

Role: Product Scientist, Manager

Based in: Tampa, USA

Education: PhD, Biochemistry, University of South Florida

Yvette Mattley of Ocean Optics enthuses that modular spectroscopy is her passion. "I have a front-row seat to watch our amazing customers use spectroscopy in ways and places never imagined," she says.

She has a 20-year history pioneering miniature spectroscopy and enabling real-world applications across sectors. An author of more than 20 scientific papers, one example investigates spectroscopy for plastics recycling.

Dr Mattley bridges science and education. A key focus is to advance spectroscopy through technology and training. Her goal is to develop coaching and technical resources that bring complex spectroscopy concepts and applications to colleagues and customers regardless of technical background or spectroscopy experience. She aims to deliver training and resources that help the firm's customers successfully apply the power of spectroscopy to their own research and measurement challenges.

Internally, Dr Mattley provides hands-on workshops, online training sessions, and resources that strengthen technical and application knowledge across the company. Externally, she shares company expertise through online sessions, in-person training, and other resources.

Alison McLeod

Organisation: Technology Scotland

Role: Director, Photonics Scotland

Based in: Coupar Angus, UK

Education: PhD, Laser Physics, St Andrews University

As Director of Photonics Scotland, Alison McLeod is a significant voice in the country's photonics and related communities.

"Never underestimate your abilities, or the power of a good network," she advises. Her goals are simple: to raise the profile of the sector, help grow this thriving cluster, and drive innovation in Scottish photonics.

Founded as the Scottish Optoelectronics Association in 1994 and part of Technology Scotland, Photonics Scotland is one of the oldest national photonics organisations in the world and remains one of the largest technology communities in Scotland. It is the cohesive point for the sector and a trusted partner to members, who allow it to represent their views with one unified neutral voice to relevant stakeholders.

Two long-standing Special Interest Groups (Photonics for Space, and Quantum Technologies) meet quarterly to bring together key players.

The Photonics and Quantum Future Skills Leadership Group meets regularly to discuss current and future workforce needs of industry and how these can be addressed: access to skills and capital are, of course, recurring challenges.

Fanuel Mehari

Organisation: Spectral Industries

Role: Sensor Application Specialist

Based in: The Hague, the Netherlands

Education: PhD, Plasma Spectroscopy, FAU Erlangen-Nuremberg

Fanuel Mehari left his home country of Eritrea to build a new life in Germany, achieving outstanding academic success and developing his expertise in laser-induced breakdown spectroscopy (LIBS) through his PhD at the renowned University of Erlangen. Eritrea and Germany's loss became the Netherlands's gain when Spectral Industries recruited Mehari having made the decision as a business to focus on LIBS. After six years, the team has grown significantly, but according to his nominators, "no other colleague comes close to the skills Fanuel shows in the lab and in the field." They continue: "After a colleague has built an optical set-up, they always ask Fanuel to check its performance. And quite often, he finds an improvement that upgrades the set-up from good to great. Getting his approval has become a quality standard – you know you have the best performing set-up after getting his approval."

Dr Mehari continuously surprises his colleagues by devising clever and easy ways to improve processes: for instance, by aligning optical components in a simpler way or mounting samples in a more reproducible way.

Célia Millon

Organisation: RayVen Laser
Role: Co-Founder and CEO

Based in: Bochum, Germany
Education: MSc, Physics, Blaise Pascal University, Clermont-Ferrand, France

Célia Millon is recognised for her dynamic entrepreneurship at RayVen, a manufacturer of ultrafast lasers. Her bold decision to leave the lab to build a commercial product from scratch – "without a clear roadmap but with conviction", she says – meant learning to pitch, to hire, to negotiate, as well as to build belief in a vision. RayVen is building a new class of ultrafast laser systems operating at 2µm, specifically designed for next-generation semiconductor and advanced materials processing. While most industrial ultrafast lasers operate at 1 or 1.5µm, RayVen's systems leverage the unique absorption properties of 2µm light, enabling new processing regimes for silicon, transparent polymers, and heterogeneous interfaces inaccessible with conventional wavelengths. The complete solution is a plug-and-play system that simplifies integration into R&D and industrial environments, removing complex wavelength conversion stages. This has already helped early adopters. For example, in pilot studies with the Fraunhofer Institute, Millon's company demonstrated precision delamination of metal interfaces – processes relevant for the inspection of chips.

Mizue Mizoshiri

Organisation: Nagaoka University of Technology
Role: Associate Professor

Based in: Nagaoka, Japan
Education: PhD, University of Osaka

A specialist in laser chemistry, Mizue Mizoshiri stands out as one of few female professors of photonics in Japan. Her research focuses on femtosecond laser multi-pulse-induced thermochemical precipitation from transparent metal complexes and metal oxide nanoparticles. Femtosecond laser direct writing is a promising tool for additive manufacturing and printed electronics, but a key challenge lies in the change of optical absorption of raw materials during multipulse irradiation. Prof Mizoshiri's work explains the transient phenomena of copper precipitation from glyoxylic acid-copper complex solutions as a function of pulse number. The process proceeds in three stages: (1) multiphoton absorption triggers nucleation and nanoparticle formation; (2) the generated nanoparticles introduce saturable absorption; and (3) sintering and melting of these nanoparticles yields localised copper precipitation with feature sizes comparable to the laser spot. By controlling the number of pulses, Prof Mizoshiri is able to suppress thermal diffusion and achieve material processing without excessive heating. This approach offers precise, thermally controlled nanoparticle precipitation directly from transparent precursors.

Iñigo Molina Fernández

Organisation: University of Málaga
Role: Head of Photonics, RF Lab

Based in: Málaga, Spain
Education: PhD, Politecnica de Madrid

As Professor of Signal Theory and Communications at Málaga University, the contributions of Iñigo Molina Fernández span more than three decades of leadership, innovation and cross-disciplinary excellence in both radiofrequency systems and photonics. He has also played a vital role in raising the profile of photonics in Spain.

His research connects the worlds of microwave and RF circuits with coherent optical communications and integrated photonic devices. His early work on non-linear transmission lines in RF laid the foundation for a career that would go on to bridge multiple domains. A research stay at École Polytechnique in Montreal (2003-2004) sparked his groundbreaking work in applying six-port techniques to optical systems, an area in which he continues to innovate. Prof Molina has led or participated in more than 25 publicly and privately funded research projects, including key roles in major European initiatives such as the Celtic 100GET consortium and the FP7 MIRTHE project, focused on enabling 100GbE integrated photonic subsystems for the future of internet infrastructure. Current projects include sub-wavelength grating (SWG) photonic devices, and the design of microwave and RF subsystems.

Annika Möslein

Organisation: Quantum Dice
Role: Head of Engineering
Based in: Oxford, UK
Education: PhD, Engineering Science, University of Oxford

"It all starts with a 'yes' – yes to any opportunities that may arise, yes to any challenge and yes to ideas." Annika Möslein is taking her own counsel as Head of Engineering at Quantum Dice, an Oxford-founded start-up aiming to solve one of the longest-standing problems in computing: generating trusted and reliable randomness.

The company has developed the world's first scalable self-certifying quantum random number generator (QRNG) to enhance cybersecurity and computation. The hardware harnesses the quantum behaviour of photons to generate true randomness, validated in real time by Quantum Dice's proprietary DISC protocol. With applications in both cybersecurity and stochastic computing, the company's QRNGs have many use cases in numerous sectors, ranging from communication security to AI optimisation.

Dr Möslein developed optoelectronic sensors through the use of hybrid nanomaterials for her PhD in Engineering Science at the University of Oxford. And now the team has miniaturised the technology using photonic integrated circuits, enabling greater scalability and integration of the chip-based quantum technology. That transition – from bulky PCIe cards and rack-mounted devices designed for data centres to a compact chip that can slot into standard hardware – marks one of Möslein's proudest career moments. After years of development, including setbacks with multi-project wafer runs, multiple packaging iterations, and advanced PCB design, the team achieved its first functioning PIC-based QRNG. It was a turning point that validated years of work and proved quantum randomness could be deployed at scale. In her words, it laid "the foundation for a secure, scalable, certifiable QRNG that could eventually fit in laptops, IoT devices, or other security modules".

The potential is broad. In cybersecurity, directly embedding QRNGs into hardware security modules can provide real-time verification for cryptographic key security, and supports the transition to post-quantum standards. In computation, they can be used to enhance the accuracy of Monte Carlo simulations – critical in fields ranging from finance and climate modelling to AI optimisation – with certification of real-time randomness provided via DISC.

Möslein also has a clear view of the wider industry context. The coming year, she notes, could be a "pivotal moment for European start-ups." Policy frameworks such as the EU Chips Act and the growth of national photonics hubs will "create access to cutting-edge fabs and pilot lines," shortening the path from prototype to market. For start-ups, this is an opportunity to capitalise on Europe's strong research base and accelerate commercialisation.

"Together with dedicated growth funding and training programmes for talent pipelines, this will give European start-ups the environment to not only compete globally – but to lead the way"

But challenges still remain. "Growth funding in Europe still lags behind the US and Asia," says Möslein, leading to talent and intellectual property flowing abroad. Although supply-chain sovereignty goals are ambitious, the current bottlenecks in volume manufacturing, packaging, equipment and skills continue to constrain scaling as long lead times and a reliance on external partners for manufacturing continue to pose problems. The ecosystem, though maturing, remains fragmented across countries and sectors. Despite this, however, Möslein sees opportunity in stronger pan-European coordination through initiatives such as PhotonHub, which connect start-ups with facilities, partners and expertise across borders. "Together with dedicated growth funding and training programmes for talent pipelines, this will give European photonics start-ups the environment to not only compete globally – but to lead the way."

