

SPIE. DEFENSE+
COMMERCIAL
SENSING

SHOW FOCUS

In this Issue

nLight results show
defense shift
p.4/5

Aeva lidar to be
deployed at JFK,
SFO airports, and
elsewhere
p.14

...plus the latest
product news



'SPHEREx' space observatory
delivered for February launch
p.11

SPIE Defense+Commercial Sensing 2025
Featuring mission-critical sensing innovation
from the commercial sector

SPIE.

Your source for cutting-edge photonics news

Stay ahead with 24/7 coverage of the latest breakthroughs in defense, surveillance, and commercial sensing.

From game-changing technologies to industry-shaping innovations, we deliver the news that keeps you informed and inspired.

- **Breaking News**
- **Emerging Applications**
- **Industry Insights**

**don't miss out...
explore the latest
updates now!**

Visit us at **Booth #1329**

 the business of photonics
optics.org

optics.org
e: rob.fisher@optics.org
t: +44 (0)117 905 5330
e: malaya.plummer@optics.org
t: +44 (0)117 905 5351



BluGlass demonstrates 'record' single-mode GaN laser

1250 mW of single-spatial mode power from a chip is highest output from one emitter, says Sydney firm.

BluGlass, a Sydney, Australia-based developer of visible wavelength lasers for the quantum, defence, and biotech markets, has demonstrated what it calls "world-record performance" of its single-mode gallium nitride (GaN) lasers, achieving 1250 mW of power from a single laser chip, while maintaining single-spatial mode.

The company stated, "This is the highest known published result available, both commercially and in academia, based on literature searches conducted by the University California, Santa Barbara and BluGlass."

This performance was enabled by combining a blue (450 nm) single-mode laser master oscillator with an integrated power amplifier in a single monolithic chip (SM-MOPA). The performance

enhances BluGlass's previously-reported 750 mW single-mode performance by more than 67%, as published at Photonics West in January 2025.

Multiple potential applications

BluGlass's high-power single-mode MOPA combines the benefits of a single-mode laser, and small form factor advantages for high-precision applications in defense and aviation, quantum sensing and navigation, space and satellite communications, and underwater lidar.

CEO Jim Haden said, "Most high-powered visible lasers sacrifice beam quality and precision to achieve more power in larger form factors. Our advanced integration capabilities will enable

industry to pioneer innovations by increasing power without sacrificing precision and beam stability. We achieved these world-leading results by combining our blue single-mode laser with a power amplifier that boosts the laser's power with minimal beam distortion or increase in noise.

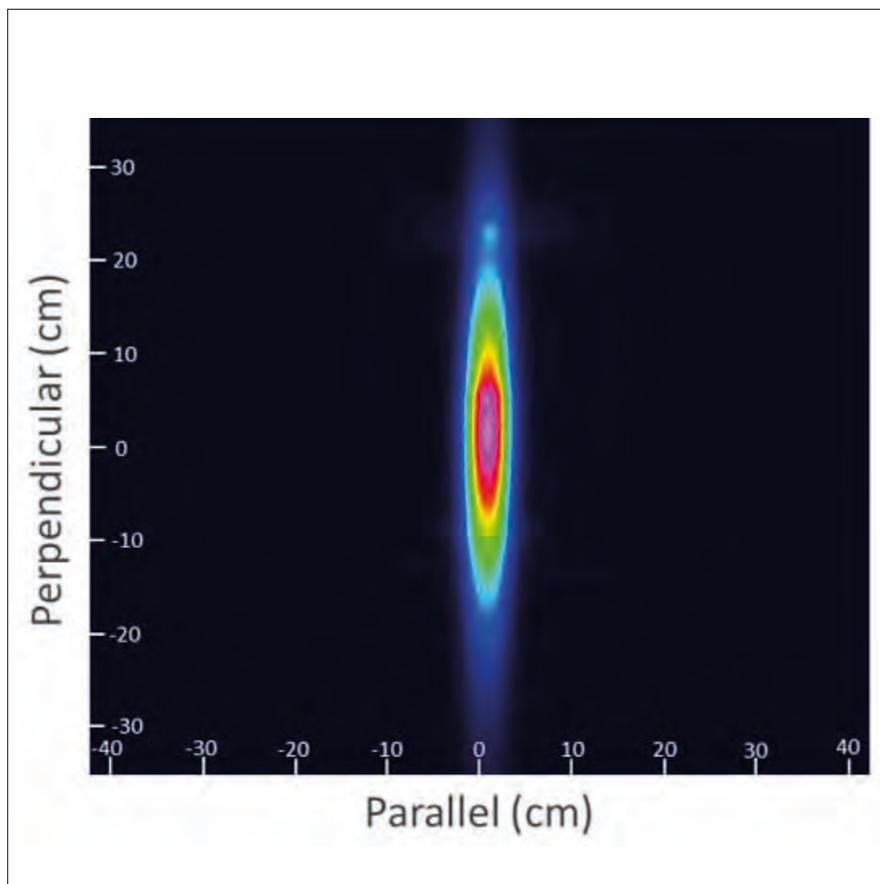
"Single-mode GaN lasers are highly sought after for their high-precision and high-fidelity, despite being challenging to manufacture at high powers. The advantage of the monolithic chip design is significant, in that we can manufacture high-fidelity power and performance at the wafer level, drastically improving size, weight and cost for defence applications, and eliminating several downstream packaging steps," he said.

BluGlass's announcement added that it has now more than quadrupled the power output of its distributed feedback (DFB) family of devices from the 100 mW range to 450 mW, since its Photonics West paper, published in January. The 450mW DFB performance while maintaining near single-frequency output and high side-mode suppression for enhanced signal-to-noise ratio, was achieved by combining a blue (450nm) single-mode DFB laser with an integrated master oscillator power amplifier, in a single monolithic chip (DFB-MOPA).

The company's GaN DFBs are being designed for wafer-scale fabrication to reduce downstream optical complexity and cost, at the same time as addressing critical challenges in quantum technologies and computing while enabling greater production volume and smaller device sizes.

Haden added, "Our strategic focus on scaling power at high fidelity for the precision market that led to this world-record single mode visible power and the quadrupling of power in our narrow linewidth lasers is a direct response to market demand. Our ability to satisfy unmet market needs is why BluGlass continues to be selected as partner of choice by industry leaders, including the US Department of Defense's Microelectronics Commons."

<https://optics.org/news/16/3/21>



A 67% improvement from the previously reported 750 mW SM performance.

nLight results show defense shift

Full-year figures from the US laser company include 20% jump in sales to aerospace and defense applications.

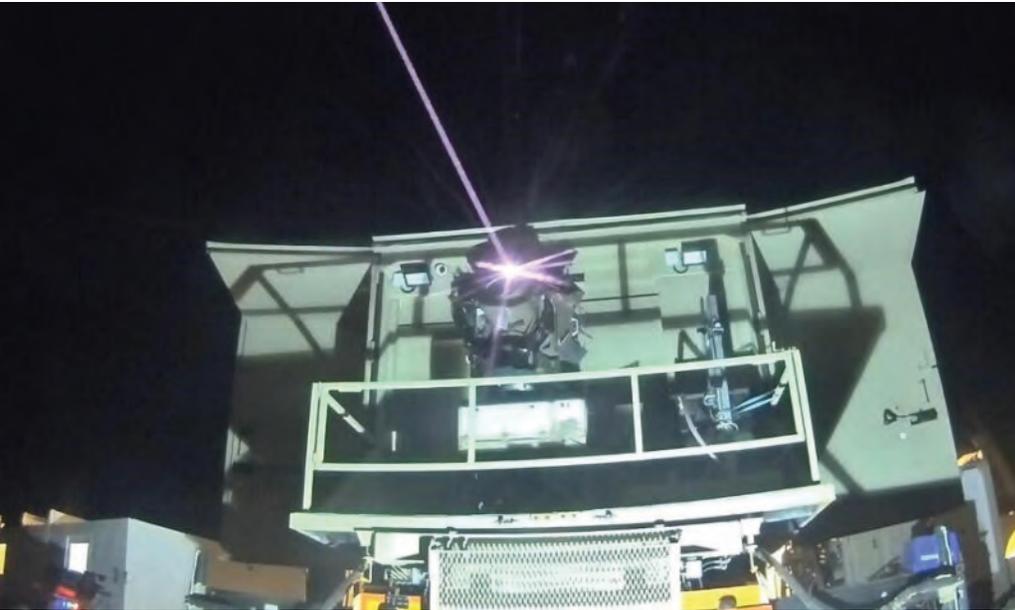


Image: Rafael.

nLight is already closely involved with the Israeli "Iron Beam" project, with an initial deployment of the laser-based air defense system now anticipated later this year. The company also stands to benefit from a similar effort intended for the US, with CEO Scott Keeney saying that funding numbers are "very big."

nLight, the US-based maker of high-power semiconductor and fiber lasers, has reported sales of \$199 million for 2024, down 5 per cent on the figure for 2023.

The drop in revenues saw nLight's pre-tax loss for the full year widen to \$60.9 million, up from \$42.6 million a year ago.

However, the company's aerospace and defense division saw its revenues rise by 20 per cent over the same period, indicating nLight's ongoing shift towards applications including laser weapons.

That shift was even more stark in the closing quarter of last year, with 64 per cent of the firm's \$47 million revenues attributed to aerospace and defense - the highest proportion ever reported by nLight.

Describing 2024 as a "transformative" year as the defense business began to scale, CEO Scott Keeney said: "We made significant progress across multiple large directed energy contracts, while securing new program wins in laser sensing.

"I am optimistic [about] our business, particularly aerospace and defense, as we head into 2025. We enter the year with good visibility across multiple programs

in both directed energy and laser sensing, and combined with record backlog and a healthy balance sheet, we are confident that we are well-positioned for near- and long-term growth in the aerospace and defense market."

Megawatt laser progress

Discussing the latest developments during an investor conference call, Keeney added: "nLight has led the world in the development of high-powered lasers for direct energy for over two decades and recently demonstrated a 300 kilowatt high-brightness laser.

"nLight lasers are built in the US incorporating patented and proprietary technologies across the company's entire technology stack, from semiconductor lasers to high-power fiber amplifiers, beam-combined lasers, and beam directors.

"We have generated revenue at nearly every level of vertical integration in the directed energy market, and we have established ourselves as the most comprehensive supplier to the US government, other prime contractors, and foreign allies."

One major research effort right now is the \$171 million High Energy Laser Scaling Initiative (HELSEI) follow-up project to build a megawatt laser - the kind of power output thought to be required to take down ballistic missiles and hypersonic projectiles - by 2026.

"We are making significant progress on our HELSEI 2 program," Keeney said. "We began shipping components to this program in the second half of 2024 and we expect to accelerate those shipments throughout 2025."

Iron Dome

Another major focus involves the development of a 50 kilowatt high-energy laser for short-range air defense (SHORAD), a project backed by the US Army.

"During the second half of 2024 we finalized the design and delivered the majority of the most critical hardware components of this beam-combined laser," Keeney said, adding that plans for an "Iron Dome" air defense system across the US would likely benefit the company.

"The funding numbers we have seen are very big, and there is a broad range of different approaches that are being considered," he told investors. "We're actively engaged with a number of them right now."

"With a mandate to build these systems in the US, we believe we are uniquely positioned to benefit from this effort over the coming years," Keeney said, adding that he expected nLight's aerospace and defense division to grow revenues by at least 25 per cent this year.

Turning to the industrial and commercial side of nLight's business, the CEO said that competition from China and weak overall demand saw divisional sales slump 25 per cent year-on-year, with those headwinds expected to persist this year.

However, Keeney stressed that the experience nLight has gained in the commercial laser realm had given it an advantage over rival suppliers in the defense sector.

"It's the commercial application of these lasers that have enabled us to bring key learnings into our defense work, ensuring that our lasers are not only the highest performing but also the most cost-effective," he said.

continued on next page

continued from previous page

nLight results show defense shift

“Many of the competitors we see today in our defense markets are defense contractors, not laser manufacturers,” he said. “We believe that it is the application of our technology at scale with thousands of high-power laser systems shipped to customers that truly differentiates our high-energy lasers for defense.”

Additive traction

One area that does look positive for both commercial and defense applications is metal additive manufacturing, where Keeney highlighted nLight’s “Corona AFX” laser and its dynamic beam-shaping technology.

It provides a combination of high-resolution printing for finely detailed features while also offering faster build rates thanks to its stable ring-mode power, the CEO said.

Shortly after the results announcement Sintavia, a component manufacturer

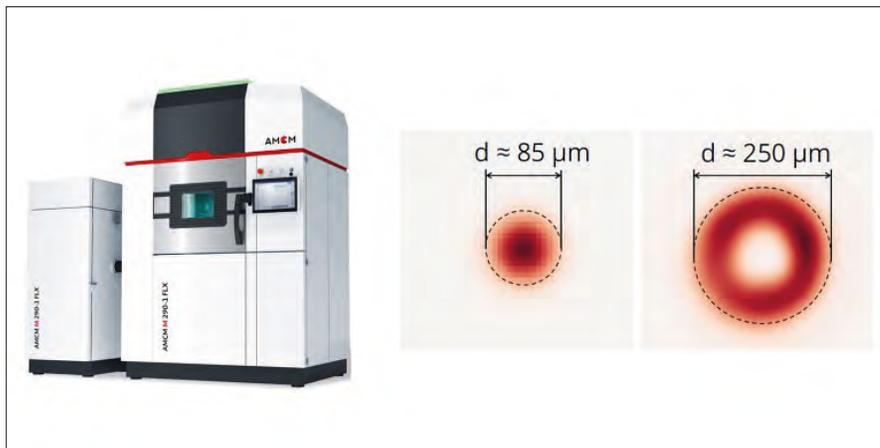


Image: Business Wire.