For those looking to follow a similar career path, Möslein returns to her mantra of positivity. "Of course, it's always easier to be quiet, to be comfortable or to take the easiest route," she says. "But [saying] a simple 'yes' to challenges might take you out of your comfort zone and allow you to try, fail, learn and innovate." She couples this mindset with building trust, being the calmest voice in chaos, and communicating clearly. For her, technical depth comes from curiosity and persistence, but leadership comes from adaptability and clarity.

Galan Moody

Organisation: University of California, Santa Barbara (UCSB)
Role: Professor
Based in: Santa Barbara, USA
Education: PhD, Physics, University of Colorado Boulder

Galan Moody pioneers work at UCSB in quantum photonics, including the use of compound-semiconductor microring resonators and related planar circuits for high efficiency entangled photon generation.

His research group specialises in III-V and heterogeneous III-V-on-SiN photonics, enabling several key breakthroughs. These include the lowest-loss III-V photonic chips enabling record-bright entangled-photon pair generation, chip-scale frequency conversion with >60% efficiency, and record-high squeezed light sources in III-Vs. Prof Moody's group has expanded fabrication to 100-mm wafer scale with heterogeneous integration on ultra-low-loss silicon nitride with >99.8% coupling between the layers, thus combining the brightest quantum sources with the lowest-loss multi-functional photonic platform. External users may utilise the nanofabrication facility for III-V photonics, including process transfer to other groups. In 2024, Moody was selected by UCSB's graduating seniors as the College of Engineering Outstanding Faculty of the Year. "The opportunity to teach such amazing students is what pulled me back into academia in 2019," he enthuses.

Oskar Painter

Organisation: Caltech; Amazon Web Services
Role: John G Braun Professor of Applied Physics; Director of Quantum Hardware
Based in: California, USA
Education: PhD, Electrical Engineering, Caltech

Oskar Painter is a significant figure in the world of quantum technology, both as a noted academic and as co-lead of the Amazon Web Services (AWS) Quantum Computing Lab at Caltech.

In February 2025, Amazon announced Ocelot, a first-generation quantum chip, as its bid to take the lead against fellow tech giants in the race to harvest the fruits of quantum capability. AWS claims the new chip can reduce the costs of implementing quantum error correction by 90%.

At the launch, Prof Painter was quoted as saying: "We believe that if we're going to make practical quantum computers, quantum error correction needs to come first. That's what we've done with Ocelot."

Canadian-born Prof Painter boasts a glittering career of academic achievement. After a BSc at the University of British Columbia, he studied for his PhD at Caltech and pursued a teaching career culminating in his current professorship at the same institution. Separately, he has been Director at the Max Planck Institute and received a Humboldt Professorship (2013).

His research topics include photonic crystals, silicon photonics, solid-state cavity quantum electrodynamics, and quantum optomechanics.

Pierre-Mary Paul

Organisation: Amplitude
Role: Vice President and Head of Advanced Laser Solutions
Based in: Paris, France
Education: PhD, CEA Paris-Saclay

A physicist by training, Pierre-Mary Paul earned his PhD in the early 2000s at CEA Saclay, contributing to a landmark achievement – the first-ever measurement of attosecond pulses. This work laid the foundation for advances in ultrafast physics and contributed to his PhD advisor, Pierre Agostini, receiving the 2023 Nobel Prize in Physics. "Being present at that ceremony was deeply personal," recalls Dr Paul. "It wasn't just a celebration of his achievement – it was a recognition of a scientific journey we had shared. To witness that moment, knowing that my own research had played a role in such a historic milestone, was profoundly humbling. It reaffirmed my belief in the power of collaborative science and the long-term impact of fundamental research."

After more than 25 years at Amplitude, Dr Paul has been instrumental in shaping some of the world's most advanced ultrafast laser systems, including cutting-edge high-intensity femtosecond lasers, from terawatt to petawatt class systems, as well as high-energy laser platforms. Deploying inertial confinement fusion (ICF) technology, the company is building platforms specifically engineered for the demands of fusion.

Antony Murphy

Organisation: Causeway Sensors
Role: CEO
Based in: Belfast, UK
Education: PhD, Nanostructured Media, Queen's University, Belfast

The attributes required to compile the complete photonics specialist are exemplified by Antony Murphy: the twin pillars of outstanding academic record and a highly successful translation to a commercial leadership role, buttressed by prominent, vocal advocacy in the wider world both of the science and the community. He has them all.

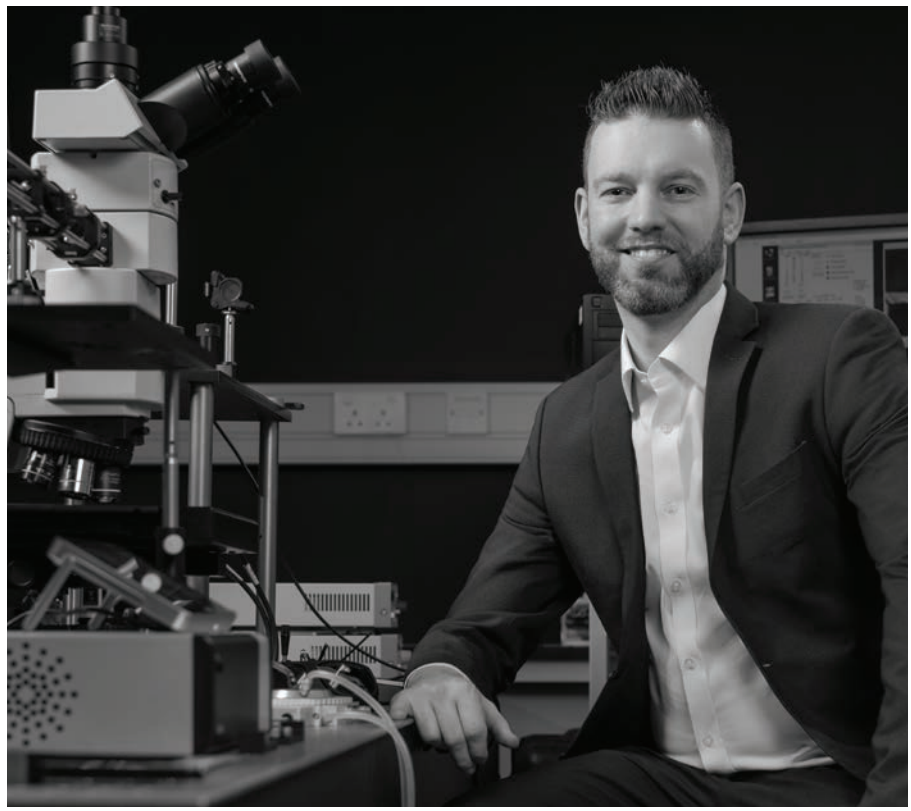
Dr Murphy's high-impact career began at Queen's University, Belfast, under the supervision of Dr Bob Ballard, where he successfully established a complex nanofabrication technique for creating plasmonic nanotubes. This foundational research led to several high-impact publications, sharing novel findings with the scientific community. The work also fostered valuable collaborations with leading institutions such as King's College London and Imperial College, providing access to diverse expertise and advanced facilities.

Crucially, it also led to a spin-out. Dr Murphy became CTO of Causeway Sensors Limited in February 2018 and eventually took over the CEO role from Dr Ballard in 2022. In doing so, he made the all-important pivot from research to senior management, and has since been involved in raising more than £5m in venture capital support.

Causeway is centred on developing a novel nanophotonic sensor platform for the precise, ultra-sensitive detection of critical quality attributes (CQAs) in bioprocessing. The company's core innovation harnesses localised surface plasmon resonance (LSPR), utilising a large-scale, inch-squared array of high-aspect-ratio gold nanopillars. These nanopillars are meticulously designed and tuned to exhibit a specific plasmonic resonance, providing unparalleled sensitivity for biological detection – Dr Murphy says this represents a highly significant advance over traditional methods that often struggle with the complex matrices and low analyte concentrations typical of bioprocess fluids.

Causeway says benefits are already evident in end-user applications and in bioprocessing research. An example is the collaboration with a multinational firm in plasmatic protein production. This process involves complex purification steps such as cold ethanol fractionation and acidic conditions, which typically render traditional quality-control methods either ineffective or impossible to implement in-line.

Through a series of rigorous trials at the corporation's German facility, Causeway's flagship TITAN system demonstrated its ability to provide crucial real-time data under challenging conditions. This success has led to discussions to establish 50 TITAN systems across five global production sites, directly addressing critical industry pain points by enabling process optimisation, reducing batch failures, and improving efficiency and consistency when manufacturing vital biotherapeutics.



'Northern Ireland Photonics Innovation Cluster serves as a model for how the industry can collectively overcome shared challenges...'

A vocal advocate of photonics in general, Dr Murphy also has a mission to solve all-too-familiar issues with the skills gap as well as the significant awareness deficit suffered by photonics. He is firmly of the view that the pervasive influence of the photonics sector, despite underpinning an enormous array of modern technologies – from high-speed internet and medical diagnostics to autonomous vehicles and quantum computing – is largely unrecognised by the wider public, policymakers, and even some potential investors. He recognises this lack of clear identity hinders investment interest, public support, and the ability to attract talent, as many do not fully grasp the breadth and impact of light-based technologies.