The AMCM M290-2 FLX Printer from Sintavia (left), and schematic diagrams (right) showing the difference between a normal Gaussian laser spot and the ring laser output from one of nLight’s high-power sources.

supplying the aerospace and defense industry that specializes in additive manufacturing, said that it had commissioned the first multi-laser industrial 3D printer in North America equipped with nLight’s AFX beam-shaping fiber lasers.

Featuring twin state-of-the-art 1.2 kilowatt lasers, the industrial 3D printer will be able to modulate beam spot size and shape without any loss of power and material density, resulting in builds that are more productive and less wasteful.

Sintavia’s founder and CEO Brian Neff said:

“Over the coming years as we develop and apply this new technology, we expect to be able to print our components at layer thicknesses of 150 microns or more without losing any material properties, thus greatly increasing the output of our installed printers.

“The best part of the nLight system, once it is fully tested, is that it can be retrofitted on other existing EOS and AMCM printers with minimal new equipment.”

<https://optics.org/news/16/3/4>

Wasatch Photonics

Compact, sensitive Raman Spectrometers, 248-1064 nm

At Wasatch Photonics, our spectrometers are more sensitive and higher throughput – to give you better spectra in less time.

We’ve made them portable, robust, and reproducible to deliver reliable spectra in the lab, the field, or the hospital.

We offer configurations to suit almost any application, supported by Raman-specific software tools that give you full control over data analysis.

Whether you’re a researcher or OEM, we’ll help you find the right fit.

Contact us to learn more.



Contact Details

Wasatch Photonics
808 Aviation Pkwy, Suite 1400
Morrisville, NC 27560 USA

www.wasatchphotonics.com
info@wasatchphotonics.com
Tel: +1 919 544 7785

Optimize Satellite Communication with Precision Optical Filters

Engineered to filter and transmit light for a strong, reliable signal over long distances with ground, air and space-based systems.



Visit us in Booth #1324
SPIE Defense + Commercial Sensing
or at Chroma.com/satcom



Spire achieves two-way laser communication between satellites in space

Company to launch further satellites with optical inter-satellite link tech on Transporter-13 Rideshare Mission.

Spire Global, a developer of space-based data, analytics and associated services, has successfully established a two-way optical link between two satellites in orbit. The company says this achievement “marks a major step toward enhancing the speed, reliability, and security of data transmissions for future missions.”

The satellites, which were launched in June 2023, are equipped with optical inter-satellite link (OISL) payloads. The payloads create lasers that send information back and forth between satellites, securely and almost instantaneously, while up to 5,000 kilometers apart.

Spire adds that the technology has the ability to enhance applications such as weather forecasting, global communications, and remote sensing for navigation and environmental monitoring by increasing data speeds, enhancing security and reducing data latency.

“Precisely pointing two satellites, across distances equivalent of New York to London, and establishing an inter-satellite optical link is a significant milestone for Spire,” said John E. Ward, Senior Director of Research & Development at Spire.

‘Overcoming the complexities of aligning satellites’

“This achievement places us among a select group of organizations capable of developing and deploying this advanced technology and overcoming the complexities of aligning satellites separated by thousands of kilometers in low Earth orbit. Integrating this technology into our future fleet will enhance resilience, improve security, and reduce latency for critical applications,” Ward added.

Thomas Carroll, Applied Optics Team Lead at Spire, said, “We have shrunk what is typically a large optical system – the size of a microwave – down to the size of a tissue box.”

“Our OISL payload is the smallest on the market, allowing us to deploy this technology

satellite communications, offering enhanced security and efficiency for space-based data transmission.”

Following the successful demonstration, Spire will launch three additional LEMUR satellites with OISL technology in 2025, two of which are set to launch via Exolaunch on the Transporter-13 rideshare mission with SpaceX.



Image: Spire Global.

Spire’s LEMUR bus is a configurable modular satellite system, specified for a broad range of application needs. The LEMUR is a modular nanosatellite system that supports configurations ranging from 5kg/3U missions up to 24kg/16U platforms and beyond.

on our small satellites while delivering performance previously achievable only with much larger systems. This breakthrough has the potential to enhance our data and Space Services solutions, especially for applications that require continuous coverage with fast and secure data relay.”

The development of the OISL technology was supported by a European Space Agency (ESA) Advanced Research in Telecommunications Services (ARTES) Pioneer Partnership Project, within ESA’s Connectivity and Secure Communications directorate, with funding from the UK Space Agency (UKSA).

“Through our ARTES Pioneer Partnership Project, we have supported Spire in the development of a new OISL capability for their space data service network,” said Clive Edwards, ESA Pioneer Implementation Manager. “This OISL system is set to transform

During the mission, Spire will also launch four additional LEMUR satellites to replenish its fully deployed constellation and enable missions for its Space Services customers. The launch is scheduled for no earlier than March 2025.

Spire Global builds, owns, and operates a fully deployed satellite constellation that observes the Earth in real time using radio frequency technology. The data acquired by Spire’s satellites provides global weather intelligence, ship and plane movements, and spoofing and jamming detection to better predict how their patterns impact economies, global security, business operations and the environment.

<https://optics.org/news/16/3/6>

Lumibird profits down as divisions register contrasting fortunes

Drop in photonics-related sales offset by stronger performance from medical and defense divisions.

Lumibird, the diversified French laser and photonics company, has posted a slight decline in full-year profits for 2024, after its largest division reported a small drop in sales revenues.

At €207.1 million, the firm's annual sales figure was up around 2 per cent on the 2023 total. But that overall total masked contrasting fortunes for the different Lumibird divisions.

The largest of those, the photonics division, reported sales of €99.4 million, down 5 per cent year-on-year on a like-for-like basis. The division includes subsidiary brands like Keopsys, which sells fiber lasers and amplifiers, and Quantel Laser, which specializes in solid-state and diode sources.

Lumibird said that sales of industrial and

scientific products were down 14 per cent year-on-year, amid weak demand from end users.

And the firm's recently reorganized "environment, topography and security" business line, which sells lidar systems, saw its sales drop more than 40 per cent year-on-year.

Dry eye therapy

On the plus side, sales into defense and space applications rose by 20 per cent, to €45.3 million, while the company's medical division recorded annual sales of €107.7 million, up around 5 per cent.