A pivotal step in addressing these challenges, which Dr Murphy has personally championed, is the establishment of the Northern Ireland Photonics Innovation Cluster (NI-PIC), which he chairs. Successfully funded by Invest NI to conduct a feasibility study, NI-PIC aims to be a catalyst for regional growth in photonics. Its strategic goal is to drive sector expansion by directly addressing these critical pain points: facilitating access to dedicated funding, enhancing the skills pipeline through collaborative training programmes, and fostering spin-outs and scale-ups. By creating a collaborative ecosystem, NI-PIC serves as a model for how the industry can collectively overcome shared challenges.

Leilei Peng

Organisation: University of Arizona
Role: Associate Professor of Optical Sciences
Based in: Tucson, USA
Education: PhD, Physics, Purdue University

Leilei Peng is a biophotonics pioneer, developing novel 3D fluorescence microscopy systems for the purpose of investigating and obtaining more functional information from complex biological systems. Her systems push the boundaries of imaging depth, resolution, and speed. Patents include a system that obtains large-volume 3D images of tissue at subcellular resolution, and also captures transient activities by imaging at 100 volumes per second. She is also the inventor of the FmFLIM method that allows dual FRET sensor imaging in live embryos; and the inventor of the spectral-SIM light sheet imaging method that enables fast synchronous 3D imaging with multiple fluorescent proteins. Dr Peng works from concept to application, devising innovative imaging techniques, building prototype instruments, developing signal processing and data acquisition systems, programming imaging software and applying techniques to collaborative biological studies. Examples include working with neuroscientists to devise a fast imaging method that enables 3D dynamic imaging of voltage signals in neural tissue at synaptic resolution.

David Phillips

Organisation: University of Exeter
Role: Associate Professor, School of Physics and Astronomy
Based in: Exeter, UK
Education: PhD, Physics, University of Bristol

David Phillips leads the Structured Light Lab at Exeter University, where he explores how light's numerous degrees of freedom can be harnessed for a variety of new applications. A key current theme is to understand how to recover images from light that has propagated through highly complex scattering media, such as frosted glass, biological tissue, or multimode optical fibres. While light readily passes through such materials, images are seemingly randomly fragmented into an unrecognisable mess. Yet the image information carried by this light hasn't been lost: just mixed up. Dr Phillips's group works on methods to characterise how this information has been 'scrambled', and then tries to build optical systems that can physically 'unscramble' it again. Tackling this problem has taken the lab on a journey involving multimodal digital holography, ultrafast laser beam shaping and photonic inverse design. Dr Phillips's long-term vision is now the realisation of new types of adaptive optical technology capable of automatically self-configuring to unscramble light that has passed through any complex optical system it is connected to.

Ryszard Piramidowicz

Organisation: VIGO Photonics; Warsaw University of Technology
Role: PIC Program Director, VIGO Photonics; Head of the Optoelectronics Division at the Institute of Microelectronics and Optoelectronics
Based in: Warsaw, Poland
Education: PhD, University of Warsaw

Warsaw-based Ryszard Piramidowicz leads the IPCEI HyperPIC project, which has two principal goals. First, developing a cutting-edge platform for mid-infrared photonic integration and, second, building a fully vertical, European supply chain in this vital field. Backed by more than €100m in EU funding and combining quantum and interband cascade lasers, antimonide-based photodetectors, and germanium-on-silicon waveguides within a heterogeneously integrated and scalable platform, it is one of the most ambitious photonics efforts in Europe today. For more than 15 years, Dr Piramidowicz been actively shaping the Polish PIC ecosystem – leading the journey from early-stage design in a fabless model and device-level experimentation, through to first fabrication steps and, ultimately, to the creation of an entirely new technological platform dedicated to mid-infrared PICs. The HyperPIC project is developing highly compact, scalable, and cost-effective chips that monolithically integrate light sources, waveguides, and detectors operating in the mid-IR spectral range. The unique focus on the mid-infrared window positions HyperPIC as a potential game-changer in the miniaturisation and mass production of advanced devices.

Simone Peli

Organisation: SolutionLab - Castellini S.p.A. Società Benefit
Role: Research and Innovation Manager
Based in: Lombardy, Italy
Education: PhD, Condensed Matter and Material Physics, University of Milan

The work carried out by Simone Peli at Castellini is noteworthy because it represents a major departure from existing norms, pushing the boundaries of laser application beyond traditional uses. It offers unprecedented speed, precision, and new functionalities in assorted heavy industries.

While lasers have traditionally been a cornerstone in cutting and welding, the continuous advancement in laser source power, coupled with sophisticated beam shaping techniques and other innovations, is dramatically widening their potential uses, yielding unprecedented results.

Dr Peli has significantly contributed to research, presentation, and publication on high-thickness laser welding technology; his achievements include hybrid laser arc welding of 20mm-thick naval steel with single pass and butt joint configuration, and double pass (double side) pure laser welding of 45mm-thick carbon steel. Also significant is his contribution to the development of a potentially disruptive and cutting-edge technology related to laser surface cleaning, which is currently at the forefront of industrial research. In the field of high-thickness welding, Peli and his team have demonstrated autogenous laser welding of 50mm-thick plates in just two passes, a significant leap forward in efficiency.

He is also actively working to integrate laser technology into inline steelmaking processes. Lasers offer immense potential for cleaning, texturing, and treating the entire surface of high-speed moving coils. For these applications, laser processes must be exceptionally effective, fast, precise, and reliable. His research involves meticulously studying laser parameters (including power, spot geometry, and scanning speed) to achieve desired process outcomes.

At the same time, his team is addressing critical technological aspects such as polygon scanner speed, mirror design, shielding gas management, and dust collection to ensure the laser process is genuinely viable and robust in demanding industrial environments. The Castellini Solutions team has also studied Hybrid Laser-GMAW (Gas Metal Arc Welding), which has been particularly well received by the shipbuilding industry. This technology allows for the welding of 25mm plates in just two passes, drastically reducing production time and costs for shipbuilders.

Peli is also active in laser scribing for electrical steel. The implementation of polygon scanner systems for continuous inline processes has garnered significant interest from producers of electrical steel. His machines enable a laser scribing process that reduces the magnetic core loss of the material, offering a substantial benefit in terms of energy efficiency.

"This pride was truly amplified by the shining eyes of my collaborators, witnessing the same remarkable result..."

Through collaboration with leading laser companies in the field of beam shaping, he is also advancing research into the laser welding of aluminium. The focus here is on achieving precise control of the melt pool, which is crucial for producing defect-free welds in the challenging material.

He believes the potential for future development and application is vast, ranging from even thicker and faster welds to entirely new surface treatments and material modifications, ultimately leading to more efficient, cost-effective, and higher-quality industrial production.

However, seamlessly integrating these advanced laser systems into existing large-scale industrial plants, often with challenging environmental conditions including dust, vibrations, and temperature fluctuations, presents significant hurdles. Overcoming these demands requires continued R&D investment in high-power laser sources and ultra-fast scanning technologies focused on performance and longevity. It means a collaborative approach between laser manufacturers, system integrators, and end-users will be required to achieve game-changing results.

Dr Peli's nominators explain that his ability to foster strong team cohesion has been crucial, as he cultivates an environment where innovative thinking is encouraged and effectively translated into tangible results.

His proudest moment? "When I saw the correct laser spot finally appear, with the expected geometry and dimension, from a complex optical system entirely designed by us. This pride was truly amplified by the shining eyes of my collaborators, witnessing the same remarkable result."

Eva Pogna

Organisation: CNR-IFN
Role: Senior Researcher
Based in: Milan, Italy
Education: PhD, Polytechnic of Milan

The National Research Council of Italy – Consiglio Nazionale delle Ricerche (CNR) – is the largest public research institution in Italy, and the only one under the umbrella of the Research Ministry that performs multidisciplinary scientific activities. Eva Pogna is building a growing reputation at the CNR's Institute of Photonics and Nanotechnologies. She works on the development of innovative material platforms for the manipulation of electromagnetic radiation in the infrared and far-infrared range, exploiting advanced material characterisation by ultrafast spectroscopy and near-field imaging techniques. Dr Pogna has been awarded an ERC Starting Grant – TREAT (Taming Radiative heat Emission with Anisotropic and Time-varying media), via which she leads research into thermal emission engineering. She aims to develop a breakthrough approach to control heat transport through radiation, targeting the thermal emission properties of materials. This is a fundamental energy exchange process that influences the temperature of objects and underlies ubiquitous thermal light sources. Her work on graphene has also been translated into novel optoelectronic devices for light manipulation.

Francesco Poletti

Organisation: University of Southampton
Role: Partner Researcher, Microsoft Azure; Professor and Head of HCF Group, Southampton University
Based in: Southampton, UK
Education: PhD, University of Southampton

Francesco Poletti is renowned for his innovation in hollow-core fibre (HCF) technology. At Southampton's Optoelectronics Research Centre (ORC), he leads the HCF group, which explores novel fibre designs, fabrication techniques, and system-level integration. At Microsoft Azure Fiber, he also directs research into deploying HCFs for next-generation cloud infrastructure, aiming to revolutionise data centre interconnects, metro-scale DCI networking and, ultimately, long-haul and intercontinental communications. His current research focuses on nested antiresonant nodeless fibre (NANF) design, which Poletti himself invented 10 years ago. Unlike conventional solid-core silica fibres, NANF-based HCFs guide light predominantly through air, enabling ultra-low latency, lower nonlinearity, and reduced transmission loss – surpassing the theoretical limits of silica in the near-infrared. His group's work has produced more than 500 peer-reviewed publications and 20+ patents, shaping the global research agenda in fibre optics. It has also achieved transition to market via Lumenisity, an ORC spinout acquired by Microsoft in 2022.