The medical division's growth was largely driven by therapeutic applications, which accounted for €83.9 million of the divisional total and benefited from

"buoyant" sales of products for treating dry eye disease, following two CE Mark approvals received last year.

The overall effect on Lumibird's profitability was negative, with earnings before interest, tax, depreciation, and amortization (EBITDA) down 5 per cent year-on-year, to €32.9 million, and net income falling 20 per cent to €5.7 million.

Despite the mixed picture, the company is confident about its prospects in defense and space applications, lidar systems, and scientific laser sales - the latter boosted by the recent acquisition of historic laser brand Continuum.

Other significant recent developments have seen the firm agree a €105 million debt refinancing package with lenders, and explore the potential sale of its medical division.

Perhaps as a result of that uncertainty, Lumibird's management team has decided not to set any more financial targets. In recent years the company had been aiming for an annual sales total of €250 million, but remains some way off hitting that goal.

<https://optics.org/news/16/3/18>



Photo: Lumibird.

Lumibird's 2024 sales revenues were boosted by "buoyant" sales of products used to treat dry eye disease, following the receipt of two key CE Mark approvals. In November the France-headquartered company said it had begun exploring a potential sale of its medical division.

LightPath set for further transformation with G5 Infrared deal

Optical component and system maker agrees \$27M acquisition of high-end MWIR camera producer.



Photo: G5 Infrared

The acquisition of G5 Infrared represents a major step in the transformation of LightPath from a supplier of low-cost lenses to a company providing cooled, high-performance, long-range thermal imaging cameras aimed at applications in counter-drone activity and border security applications.

LightPath Technologies, the Florida-based maker of infrared optical components and systems, has agreed what it describes as a “transformational” deal to acquire the thermal imaging and optics specialist G5 Infrared.

Valued at \$27 million, the cash-plus-stock agreement expands both LightPath’s vertical integration and its spectral coverage, with G5 Infrared’s expertise ranging from mid-wave infrared (MWIR) imaging systems to thin-film optical coating deposition enabling high-performance, long-range capabilities.

‘Transformative step’

Established in 2011, and with a manufacturing site at its Hudson, New Hampshire headquarters, G5 Infrared is said to have generated “at least” \$15 million in sales in 2024, with that figure expected to rise in the near future. For comparison LightPath’s recent quarterly sales have been in the region of \$7.5 million.

LightPath CEO Sam Rubin said in a statement announcing the deal: “The acquisition of G5 Infrared is a transformative step in our strategy to become a leading vertically integrated provider of infrared imaging solutions.

“G5 brings deep expertise in high-end cooled infrared camera systems and is considered the market leader in long-range imaging, which perfectly complement[s] our existing uncooled camera technology.”

As an example highlighting the kind of performance that technology is capable of, Rubin said that G5 Infrared cameras were able to identify vehicles from a stand-off distance of some 68 kilometers.

The CEO added that by integrating G5’s capabilities with LightPath’s proprietary ‘BlackDiamond’ glass and in-house optics manufacturing, the company would enhance its ability to deliver high-performance imaging technologies across defense and commercial applications.

Sales ramp expected

He also said that the business combination would likely achieve annual revenues of “at least” \$55 million over the coming twelve months, while adding established programs with US military and federal agencies.

“With most critical optical components and materials now produced internally, we expect to accelerate both growth and new product innovation,” he noted.

Lou Fantozi, who has been G5 Infrared for the past seven years, commented: “We are eager to join the LightPath family, bringing what we believe is a highly incremental and complementary product offering to the robust product suite offered by LightPath today.

“Together, we believe we can significantly ramp sales, bring new products to market and ultimately drive enhanced profitability for shareholders. I look forward to working closely with Sam and the LightPath team in the months ahead.”

During LightPath’s latest quarterly earnings investor conference call, Rubin said that the G5 Infrared agreement represented the latest step in LightPath’s strategic transition.

“Up until about four years ago, LightPath was a pure-play optical component manufacturer,” he said. “The core technology for LightPath, up until that point precision glass molding, was an innovative technology in the early 2000s.” But with that technology becoming fully commercialized and commoditized, LightPath faced aggressive competition and was effectively pushed out of the market by 2020, explained the CEO.

Up the value chain

Since Rubin took over in late 2020, the goal has been to reposition LightPath as a provider of optical systems and solutions, starting with optical assemblies, then compact thermal cameras, and - thanks to the 2023 acquisition of Visimid - thermal imaging and night vision technologies that have since been adopted by defense

continued on next page

continued from previous page

LightPath set for further transformation with G5 Infrared deal

giant Lockheed Martin in a new missile program.

“The addition of G5 Infrared fits naturally into what we have been building, and is a logical next step in our journey,” Rubin told investors. “Not only do G5’s products complement LightPath’s products perfectly; G5 is also at a pivoting point, about to be awarded some large, lucrative defense programs.”

He pointed out that completion of the deal will mean that in just four years, LightPath has gone from a company selling sub-\$10 lenses to one offering high-performance thermal cameras costing tens of thousands of dollars.

With only \$3 million on its balance sheet at the end of 2024, LightPath is financing the deal through a combination of \$6.75 million in common shares and \$20.25 million in cash raised through new convertible warrants and preferred equity arrangements with lenders.

As well as financing the G5 Infrared deal, which is expected to complete February 19, the injection of new cash is expected to strengthen LightPath’s balance sheet, and enable further investment in growth opportunities.

China germanium ban

Turning to other developments in LightPath’s latest trading quarter, Rubin highlighted the decision by the Chinese government in December to ban the sale of germanium to any US company - a move that also impacted the firm’s orders of other infrared materials like zinc selenide and zinc sulfide.

Although that has delayed some of the company’s sales from 2024 into 2025, the CEO emphasized that no sales had

been lost. “We have many other suppliers and are recovering from the small hiccup,” he told investors, pointing out that on the plus side the firm has seen a surge of interest in its BlackDiamond chalcogenide glass, which offers an alternative to germanium.

But because of the timing of the Chinese germanium ban, LightPath’s December 2024 quarter sales came in at \$7.4 million, a little below expectations and up only very slightly year-on-year. That translated to a pre-tax loss of \$2.6 million, widening from \$1.6 million a year ago.

- Shortly after revealing details of the acquisition and financing arrangement, LightPath’s Nasdaq-listed stock price dropped in value by around 7 per cent and is now equivalent to a market capitalization in the region of \$100 million.