Joyce Poon

Organisation: University of Toronto; Lightmatter
Role: Professor; Head of Photonics Architecture
Based in: Toronto, Canada
Education: PhD, Electrical Engineering, Caltech

If you doubt that your photonics research will ever lead to practical commercial outcomes, take heart from Joyce Poon: "I am very happy to see how my group's research on photonic components and silicon photonics is now being commercialised," she enthuses. "I first started working on microrings when I was a graduate student some 20 years ago. I was thrilled to hear NVIDIA's CEO talk about using microrings in its CPO product in March 2025."

At Lightmatter, Prof Poon is responsible for the chip architectures of test and product chips for co-packaged optics (CPO); Lightmatter is developing 3D-integrated (die-stacked) CPO using silicon photonics technology to enable the scale-up and scale-out of AI compute clusters. Poon's academic research group is developing a silicon photonic platform with integrated MEMS for visible and near infrared light. The team is applying this technology both to devise compact brain implants with the objective of enabling neuroscience experiments, as well as to beam scanners for sensing and light projection. It is also investigating AI-driven design and workflows to reduce barriers of entry to photonics.

Oleg Pronin

Organisation: n2-Photonics; Helmut Schmidt University

Role: Co-Founder; Professor

Based in: Hamburg, Germany

Education: PhD in Physics, Max Planck Institute of Quantum Optics

Oleg Pronin is one of the co-founders of n2-Photonics, a Hamburg-based start-up working on femtosecond pulse shortening modules reaching 10-50fs pulses based on industrial-grade Yb-based lasers. He describes it as a technology push, bringing new products to the market and demonstrating their benefits; and also exploring the applications of this technology in material processing. The team has identified advantages in glass processing with <50fs pulses, avoiding cracking and chipping of glass at 1,030nm, infrared wavelength. Dr Pronin leads strategic product and company development, and jokes that he should be re-titled 'Chief Big Picture and Motivation Officer'. His advice to others: "Work over 60 hours a week, never give up, self-reflect," he advises. "Inertia and comfort are the biggest challenges – keep pushing and exploring." After studying physics at the Moscow Engineering and Physics Institute (MEPhI) Pronin's passion for photonics, optics, and lasers started to evolve during his PhD. Projects on thin-disk laser development, spectral broadening, compression experiments, and frequency comb stabilisation followed.

Gediminas Račiukaitis

Organisation: FTMC - Centre for Physical Sciences and Technology; Lithuanian Laser Association

Role: Head of Department of Laser Technologies; President

Based in: Vilnius, Lithuania

Education: PhD, Laser Spectroscopy, 1985, Vilnius University

Gediminas Račiukaitis is a significant force in Lithuanian photonics. He created the Laser Technology department at the Centre for Physical Sciences and Technology (FTMC), acts as President of the Lithuanian Laser Association, and is a member of ERIC, promoting Lithuanian photonics science and technology. His work now focuses on ultra-short pulse laser-based technologies for the semiconductor, electronics and photonics industries. Examples include laser-assisted electro-less metal plating on dielectrics for advanced chip packaging.

Dr Račiukaitis takes particular pride in the laser application laboratory at Ekspla. Established in 2004, it now boasts around 100 researchers, and a new generation of laser and optics experts developing optical coatings, new laser sources, and industrial technologies utilising ultrashort pulse lasers. Challenges and obstacles are opportunities, says Dr Račiukaitis. He believes the principal challenge facing the industry is to scale up laser-based processes to be competitive with alternative and established technologies.

Pouya Rajaeipour

Organisation: Phaseform GmbH

Role: CTO and Co-Founder

Based in: Freiburg, Germany

Education: PhD, Microsystems Engineering, University of Freiburg

Pouya Rajaeipour has consistently demonstrated expertise, innovative thinking and dedicated leadership in advancing adaptive optics technology. As CTO and co-founder of Phaseform, his work bridges the advancement of the company's core technology with technical business development. At the heart of his innovation is the Deformable Phase Plate (DPP), a new class of transmissive wavefront modulator that redefines how dynamic aberration correction is integrated into optical systems. Unlike traditional reflective modulators, the DPP enables compact, alignment-friendly, and scalable designs, unlocking new possibilities across imaging platforms.

Phaseform's DELTA and PHI product series has enabled researchers to retrofit adaptive optics onto existing microscopy systems efficiently. The co-founder's ability to bridge the gap between advanced research and practical applications has been crucial to Phaseform, including his work securing a €6m EIC Accelerator grant. His PhD research at the University of Freiburg, for which he received the Wolfgang-Gentner Young Scientist Award, laid foundational insights into optofluidic adaptive optics.

Madison Rilling

Organisation: Optonique
Role: Executive Director
Based in: Québec, Canada
Education: Université Laval, Canada

Madison Rilling is recognised for her work promoting the photonics industry in Canada and beyond. Although photonic technologies are crucial contributors and enablers to the most critical and fast-growing sectors, many stakeholders agree that the industry rarely benefits from political and public recognition and lacks comprehension as to its role in making possible life- and world-changing technologies. Dr Rilling's leadership role at Optonique is dedicated to supporting and enabling the R&D capacity of photonics in Québec, home to half of Canada's photonics industry. Through major collaborative initiatives for developing skills, establishing local and international partnerships, advocating for the sector and facilitating public outreach, she serves as a spokesperson, diplomat and catalyst for unlocking the "full economic and societal potential" of photonics. Bringing to life Québec's first-ever Photonics Industry Summit mattered, because so many photonics academics and professionals focus solely on their sectors of application and their paths rarely intersect. On the International Day of Light 2024, Dr Rilling and her team successfully changed that, filling the venue with key executives, government officials, and industry partners.

Andrew Robertson

Organisation: Bay Photonics
Role: CTO
Based in: Devon, UK
Education: PhD, University of Strathclyde, Scotland

Bay Photonics specialises in advanced photonics assembly and packaging, helping companies turn research-stage prototypes into commercial-scale products. Andrew Robertson is driving this. In 2002, he co-founded SIFAM Fibre Optics, a start-up launched when the telecoms market had collapsed, grew it successfully and later sold the company to Gooch & Housego. His current focus at Bay Photonics is on applications in quantum technologies. In collaboration with academic and industrial partners, the company's work has helped accelerate the packaging of sources to drive secure quantum communications. The firm's adhesive testing protocols at low temperatures have informed material selection for quantum computing, reducing risk of delamination or signal loss under thermal cycling. As quantum technologies mature, scalable packaging will be a key enabler. Techniques can be adapted for quantum photonic circuits, lidar systems, and next-gen telecommunications devices. In the future, he aims to integrate AI-based alignment feedback and in-line optical inspection, pushing toward fully automated, closed-loop packaging lines.

Bruno Romeira

Organisation: International Iberian Nanotechnology Laboratory
Role: Research Scientist - Principal Investigator
Based in: Braga, Portugal
Education: PhD, Physics, University of the Algarve, Portugal (jointly with University of Glasgow and University of Seville)

Bruno Romeira's groundbreaking work has the potential to impact the future of technology, revolutionising neuromorphic computing, sensing, and brain-computer interface (BCI) systems. His leadership of the EU-funded ChipAI project successfully developed resonant tunnelling diode-based light sources and detector devices. These innovations are thought crucial for high-speed neural-like signalling, paving the way for advanced photonics-based neuromorphic computing and sensing applications. The success of ChipAI has already laid the groundwork for significantly funded follow-up projects. Romeira researches at the frontier of neuromorphic nanoscale photonics, developing next-generation spiking light-based computing systems for AI. His team is engineering ultra-compact and energy-efficient photonic neurons using III-V semiconductor nanoLEDs, nanolasers, nanophotodetectors, and hybrid optoelectronic circuits capable of emitting, detecting, and processing optical spikes – the fundamental building blocks of brain-inspired computing. Unlike conventional photonic AI systems that rely on bulky optical elements, Romeira's approach mimics the discrete, nonlinear spiking behaviour of biological neurons.