<https://optics.org/news/16/2/17>

Wasatch Photonics

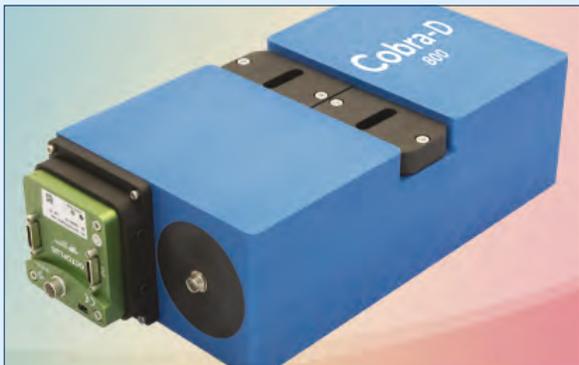
Ultra-deep 800nm OCT Imaging with the Cobra-D 800 spectrometer

Our Cobra-D OCT spectrometers deliver all the benefits of 800 nm OCT at greater depths than ever before – including more sensitivity, faster measurements, and lower camera cost than 1300 nm imaging.

The Cobra-D’s industrial design is ideal for ophthalmology, medicine, and nondestructive process monitoring.

Available in four bandwidths matched to commercially available SLDs

Contact us to learn more!



Contact Details

Wasatch Photonics
808 Aviation Parkway, Suite 1400
Morrisville, NC 27560

www.wasatchphotonics.com
info@wasatchphotonics.com
Tel: +1 919-544-7785

CHUNGHWA

LEADING PHOTONICS TECH

SWIR InGaAs PIN Photodiode

Based on the skilled InGaAs processing, we can provide a series of high-quality large-area InGaAs PIN photodiode chips with

Apertures of 0.3, 0.5, 1, 2, 3, and 5mm.

Visible Wavelength 600nm-1700nm

Standard Wavelength 900nm-1700nm

Extended wavelength 900nm-1900nm
900nm-2200nm
900nm-2600nm

Customized products and Die/Chip are also available

Contact : Chunghwa Leading Photonics Tech Co., Ltd.
Address : No.6, Ziqiang 7th Rd., Zhongli Dist., Taoyuan City , Taiwan
Tel: 886 3 4353888 Fax: 886 3 4351223
E-mail: sales@clpt.com.tw
http://www.clpt.com.tw/

Lumotive eyes new frontiers after \$45M series B investment

Total funding now tops \$100M as a raft of new investors back the developer of light-controlling metasurfaces.

Lumotive, the US-based optics startup that has developed beam-steering metasurfaces for applications including 3D sensing and lidar, says that it has raised \$45 million in a series B round of venture funding.

The Redmond, Seattle, firm received support from several new investors in the form of Swisscom Ventures, East Bridge, EDOM, Grazia, Hokuyo Inc., and TSVC. Lumotive said that the oversubscribed round also saw the return of existing investors including Gates Frontier, MetaVC Partners, Quan Funds, USAA, and HiMax Inc.

The additional funding is set to support a sales drive aimed at novel applications for what the firm calls its "Light-Control Metasurface (LCM)" technology, including the zeitgeisty areas of artificial intelligence (AI) data centers and optical satellite links.

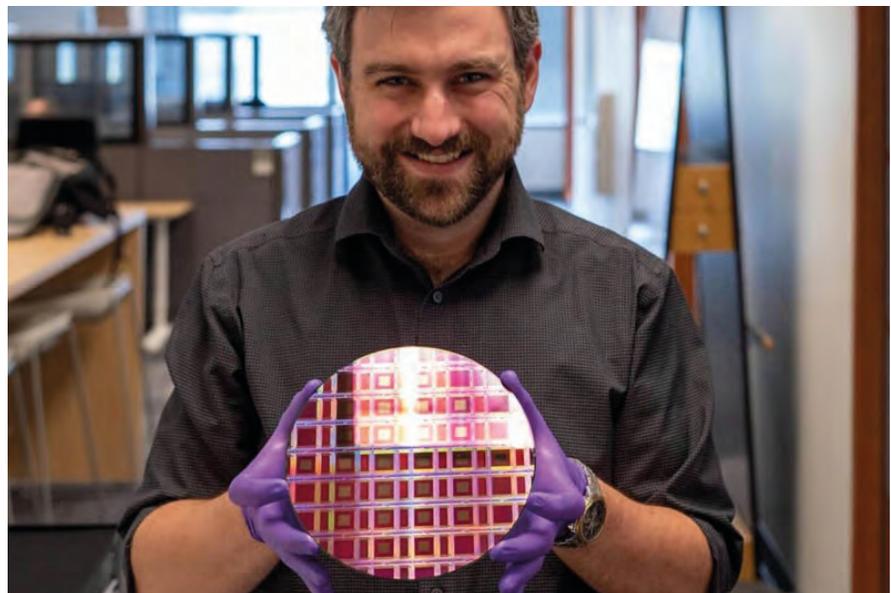
'Programmable optics'

Created out of research initially carried out at the Center for Metamaterials and Integrated Plasmonics at Duke University and Intellectual Ventures by CTO and founder Gleb Akselrod, the company briefly went under the name HoloSense Technologies before adopting Lumotive in 2018.

After seed funding by Bill Gates and other early backers the company announced a \$13 million venture round in 2023, and said at the time that it had raised \$56 million overall. The series B effort indicates that the total now exceeds \$100 million.

Pär Lange, an investment partner at Swisscom Ventures, said: "Lumotive's unique technology represents a fundamental advance in optical semiconductors. Their proven success in automotive and industrial markets, combined with their ability to precisely control light at the chip level, enables applications that were previously impossible."

Thus far the firm has aimed the technology at industrial 3D sensing, autonomous lidar systems and augmented reality (AR)



Credit: Lumotive.

Lumotive's beam-steering metasurfaces are produced at scale. Here, an engineer in the firm's laboratory poses with a wafer containing "Light Control Metasurface (LCM)" solid-state beam steering chips.

markets. Recent developments have included a strategic partnership with E-Photonics, a manufacturing facility in Saudi Arabia focused on solid-state lidar and 3D sensing.

Others to have demonstrated applications or products based around Lumotive's beam controllers include Sony, Hokuyo, Lattice Semiconductor, and the Korean camera module firm Namuga.

And as recently as December Lumotive announced details of a partnership with "AI solutions" developer MulticoreWare that targets potential applications in autonomous vehicles, robotics, smart cities, 'Industry 4.0', and drones.

Strategic areas

Commenting on the latest round of investor support, Lumotive CEO Sam Heidari said: "This funding marks a pivotal moment in the evolution of programmable optics. Our LCM technology has already driven innovation across autonomous vehicles, advanced robotics, and industrial applications. With this new investment, we will accelerate sales in other new markets, particularly in AI data centers and satellite communications."

More specifically the additional cash is aimed at accelerating growth in three strategic areas: a global market expansion of operations; applications in AI data center infrastructure; and deployment in aerospace and defense applications.

"The company is scaling its operations

worldwide to meet growing demand from customers and partners in critical industries," announced the firm. "By strengthening its international presence, it will provide responsive, localized support and customized solutions tailored to specific technical and business needs."

For data centers, the idea is to advance high-performance optical switching, which is seen as one of the potential ways to both push computing performance and improve power efficiency.

Lumotive's beam-steering technology is said to enable ultra-reliable optical circuit switches with thousands of ports and rapid switching speeds, addressing the demands of hyperscale and AI-driven networks.

"This technology is being deployed to support AI model training, real-time analytics, and energy-efficient hyperscale infrastructure management," reports the company.

For aerospace and defense, the plan is to advance next-generation optical semiconductors to provide secure communications, advanced sensing, and mission-critical precision.

<https://optics.org/news/16/2/25>

'SPHEREx' space observatory delivered for February launch

Telescope to carry out all-sky surveys in unprecedented spectral detail, thanks to 102-color spectrophotometer.

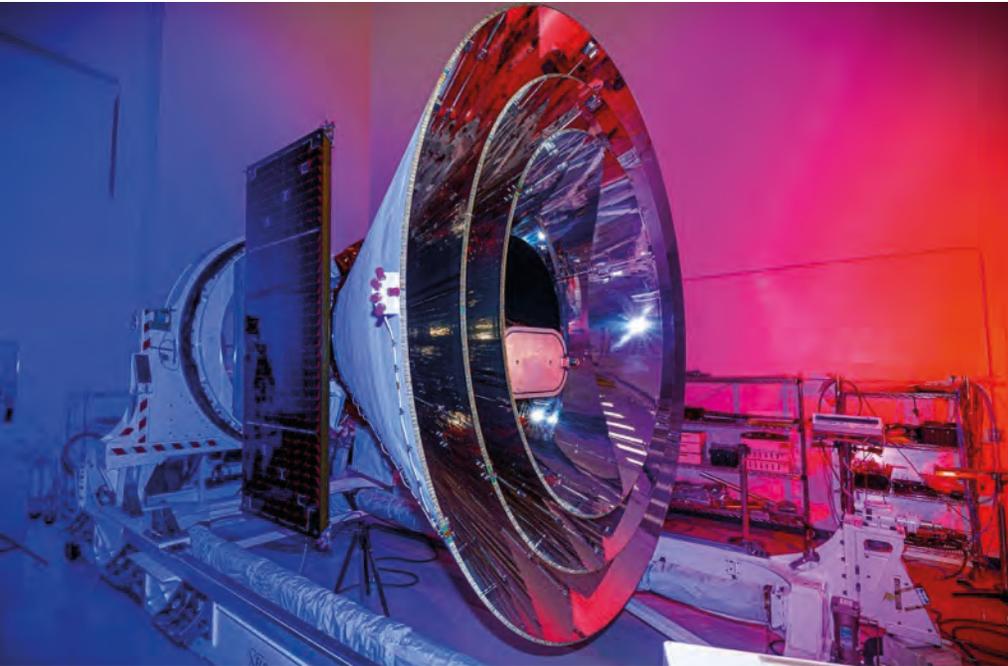


Image: BAE Systems.

NASA's 'SPHEREx' space observatory, which is due to be launched into a polar orbit next month, will conduct four sky surveys over the course of around two years. The surveys will map galaxies and Milky Way stars in unprecedented spectral detail, hopefully revealing more about what exactly happened during the first split-second of the universe, when the Big Bang was followed by rapid inflation. It will also look for spectral signs of water, carbon dioxide, and other key ingredients for life in the Milky Way.

BAE Systems says it has successfully delivered the "SPHEREx" space observatory to Vandenberg Space Force Base in California, ahead of a planned launch in late February.

Short for "Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer", the NASA mission is expected to create three-dimensional, colored maps of more than 450 million galaxies, plus millions of Milky Way stars, over the course of a two-year-plus survey.

The defense contractor highlights the use of an advanced near-infrared imager developed by NASA's Jet Propulsion Laboratory (JPL) and the California Institute of Technology (Caltech) for the SPHEREx mission that will enable it to survey the entire sky at more than 100 wavelengths.

"This data will provide the scientific community with novel insights on the formation of the universe in the moments after the Big Bang, help determine how galaxies evolve over time, and seek out water and other life-sustaining molecules in areas where planets are forming," announced the firm.

All-color sky maps

Initially signed with Ball Aerospace, which has since been acquired by BAE Systems, the SPHEREx mission will be used to identify targets of interest for follow-up studies in greater detail by other observatories, including the James Webb Space Telescope.

The Ball-BAE team built both the spacecraft bus and telescope for the observatory, in addition to leading spacecraft integration and environmental testing for the mission. The company will also support launch operations and post-launch spacecraft commissioning.

Said to be approximately the size of a sub-compact car, SPHEREx is due to enter a polar orbit around Earth and create a map of the entire sky in 3D, by capturing images in every direction.

It is scheduled to produce four complete all-sky maps over the course of the mission, each of which will contain hundreds of millions of stars and galaxies, and capture detail at an unprecedented 102 different wavelengths.

Those SPHEREx maps should enable scientists to study the rapid expansion of the universe that is thought to have taken place just a fraction of a second after the Big Bang.

"The observatory also will measure the collective glow from galaxies near and far, including light from hidden galaxies that individually haven't been observed, and look for reservoirs of water, carbon dioxide, and other key ingredients for life in our home galaxy," says NASA.

Dichroic beam-splitter

The observatory is based around a triple-mirror telescope with an effective diameter of 20 cm, and a 11°x3.5° field of view. According to Caltech the focal plane is split with a special optical component into three short-wavelength, and three long-wavelength detector arrays.

Using the dichroic beam-splitter means that two focal plane assemblies (FPAs) can simultaneously image the sky. Each FPA contains three 2000 x 2000 pixel mercury-cadmium-telluride arrays placed behind a set of filters, providing a narrow-band response with a band center that varies along one axis of the array.

SPHEREx then obtains spectra through multiple exposures, placing a given source at multiple positions in the field of view, where it is measured at multiple wavelengths by repointing the spacecraft.

Caltech's Dr. Jamie Bock, the mission's principal investigator, said: "The development of SPHEREx represents a remarkable collaborative effort between BAE Systems, JPL, Caltech, and numerous other institutions that helped to make this groundbreaking mission a reality."

Brian Pramann, the SPHEREx program manager at BAE Systems' Space & Mission Systems division, added: "After years of complex design, manufacturing, integration and testing efforts, our team can't wait to see SPHEREx launch."

- Accompanying SPHEREx in the launch payload on board a reusable Falcon 9 rocket from SpaceX will be NASA's "PUNCH" mission.