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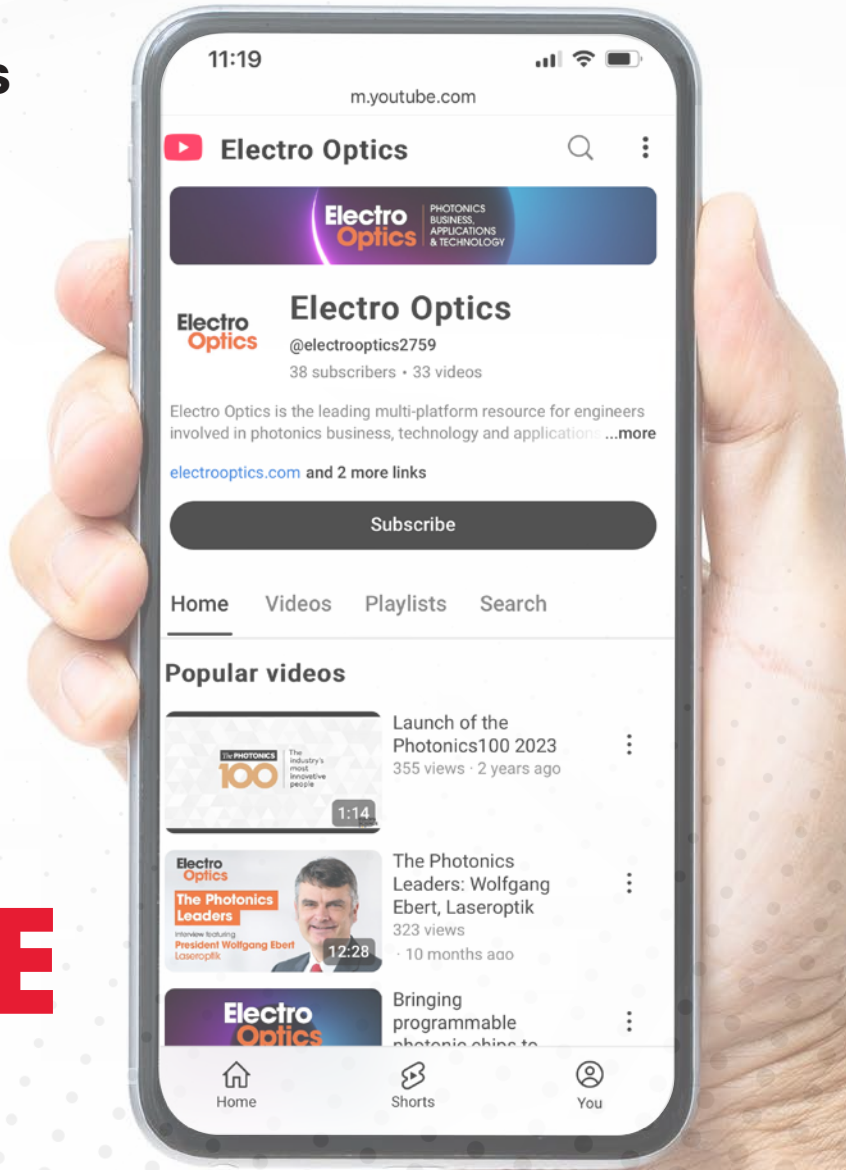

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Liliana Ruiz Diaz

Organisation: Amazon
Role: Hardware Developer Engineer
Based in: Seattle, USA
Education: PhD, Optical Sciences, University of Arizona

Liliana Ruiz Diaz can claim to be at the forefront of the race to develop high-profile technologies promising the potential to manifestly influence the day-to-day habits of humans across the planet. Having started at Amazon as recently as June 2025, she is working to develop autonomous drone delivery as a viable commercial proposition, researching sensing technology for this purpose. Previously, Dr Ruiz Diaz spent six years at Meta Reality Labs researching AR/VR. At Meta, she began as an optical scientist, developing eye-tracking technology for near-eye displays, also designing and optimising thin-film coatings for polarisation applications. Dr Ruiz Diaz has also conducted research on hybrid solar energy conversion systems, focusing on optical design, characterisation, and tolerancing of solar concentrators.

Dr Ruiz Diaz has patented more than 30 inventions – with examples including 'Dynamic beam steering with metasurface'. Dr Ruiz Diaz has authored multiple journal articles, and is committed to outreach and communication, also serving on the board of directors of a local STEM non-profit organisation.

Lucile Rutkowski

Organisation: Centre National de la Recherche Scientifique, Institut de Physique de Rennes
Role: Research Physicist
Based in: Rennes, France
Education: Education: PhD, Broadband Molecular Spectroscopy, Institute of Light and Matter, Lyon

Lucile Rutkowski pushes new approaches to high-resolution spectroscopy with frequency combs, advancing our understanding of the discipline. Dr Rutkowski is developing a new type of spectrometer that allows detection of multiple reactive molecules in gas phase at cold temperatures with a time resolution down to the microsecond level. Chemistry at temperatures ranging 10-80 K (i.e. not ultra-cold, but lower than liquid nitrogen temperature) is highly relevant to understanding the chemistry of interstellar clouds. In particular, the chemical kinetics of molecular-free radicals is generally poorly known as it remains extremely challenging experimentally to monitor the entirety of cross-reactions in the compounds.

The approach she and her team are taking relies on a mid-infrared frequency comb that provides spectral coverage, combined with an optical cavity that maximises the absorption sensitivity, as well as Fourier transform spectroscopy to provide fast time resolution. Future developments will enable the real-time, simultaneous, and non-invasive diagnosis of two radical species in a cold reactor environment, their respective precursor molecules, and reaction products.

Abdel Karim Ruvalcaba-Perez

Organisation: Friedrich Schiller University Jena
Role: PhD Student
Based in: Jena, Germany
Education: MSc, Technical University of Munich

Abdel Karim Ruvalcaba-Perez is recognised for his efforts in the field of optimal food harvesting. He is working on the development of a broadband multispectral sensor that integrates silicon and III-V compound-based photodiodes, covering a continuous spectral range from 400nm to 2,300nm. The system is designed for real-time, non-invasive monitoring of agricultural products, with a focus on identifying optimal harvest windows. Given that approximately one-third to one-quarter of all food produced is ultimately discarded – often as a result of an inability to accurately identify the optimal time of harvest – addressing this challenge is critical. What sets his work apart from existing solutions is its compact integration of dual photodiode architectures, enabling simultaneous acquisition across VIS-NIR-SWIR-eSWIR domains on a single miniaturised platform. While conventional solutions rely on bulky hyperspectral cameras or limited-range sensors, Ruvalcaba-Perez says his approach delivers comparable spectral precision in a scalable, field-deployable format. His project was shortlisted in the 2025 Photonics Frontiers Award.

Mohammad Mahdi Salary

Organisation: Meta Platforms

Role: Optical Engineer

Based in: San Francisco Bay area, USA

Education: PhD, Electrical and Computer Engineering, Northeastern University

A key challenge facing the AR/VR industry is to achieve the right balance between performance, form factor and cost, particularly for optical systems. As devices push toward more natural, immersive experiences, the demands on optical quality, compactness, and power efficiency grow. Designing miniaturised optics that deliver wide field-of-view, high resolution, and low distortion in a thin, lightweight package remains a fundamental technical hurdle. At Meta, Mohammad Mahdi Salary is developing miniaturised optical modules for illumination and imaging in AR/VR. His focus is on designing and prototyping compact, high-performance optical systems that can be integrated into wearable devices such as AR glasses and VR headsets.

Unlike traditional imaging or illumination systems, the team's solutions prioritise extreme miniaturisation without sacrificing performance. This has a direct impact on user experience, enabling lighter, more ergonomic devices with more immersive interactions and clearer visuals.

Future potential includes telepresence, spatial computing and even surgical or industrial visualisation. He expects such systems to become even more integrated, intelligent, and ubiquitous.

Salvador Sales Maicas

Organisation: Universitat Politécnica de València; CalSens

Role: Professor; Co-Founder

Based in: Valencia, Spain

Education: MEng, Universitat Politécnica de València

A world-leading expert in speciality fibre-sensing solutions, Salvador Sales Maicas created and leads a team of more than 30 professionals dedicated to the development of novel and extreme-environment fibre optic sensors. This team spans both the Fibre Optic Devices Group, which he leads within the Photonics Research Lab at the Universitat Politècnica de València, as well as the growing spin-off company, CalSens. A key feature of his work is the design of easily multiplexable sensors, which allow for the simultaneous monitoring of multiple points along a single fibre line, therefore significantly reducing system complexity and installation costs. He also works with space-division multiplexed (SDM) fibres, which enable the development of multi-parameter sensors, or sensors with enhanced resolution and precision. The desired result is a powerful platform for capturing richer, more accurate datasets in real time. Compared to existing solutions, they offer major advantages. Prof Sales Maicas says they have shown promise in high-temperature monitoring of turbine engines and in cryogenic applications pertaining to scientific research infrastructures.

Hamed Sattari

Organisation: CCRAFT SA

Role: CEO and Founder

Based in: Neuchâtel, Switzerland

Education: PhD, University of Tabriz, Iran

"Just thinking about what we are unlocking makes it truly fulfilling," enthuses Hamed Sattari. "Even more exciting is knowing we are enabling new possibilities in quantum, sensing, space and beyond." Dr Sattari is founder and CEO of CCRAFT, an industrial-grade, open-access foundry for thin-film lithium niobate (TFLN) photonic integrated circuits (PICs), offering scalable solutions for telecom, quantum, sensing and AI data centres. The firm delivers wafer-scale, high-yield TFLN photonic chips with reliable process design kits (PDKs) and multi-project wafer (MPW) access, which it says is a world-first. Chips built with TFLN promise up to eight times higher speed and consume up to 10 times less energy than conventional optical components. CCRAFT's nonlinear building blocks have enabled demonstrations in quantum optics, optical computing, and advanced sensing. Several prototypes have been tested, and Dr Sattari and his team are now tailoring modulators and switches to meet the stringent demands of AI data centre interconnects. After an academic career in his native Iran, followed by Turkey, Dr Sattari worked on research projects for EPFL and CSEM in Switzerland.