Short for "Polarimeter to Unify the Corona and Heliosphere", PUNCH comprises four small satellites that are designed to take global, three-dimensional observations of the Sun's corona, to better understand how the mass and energy there turns into solar wind.

<https://optics.org/news/16/1/26>

New UK air defense laser engages multiple missiles at once

RAF pilots closer to being equipped with laser system, after successful live-fire trials in Sweden.

The UK's military Royal Air Force pilots are "one step closer" to being equipped with a cutting-edge laser self-protection system, following 100% successful live-fire trials, the country's Ministry of Defence (MoD) has announced.

The laser is being designed to be fitted to a range of RAF aircraft including the intelligence gathering Shadow R2 and A400M transporter, ready to rapidly detect and defeat threats such as missiles.

During the trial at the Vidsel Test Range in Sweden, the operational system defeated a range of infrared heat-seeking missiles being fired simultaneously.

The MoD statement said, "100% of threats were quickly defeated using a laser with pinpoint accuracy, which has been designed and developed by the Team Pellonia partnership between Leonardo UK, Thales UK, and the MoD's Defence Science and Technology Laboratory (Dstl).

Operational advantage

Defence Secretary, John Healey said, "Identifying, tracking and defeating threats from the air in seconds is crucial to having the edge over those who try to do us harm. We're equipping our armed forces with the latest technology to keep them safe and give them the advantage on operations."

The system works by Thales's Elix-IR threat warning system rapidly detecting and identifying the launch of missiles, using a series of algorithms to filter out background clutter so that only valid threats are tracked, classified and declared.

Once a threat is classified, an alert is sent to the Leonardo Miysis directed infrared countermeasure which then tracks the incoming missile and directs a jamming laser onto the missile.

The MoD statement continues, "Threats are defeated faster than the time it takes to read this sentence. This UK engineered capability gives the MoD the latest generation best-in-class protection, whilst enjoying full operational independence, and offering the same freedoms to export customers."

The live tests were witnessed by senior military officers from a number of NATO

nations. Dstl's Chief for Air Survivability, Mark Elson, said, "The UK defensive aids system is the culmination of MoD's detailed understanding of changing threats alongside years of sustained defense investment in science and technology nurtured within Dstl. This has been aligned with the development capabilities of our commercial partners through Team Pellonia."

Elson added, "The design of the system has the agility to protect platforms now and into the future, providing long-term operational advantage to the UK and our allies. This is enabled through Spiral Development, which provides capabilities such as the Dstl developed jamming waveform that defeats the guidance of a missile threat."

<https://optics.org/news/15/11/5>



The new air defense laser system.

MOD Crown Copyright.

HySpex secures hyperspectral camera contract with European Space Agency

Aim is to make methane detection technology more widely accessible, with 'off-the-shelf' satellite imaging payload.

HySpex, a subsidiary of Norway's Norsk Elektro Optikk (NEO), says it has begun developing a new hyperspectral imaging system for satellite-based methane sensing that should enable many more companies to track emissions of the gas.

Supported by the European Space Agency's "InCubed" project - a public-private partnership aimed at industrial innovation - the aim is to enhance global monitoring of methane emissions from space, and add to the existing HySpex portfolio of similar imaging systems for drone and other airborne deployments.

Trond Løke, the CEO of NEO, said: "Securing an ESA InCubed project is a major milestone for our company and a testament to the cutting-edge work being done by our space department.

"This collaboration not only validates our technology but also accelerates our mission to drive innovation in the space sector. With ESA's support, we are confident that we can push the boundaries of Earth observation and satellite technology, creating real impact for the industry and beyond."

Off-the-shelf instrument

Methane is acknowledged as a major contributor to climate change, as although its atmospheric concentration is much lower than that of carbon dioxide, the molecule's absorption and transmission of infrared light results in a much more potent warming effect. On the plus side methane does not remain in the atmosphere as long as carbon dioxide, meaning that mitigation efforts should have a much more rapid impact.

NEO says that satellite-based hyperspectral imaging offers a precise and scalable way to identify methane plumes and leaks, in principle enabling industries to detect and mitigate their emissions effectively.

However, the technology remains relatively complex, with custom hyperspectral

cameras demanding substantial financial resources, years of research and development effort, rigorous testing, and the risk of failure in space.

HySpex thinks that one answer is its methane satellite camera (MSC), which it claims will eliminate these barriers by offering a ready-to-deploy, low-risk



Photo: NEO/HySpex

HySpex is developing a hyperspectral camera for satellite-based detection of methane based around off-the-shelf parts, something that it is hoped will make the technology much more widely available for tracking methane emissions.

alternative based on commercial, off-the-shelf (COTS) parts.

"The new system will provide a commercially available tool for Earth observation services, expanding access to high-quality methane monitoring," it said, touting key technological advances including a refined optical system for higher imaging precision, an extended spectral range to cover critical methane absorption bands, and improved cooling for stability in space.

Strong market interest

With funding from ESA, the project will progress through key design and testing phases over the next year, said the Oslo-based company, adding: "A commercial agreement for multiple flight models has already been proposed, signaling strong market interest.

"This initiative will make methane detection technology more widely accessible, offering an alternative to proprietary solutions. By opening the market to multiple operators, it is expected to play a significant role in environmental monitoring and commercial satellite services."

Ole Bjørn Eithun Pedersen, a research scientist at NEO and contractor project manager for the InCubed effort, added: "Being the second most significant contributor to global warming, identifying and stopping methane emission has been recognized as one of the most effective ways of limiting further global warming.

"Using our existing HySpex SWIR cameras we have already proven that we can

accurately identify methane emissions remotely. Now, building on our proven systems, we are developing a new and highly sensitive satellite camera optimized specifically for [more accurate and reliable] methane detection and quantification on a large scale."

Building upon the existing SWIR640 camera from HySpex, the MSC version is said to have a development cycle of only 12 months, with optical and mechanical design well under way already.

The Norwegian firm is also part of the "HyperImage" European project, which is aiming to develop similar technology for applications in vertical farming - where hyperspectral data can be used to monitor crop health and optimize yields - and drones.

<https://optics.org/news/16/2/28>

Aeva lidar to be deployed at JFK, SFO airports, and elsewhere...

...and Hesai signs lidar supply deal with China-based E-vehicle developer Leapmotor.

The Indoor Lab, a developer of lidar solutions, and Aeva, which supplies sensing and perception systems, have announced that Aeva is to provide lidar for The Indoor Lab's analytics platform. The platform is used to improve safety, security and operational efficiency at major airports, mass transit railways, agriculture, and in "smart infrastructure" venues across the U.S.



Image: Aeva.

Atlas 4D lidar sensor; the production win with The Indoor Lab is expected "to solidify Aeva's position in the industrial market". Leapmotor C-series models are fitted with Hesai's ultra-high-definition long-range AT128 lidar.