Thomas Schopphoven

Organisation: Fraunhofer Institute for Laser Technology (ILT)
Role: Head of Department
Based in: Aachen, Germany
Education: PhD, Engineering Sciences, University of Aachen

At Fraunhofer, Thomas Schopphoven pioneers the development and industrial application of extreme high-speed laser material deposition (EHLA) and hybrid manufacturing processes, such as simultaneous machining and coating (SMaC). EHLA is a laser-based coating and additive manufacturing technology that operates at feed rates of several tens to hundreds of metres per minute while depositing extremely thin layers – typically between 10 and 500 micrometres. Compared to conventional laser material deposition or hard chrome plating, EHLA offers much higher productivity, reduced heat input into the base material, and the ability to work with corrosion- and wear-resistant alloys in a more resource-efficient way. A key differentiator of Dr Schopphoven's work is the integration of AI for real-time, spatially resolved process parameter prediction. This enables precise deposition with minimal manual intervention, improving contour accuracy and reducing rejection rates.
His team is also pioneering SMaC, which merges coating and machining into a single, hybrid process. This shortens production cycles and also improves part quality by allowing coatings to be applied and finished in one continuous workflow.

Zhujun Shi

Organisation: University of Pittsburgh; Meta
Role: Assistant Professor; Display Researcher
Based in: Pittsburgh, USA
Education: PhD, Physics

Zhujun Shi is that rare optical scientist who bridges the domains of academic research and industry. After devising several fundamental contributions to diffractive/meta-optics and polarisation optics in her PhD, she joined Meta (Facebook Reality Labs) where she has made significant contributions to display research and development for augmented reality applications. She has also rejoined academia as an assistant professor at the University of Pittsburgh. She is developing new types of hybrid photonic systems for advanced light modulation. Her research combines photonic elements with MEMS, liquid crystals, and other nonlinear materials to build reconfigurable photonic platforms. Her previous industrial work has focused on applying nanophotonics to improve display performance. One example is a flat-panel laser microdisplay developed using a large-scale visible photonic integrated circuit, which makes AR displays much smaller and brighter. "Seeing the device working with my own eyes – that's the privilege of working in the visible regime," she reflects. "The high-quality image from our PIC-laser display projected through an AR glass made all the design and integration feel real and rewarding."

Ronian Siew

Organisation: Inopticalsolutions
Role: Optical Consultant
Based in: Vancouver, Canada
Education: MSc, Optics, University of Rochester

An optical consultant with more than two decades of experience, Ronian Siew's understanding of optical systems is evident through his publications, and active engagement within the photonics community. He says his work centres on 'modern classical' optical system design – described as "roughly, new ways of doing old things" – and involves either hardware solutions or pedagogical methods in optical design. Examples of hardware solutions include the invention of the anti-zoom lens (a lens system that can maintain a fixed focal length while varying the focal position in a confined space), a freeform progressive lens that can focus the image from a scene without mechanical motion, and the Villuminator (an optical module that provides almost 100% uniform illumination at planes and oblique surfaces). Some of these innovations were the result of R&D undertaken in Siew's personal time, while others were the result of providing optical solutions to a major client (including the Villuminator). Siew's engagement with the wider photonics community is exemplified by his published books, such as 'Perspectives on Modern Optics and Imaging'.

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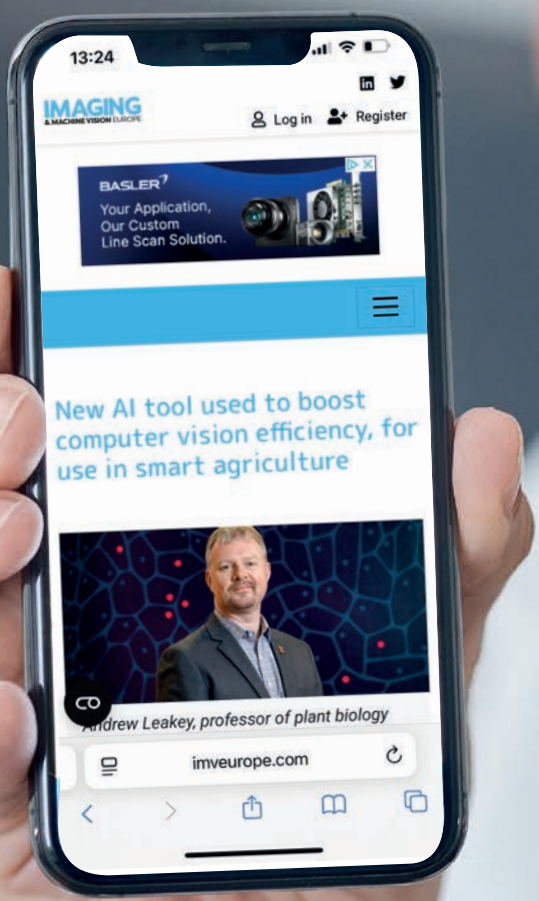

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Kanu Sinha

Organisation: University of Arizona
Role: Assistant Professor of Optical Sciences
Based in: Tucson, USA
Education: PhD, Physics, University of Maryland

Kanu Sinha specialises in quantum optics, studying interaction between light and matter at the quantum level. Her group's work aims to find novel ways to engineer interactions between atoms/atom-like emitters and photons, with the goal to build efficient light-matter interfaces and explore quantum phenomena at macroscopic scales.

Prof Sinha's work departs from conventional approaches by operating in regimes by which the group controls light-matter coupling through a combination of collective many-body dynamics, nanoscale interactions and memory effects of the photonic environment (known as non-Markovian dynamics, where the system's future evolution depends on its past). One of her proudest moments was when her theoretical work on non-Markovian dynamics in waveguide quantum electrodynamics inspired her experimental collaborators to design a set-up that could directly probe the delay-induced effects the team had predicted. For Prof Sinha, seeing ideas that began as equations on a whiteboard take form in the lab reinforces the impact that research can have in shaping the next generation of quantum science.

Eli Slenders

Organisation: Istituto Italiano di Tecnologia
Role: Researcher
Based in: Genoa, Italy
Education: PhD, Biomed, UHasselt, Belgium

Eli Slenders is recommended by peers as an outstanding researcher in the field of optical microscopy. He spearheads the use of single photon avalanche diode (SPAD) arrays for molecular investigations, exploring techniques ranging from fluorescence fluctuation correlation to single-molecule localisation. Combining experimental and theoretical approaches, he has engineered laser-scanning microscopes equipped with a SPAD array to enhance both their performance and information throughput for single-molecule studies. The aim is to make a tangible impact on the optical instruments industry and to revolutionise the field of biomedical research. Slenders is now working on a single molecule localisation microscope (SMLM) with SPAD array detector and a MINFLUX based illumination scheme. He says the resulting set-up is significantly simpler than the commercial MINFLUX system, allowing users to transform a conventional confocal microscope into a super-resolution single-molecule localisation microscope cheaply, easily, and in a user-friendly way. After a Masters in Soft Matter Physics at KU Leuven, Slenders took his PhD at UHasselt, and has been at the Istituto Italiano di Tecnologia in Genoa for the past seven years.

Matthew Sysak

Organisation: Lumentum
Role: CTO, Cloud and Networking
Based in: Santa Clara, USA
Education: PhD, Electrical Engineering, UC Santa Barbara

As CTO of Lumentum's Cloud and Networking Platform, Matthew Sysak is a driving force behind the company's most advanced optical innovations. The aim is to shape the future of AI/ML data centre infrastructure through high-performance photonic solutions. His leadership bridges the gap between cutting-edge R&D and scalable, real-world deployments. With a PhD from UC Santa Barbara, his technical vision continues to drive the development of new technologies. Examples include VCSELs for next-generation scale-up AI architectures, and 400G Mach-Zehnder modulators and EMLs for next-generation optical interconnects. Under Dr Sysak's technical direction, Lumentum showcased two groundbreaking demonstrations at OFC in 2025 that define the optical roadmap for AI-centric cloud infrastructure. First, in collaboration with Marvell, the industry's first integrated 450G high-speed optical interface, leveraging Lumentum's indium phosphide (InP) DFB-MZI transmitter; second, a joint 448Gbps benchmark demo with Keysight and NTT Innovative Devices, featuring Lumentum's high-bandwidth InP externally-modulated laser (EML), paving the way for 3.2T optical interfaces optimised for AI and ML workloads.

Michael Stelzl

Organisation: MSTVision
Role: Managing Director
Based in: Germany
Education: MBA, Hochschule, Esslingen, University of Applied Sciences

Michael Stelzl's nominators for the Photonics100 highlight the impact and dedication he has brought to advancing photonic technologies throughout his impressive career. Not only does he lead a dynamic and fast-growing company always pushing the boundaries in industrial imaging and optical metrology, but he is also extremely well connected in both industry and research, constantly building bridges and sparking new collaborations. His efforts as an employer who fosters a creative and supportive work environment are also applauded.

A story from the early days of Stelzl's career provides a colourful illustration. Fresh out of university, he was tasked with evaluating a highly complex surface inspection system that used many line scan cameras. The system had a poor reputation and, unfortunately, no engineer who could properly defend its performance. Stelzl's challenging assignment was to identify the root causes of its issues – some even expected him to prove that the system was fundamentally flawed.

Instead, he discovered that the system was actually very capable, just not being used correctly. The main issue was with a special customer-supplied lighting set-up, specifically its alignment. There was no practical way to check or adjust the lighting, and no good adjustment mechanisms were in place. To solve this, he stretched a three-metre string through the system to enable precise alignment for the first time. He also drilled three small holes in the protective housing to access the adjustment screws of an internal mirror.

With just a string and a few carefully placed holes, he was able to properly align the lighting and demonstrate the true potential of the system. As a result, Stelzl helped save a €600,000 investment that was at risk of being written off. Achieving this as a young engineer, using simple but effective solutions, set the tone for his approach to problem-solving ever since.

Stelzl founded MSTVision as a one-man band a decade ago; it now has a team of nearly 20, mainly engineering specialists in optical technology and image processing. Over the years, the team has built core expertise in high-speed line scan cameras and the ability to process high data bandwidths with minimal latency. This is achieved by distributing computational loads efficiently across CPUs, FPGAs, and GPUs. Current focus is on launching several new products in the field of computational imaging, with a particular focus on photometric stereo, an area in which Stelzl says he expects the company to become a key player in the coming months. Solutions are designed for both line scan and area scan cameras.

'Achieving this as a young engineer, using simple but effective solutions, set the tone for his problem-solving ever since...'

One of the company's most innovative developments is the combination of programmable frame grabbers from Basler with MSTVision's newly developed photometric stereo line light. Stelzl believes it is the fastest solution on the market: the FPGA in the frame grabber can process up to 3.6GB per second, while the line light, optimised specifically for photometric stereo, delivers the high intensities and fast switching times required for applications that were previously impossible.

Examples of applications include quality inspection in e-mobility, such as battery foil and bipolar plates for fuel cells, as well as embossed surfaces in the furniture industry, and other technical applications where texture and topography need to be evaluated separately. By performing the photometric stereo algorithm directly on the FPGA, CPU load is minimised, leaving it available for other image processing tasks. This technology is particularly well suited for surface inspection of large, moving objects.

Stelzl's commitment to the industry is typified by his work with the VDI Guideline 2632 working group. He also teaches at Hochschule Darmstadt in the Photonics and Machine Vision programme, ensuring a steady flow of new talent for the sector.

Jacob Tunesi

Organisation: National Physical Laboratory
Role: Senior Scientist
Based in: Teddington, UK
Education: PhD, Physics, University of Sussex

A senior scientist at the UK's NPL, Jacob Tunesi aims to make optical frequency metrology more useful by applying frequency combs to translate state-of-the-art optical reference standards to domains where they can be accessed by external partners. He is doing this by facilitating international optical clock comparisons with other metrological institutes and by incorporating optical clocks into international atomic time in anticipation of a future redefinition of the SI second. He points out that clock comparisons have the added benefit of enabling tests of fundamental physics, searches for dark matter, and chronometric levelling. Alongside this research work, Tunesi is also building a new test and evaluation facility at NPL in support of UK industry and academia. This capability is unique among the metrology community and has since been used in five projects with external partners (three industrial, two academic) to measure various critical parameters (such as frequency stability or phase noise) of early hardware prototypes. This enables the partners to validate their products' performance against NPL standards, and enables further iterative research and development of the hardware being tested.

Deepa Venkitesh

Organisation: Indian Institute of Technology, Madras
Role: Professor, Department of Electrical Engineering
Based in: Chennai, India
Education: PhD, Physics, Indian Institute of Technology, Bombay

Deepa Venkitesh believes we will see an increase in demand for capacity in optical communication as AI becomes widespread, and argues that space division multiplexing (SDM), hollow-core fibre and associated technologies will be the game changers.

Her research in SDM technology is at the forefront of developing high-capacity optical networks. She focuses on multi-mode and multi-core fibres, devising innovative techniques for modal decomposition, and signal processing to enhance transmission efficiency. Prof Venkitesh also leads the Advanced Optical Communication Testbed project, where a first-of-its-kind SDM-Multicore Fibre testbed is deployed at IIT Madras. Her work has attracted more than $25.8m in research funding from national agencies. Having published more than 60 articles, Prof Venkitesh also actively contributes to the academic community, having served as the AVP of 'Women in Photonics' within the IEEE Photonics Society. What makes her tick? "Every time my PhD student learns and comes up with new ideas; every time we make a new indigenous product, however small; the list is endless – I am excited on a daily basis!"

Jamie Vovrosh

Organisation: QinetiQ
Role: Quantum Sensing, PNT and Communications Lead
Based in: Cheltenham, UK
Education: PhD, University of Southampton

Jamie Vovrosh leads a team at QinetiQ focused on bringing quantum into the real world. "To transition this technology and convince end-users that it is valuable can be difficult and Jamie does a fantastic job," say his nominators.

An exciting area currently being explored by Dr Vovrosh is quantum-enhanced position, navigation and timing (PNT). While PNT is critical to much of human activity and underpins our daily lives, it relies heavily on global navigation satellite system (GNSS), the unavailability of which can have catastrophic consequences. It has been estimated that a day of GNSS outage could cost the UK economy £1bn.

Vovrosh is researching how several different quantum sensors can best be used to provide GNSS-free navigation. These include quantum inertial sensors, which navigate via a technique called dead reckoning; and quantum magnetic/gravity sensors that will enable navigation through the map matching technique. Dr Vovrosh and his team are developing novel data fusion algorithms and testing quantum enhanced navigation systems on platforms such as London Underground trains.

Dominic Sulway

Organisation: Light Trace Photonics
Role: CTO
Based in: Bristol, UK
Education: PhD, University of Bristol

It is no secret that there is a skills gap needing to be filled if the photonics industry is to meet its full potential. Dominic Sulway and his team are trying to bridge that gap. As CTO and co-founder of Light Trace Photonics, Dr Sulway leads an R&D team dedicated to accelerating the adoption of integrated photonics by developing solutions that address the industry's most significant engineering challenges.

Early in its work, the group identified a critical limitation to wider adoption: a shortage of skilled integrated photonics engineers. To address this, the team developed its first product, the LightPort – a hands-on, programmable photonic chip module empowering engineers and students to learn by doing. This groundbreaking tool is already helping to close the talent gap, with modules having been sold to universities across the UK and the EU.

With LightPort helping to bridge the skills gap in integrated photonics, Light Trace turned its focus to one of the field's most pressing technical hurdles: low-complexity, ultra-efficient fibre-to-chip coupling. Building on research from Sulway's PhD at the University of Bristol, the team developed LightBridge. It is a breakthrough solution that achieves coupling losses below 0.5dB across a 250nm optical bandwidth, marking a significant advance over the current state of the art.

Just as importantly, LightBridge is engineered for mass manufacturability, which is an essential step towards scaling integrated photonics into high-volume, real-world applications. Beyond its performance, it dramatically simplifies fibre-to-chip packaging, a shift that Dr Sulway believes could really accelerate the commercial adoption of integrated photonics technologies. In other words, this is innovation that doesn't just improve; it redefines the technological landscape.

Ultimately, the work Dr Sulway and his team are leading at Light Trace is not just about creating better components; it is about building the foundations for a scalable and accessible integrated photonics future. "We are pushing the frontiers of what integrated photonics can achieve, from enabling quantum technologies and next-generation data communications, to empowering the next generation of engineers," he asserts.

Dr Sulway is in tune with many of his peers when he says that the biggest challenge – and opportunity – for integrated photonics in the next 12 months is to make the transition from a niche technology to a foundational enabler of next-generation data communications and quantum technologies. While momentum is building, broad adoption is still held back by two key hurdles: a fragmented value chain and the lack of accessible, reliable component designs. He believes companies seeking to integrate photonics chips into their products face a complex set of questions. Which material platform should they choose? Which foundry should they fabricate with? How can they ensure their designs are scalable and packageable?

"Actively seek out discomfort... Put yourself in rooms with people who know far more than you do, challenge them with questions and learn from their expertise"

"The lack of standardisation and clarity creates high barriers to entry and slows innovation," he adds. To fully capitalise on this moment, the industry must work toward unifying development pathways, he advises. "The existing traction in data communications and quantum computing should be leveraged to expand integrated photonics into adjacent sectors such as healthcare, environmental monitoring, and metrology, where the technology holds tremendous potential."

Light Trace Photonics is currently working to address these challenges directly. By offering a comprehensive simulation, design, and measurement platform, the company aims to help to build a more integrated and accessible development ecosystem.

Sulway has pithy advice for up-and-coming researchers looking to break boundaries within science and photonics. "Actively seek out discomfort," he says. "Put yourself in rooms with people who know far more than you do, challenge them with questions, and learn from their expertise. Significant breakthroughs rarely happen in a vacuum; they often emerge from the conversations you least expect."

Min Wan

Organisation: Eindhoven University of Technology
Role: Assistant Professor
Based in: Eindhoven, the Netherlands
Education: PhD, University College, Dublin

Min Wan is a driving force in the education, mentoring, and nurturing of enquiring minds in the field of optical engineering.

Dr Wan obtained her MSc in Optical Engineering from Beijing University of Technology in 2017; her thesis focused on the design and implementation of terahertz digital holographic systems and holographic image reconstruction. She then travelled to Europe, completing her PhD in 2021 at University College Dublin under the supervision of Prof John (Séan) Sheridan, in which she explored optical imaging techniques in the terahertz regime. This research in terabit imaging and holography has been acknowledged by OPTICA, SPIE, EOS and other professional institutions including the IEEE and IET.

Dr Wan also taught an MSc course in Optical Engineering in Dublin. She is now Assistant Professor at Eindhoven University, running a new course on Optical and Communication Engineering.

Dr Wan's peers celebrate that, while still only in her thirties, she has managed to learn, deliver and then collate her own course in a very challenging area, with fast-changing innovations such as 6G, submarine cable technology, and next-generation networks.

Jan-Philipp Weberpals

Organisation: Audi AG
Role: Expert Laser Beam Processes for Car Body Construction and Electromobility
Based in: Neckarsulm, Stuttgart, Germany
Education: PhD, Laser Beam Technology, University of Stuttgart

The switch from combustion engines to EVs in the automotive industry is one of the great transformations of our time. Quality assurance in battery production will be an essential tenet of success; Jan-Philipp Weberpals is at the heart of this challenge.

Dr Weberpals and his team at Audi have developed an integrated laser remote welding process for battery cell contacts. The process not only ensures electrical conductivity of every weld seam, but also enables emission-free production and thus supports wider environmental goals set by Audi/VW. It is currently in use with prototypes and is well on its way to serial production. The advanced technology offers many advantages, including compensation of tolerances and optimum positioning of weld seams to protect battery cells from damage. This is done by the use of AI-supported image analysis of every weld position via the use of unique image labels.

Beam oscillation and high-speed welding produce weld seams of the highest quality and reduce process time. By superimposing beam oscillation and beam shaping, the desired seam shape adapted to the components can ultimately be programmed.

Thomas Willemsen

Organisation: Laseroptik
Role: Team Lead Coating Design
Based in: Germany
Education: PhD, Leibniz University, Hanover

Thomas Willemsen has made groundbreaking advances leading the coating design team at Laseroptik.

His research focuses on dielectric quantised nanolaminate structures and precise material engineering to significantly improve the laser-induced damage threshold (LIDT) of femtosecond optics using advanced coating design techniques. The knowledge gains derived from his work have directly contributed to the production of large-area sputtered beam transport mirrors with the highest laser-induced damage threshold, a capability deemed essential for the reliable operation of petawatt-class laser facilities; examples of such facilities include ELI Beamlines in the Czechia.

Having begun this work as part of his PhD research, Dr Willemsen says it is a rare privilege to help shape a line of research from its early stages through to visible industrial application. He cautions that a key challenge in the next year will be scaling the supply chain for the high-LIDT, large-area optics needed in laser fusion power plants, where hundreds of components per system are required. This demands not only cost-efficient coating processes, but also the rapid availability and polishing of hundreds of kilograms of optical glass.

Calum Williams

Organisation: University of Exeter
Role: Lecturer
Based in: Exeter, UK
Education: PhD, University of Cambridge

Calum Williams's goal is to make powerful optical sensing technologies accessible beyond the lab, embedding them into everyday objects and enabling real-time insight into the world around us.

Long term, he wants nothing less than to put a mid-infrared spectrometer in your pocket. In his own words, he utilises nanophotonics and photonic metamaterials to overcome the limitations of conventional spectroscopy, sensing, and imaging systems. "My current work focuses on shrinking and simplifying tools like mid-infrared spectrometers – traditionally bulky, fragile, and confined to lab environments – by replacing complex optics with nanostructured materials and computational sensing," he explains. "This enables entirely new device classes that fit in the palm of your hand yet reveal rich chemical and structural information."

His nominators say Dr Williams is exactly the kind of 'coal-face' innovator whom The Photonics100 exists to recognise. They point out that over the past decade, and particularly in the past 12 months, he has delivered breakthrough optical technologies, translated them into real-world products (including some in healthcare and some now orbiting the Earth), and built bridges between academia, industry, and the public sector. Dr Williams is a world-leading nanophotonics researcher whose 25 peer-reviewed papers have already amassed more than 1,400 citations (h-index 18). He pioneered the first multicolour plasmonic holograms (PNAS 2014), polarisation-controlled flat lenses (Adv. Opt. Mater. 2017) and holographic 'metapixels' (Sci. Rep. 2017). Additional research achievements of note include delivering the world's first CMOS multispectral image sensor for early cancer detection in endoscopy; this innovation formed the core technology of a Cambridge University spin-out. He also saw his phase-change mid-IR filters fly aboard the International Space Station as part of NASA's MISSE mission (2021-23), generating four high-impact publications – including an Optica 'Editor's Pick' – and a $375,000 NASA Innovative Concepts Award.

He has released two open-source tools (OptiMSFA and PCM-net) that have become standard resources for researchers working on multispectral imaging and phase-change photonics. Dr Williams is also developing new optical methods for chirality in nanomaterials with Prof Venstislav Valev (University of Bath, and also a Photonics100 honouree in 2024), producing two highly cited publications, one featured as Nanoscale Horizon's 'Top 15 Most Popular Papers, 2019'. He is also contributing, with Dr Tawfique Hasan (Cambridge), to the world's first single-nanowire spectrometer (published in *Science*).

"My current work focuses on shrinking and simplifying tools like mid-infrared spectrometers – traditionally bulky, fragile and confined to lab environments..."

He turns fundamental discoveries into deployable technology; the Cambridge spin-out is just one example. As an optics consultant to the New Murabba Development Company, he advises display manufacturers in China and Korea on next-generation 3D screens for Saudi Arabia's multi-billion-dollar smart-city project.

He also consults for PepsiCo on sustainable structural-colour solutions that could replace synthetic food dyes, and has previously advised Nike on plasmonic holographic anti-counterfeiting tags. Williams also holds three patents in optical sensing and fabrication techniques, ensuring his academic discoveries become deployable technologies.

Within the UK Metamaterials Network+, Dr Williams co-leads the 'Metamaterials in Healthcare' theme, organising sandpits and training events that connect photonics researchers, med-tech developers, and NHS stakeholders. He is an invited speaker at several leading photonics conferences including SPIE, CLEO and UK Nanophotonics.

It is not simply the range and depth of his concepts, from nanophotonic holography and tunable mid-IR filtering to on-chip multispectral imaging; it is the fact that all have translated from the lab to the outside world, from the ISS to hospital endoscopes and next-generation immersive displays.

Dr Williams's backers are emphatic: his rare fusion of scientific imagination, translational drive and community leadership already set him apart, and his trajectory points toward a future as a global leader and top innovator in photonic multispectral sensing and imaging.

Hollie Wright

Organisation: Heriot-Watt University
Role: Research Associate
Based in: Edinburgh,UK
Education: EngD, Centre for Doctoral Training in Applied Photonics, Edinburgh

An early-career researcher at Heriot-Watt University, Hollie Wright develops dual-comb based lidars. Lidar sensors are already widely adopted for many applications, however, the electronic timing response of photodetectors limits the resolution of time-of-flight (ToF) lidar to ~1cm. To address this limitation, Dr Wright has developed a dual-comb approach, which improves the resolution by a factor of 10,000. She believes this technology will be as broadly applicable in the future as conventional lidar; the current focus is on applications in sustainable manufacturing.

She explains that, during operation, the motion of manufacturing machines is determined by internal controls subject to many sources of positional uncertainty. Positioning missteps during manufacturing can accumulate into a final product that does not fit design specifications. Her collaboration with Huddersfield University experts will see lidar technology track the position of manufacturing machines during operation. The data collected will describe the 'true motion' of the machine and will be compared to the expected motion to identify and counteract positional missteps.

Qing Yang

Organisation: Zhejiang University, China
Role: Professor, College of Optical Science and Engineering
Based in: Hangzhou, China
Education: PhD, Materials, Zhejiang University

Qing Yang researches micro-/nanophotonic devices, super-resolution imaging and multimodal endoscopy. She has substantially advanced the field of making ultra-thin endoscopes by pioneering a new technique for imaging through multimode fibres without any distal optics. Adherents argue the technology is likely to be widely adopted within the next decade.

A professor at Zhejiang University for over a decade, Prof Yang also undertook both her undergraduate and postgraduate education at the same institution. She has also been a Visiting Scholar at both the University of Cambridge and the Georgia Institute of Technology.

Prof Yang holds more than 40 patents, has authored a book, 'Spectroscopy and its Applications', and edited two others: 'Spatial Frequency Shift Super-resolution', and 'Nanophotonics Devices Based on ZnO Nanowires'. She has published 105 peer-reviewed journal articles and the publications have been cited by others more than 5,400 times. Recent examples include Efficient reference-less transmission matrix retrieval for a multimode fibre using fast Fourier transform.

Nouman Zia

Organisation: Nokia Networks
Role: System-on-Chip Quality/Reliability Specialist
Based in: Tampere, Finland
Education: PhD, III-V Semiconductors and Silicon Photonics Integration, University of Tampere

Nouman Zia demonstrates outstanding expertise in hybrid integration of III-V optoelectronics with CMOS silicon photonic circuits. His PhD research focused on mid-infrared tunable light sources – a cutting-edge domain with major implications for gas sensing, healthcare, and environmental monitoring. Alongside more than 30 publications in peer-reviewed journals and conferences, signifying a strong contribution to the global photonics research community, Dr Zia was awarded the Gold Medal (1st Prize) in the Huawei Europe Silicon Photonics PhD Student Contest 2022, reflecting both technical excellence and innovation impact. Currently working at Nokia Networks, with strong affiliations to Tampere University, he is now uniquely positioned at the intersection of semiconductor manufacturing, photonic chip design, and system reliability for 5G/6G. Zia's role at Nokia involves qualifying advanced nodes and packaging, crucial for real-world deployment of photonic systems. He is working on optical interconnects for high-speed data transfer by replacing the traditional copper interconnects. The team's solution will integrate hybrid photonics and RF interconnects on a single substrate for efficient data transfer.


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Claudia Jaffe, Ph.D.
Founder of Lumencor, Inc.
Lumencor
Proud member of Photonics100 alumni

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