Aeva's Atlas 4D lidar sensors will be integrated into The Indoor Lab's lidar Overwatch Perception Platform that is the key driver to its Enterprise Analytics Suite for Critical Infrastructure to provide data for AI-powered analytics to monitor and manage indoor and outdoor environments.

The technology will be leveraged for its instant velocity detection, immunity to interference, and compact form factor. The multi-year agreement represents Aeva's first industrial customer win for its Atlas system, with sensor shipments beginning this month (October, 2024) for The Indoor Lab's initially planned customer deployments.

'Advantages in Aeva's 4D lidar'

"We have evaluated nearly all time-of-flight 3D lidar technologies on the

market today and selected Aeva because we see significant advantages in its 4D lidar technology," commented Patrick Blattner, founder and CEO of The Indoor Lab.

"Aeva is the first to commercialize 4D lidar for production at scale and its technology brings crucial advantages to our analytics platform, including the addition of instant velocity data and the inherent immunity to sunlight interference. By selecting Aeva, we have future-proofed our perception analytics platform and will be able to provide the most advanced solutions for our customers at scale," Blattner said.

Together with The Indoor Lab, Aeva's 4D lidar technology is initially planned to be implemented at some of the U.S.A's largest and most heavily trafficked airports, including John F. Kennedy International Airport's new Terminal One and San Francisco International Airport, followed by undisclosed integrations in agriculture, and in smart infrastructure at theme parks, cities, and other large venues.

"We are seeing significant momentum in the market following recent wins in automotive and industrial including our recent selection by a top national defense security organization," said James Byun, Managing Director of Business Development at Aeva.

"The Indoor Lab is a leader in lidar-based perception analytics and is expanding deployments rapidly at large venues and critical infrastructure sites across the U.S. Our FMCW technology will allow The Indoor Lab to deliver high-performance sensing at scale across a wide variety of indoor and outdoor customer use cases to enable improved safety, security and efficiency," said Byun.



Image: Hesai.

Hesai's ultra-high-definition long-range AT128 lidar.

Hesai signs lidar supply deal with Leapmotor

Lidar systems developer Hesai Technology is to become the exclusive provider of automotive long-range lidar for China-based E-vehicle developer Leapmotor's operating platform. The firm's first model is expected to enter mass production in 2025.

According to the agreement, Hesai will provide lidar products for "multiple models of Leapmotor's next-generation new vehicle platform". The announcement added, "This exclusive partnership deepens the long-term collaboration in intelligent driving, highlighting Hesai's leading lidar technology and Leapmotor's continued trust in Hesai and its capabilities.

The two companies say they have together "advanced intelligent driving projects for multiple new Leapmotor models". The Leapmotor C-series intelligent driving edition models are fitted with Hesai's ultra-high-definition long-range AT128 lidar, enabling Navigation Assist Pilot, Navigation Assisted Cruise, and other advanced intelligent driving functions.

According to Leapmotor, as of September 23rd, 2024, it has already commenced sales in Europe, with over 200 dealers across 13 countries. The company plans to expand this footprint to 500 sales points in Europe by the end of 2025. The companies say they will continue to cooperate closely on intelligent driving, to help Leapmotor accelerate its leadership in ADAS.

<https://optics.org/news/15/10/45>

UK's Phlux gets £9M backing for low-noise infrared detectors

Investor BGF leads series A venture round in compound semiconductor spin-out from the University of Sheffield.

Phlux Technology, a UK startup that was spun out of research into low-noise infrared sensors at the University of Sheffield, has attracted £9 million in a series A round of venture funding.

The funding, led by UK-based BGF, is intended to accelerate the firm's expansion, and exploit its development of antimonide-based semiconductor alloys that result in better detector performance at the critical 1550 nm wavelength.

Phlux says it will use the latest investment, which follows a £4 million seed funding round led by Octopus Ventures in 2022, to scale its team, ramp up production, and launch two new product ranges targeting optical communications and sensing systems.

CEO Ben White, who co-founded Phlux with Sheffield professors of electronic engineering Chee Hing Tan and Jo Shien Ng, said in a company statement:

"This funding comes at a pivotal moment as demand for high-speed optical communication systems is growing enormously. By developing world-class, high-performance infrared sensors, we are enabling industries to push the boundaries of connectivity, efficiency,

and security by removing a technology bottleneck that has persisted for over 20 years."

Higher sensitivity

According to Phlux, its latest ultra-low-noise infrared sensors promise to improve the performance of communications systems dramatically - enabling up to five times higher data rates for both free-space and fiber-based systems.

"Early engineering samples have shown sensitivity improvements of 5 dB or more are realisable, compared to current commercial devices," it claims.

"Additionally, Phlux's infrared sensors will play a crucial role in advanced sensing technologies that include driver-assisted safety features in vehicles, industrial automation, defense and security, and high-precision gas sensing."

The firm first showed off its "Aura" range of avalanche photodetectors (APDs) at last year's SPIE Photonics West event, claiming that they were 12 times more sensitive than traditional best-in-class indium gallium arsenide (InGaAs) APDs.

As a result, it said, the operating range of lidar, laser rangefinders, and optical fiber

test equipment incorporating the devices can be extended by up to 50 per cent. Advanced methane imaging is another potential application area, where Phlux has previously collaborated with Bristol-based QLM.

And because the higher APD sensitivity allows the use of lower-power lasers and smaller optical apertures, systems can be reduced in size and weight by up to 30 per cent, while system cost is nearly halved.

Thermal management is also said to be made simpler, because the Aura APDs operate at up to 85°C without performance degradation.

Disruption 'overdue'

Phlux is showing off its sensors at the Optical Fiber Communications (OFC) conference taking place in San Francisco this week, and is scheduled to attend SPIE's forthcoming Defense + Commercial Sensing event in Orlando, Florida, as well as the giant LASER World of Photonics trade show in Munich this summer.

Owen Metters from returning investor Octopus Ventures commented on the new round: "When we first invested in Phlux, we were impressed with both the team's expertise in developing novel semiconductor materials, and their ambition to revolutionize infrared sensing.

"We've been delighted with their progress to date and are excited to see this funding deployed to grow the team and bring two exciting new product ranges to market."

Luke Rajah, a partner at BGF, added: "Phlux has developed a game-changing technology in a sector that's long overdue for disruption. With strong academic roots, early commercial traction, and a compelling roadmap, the team is well-positioned to lead in infrared sensing."

Other photonics companies in the BGF portfolio include M Squared Lasers and Cambridge-based Zomp, which is developing advanced flow cytometers.

M Squared received £6.4 million backing from BGF in a series of funding rounds from 2012 onwards - although in 2020 it sold part of its stake in the Glasgow laser manufacturer.

<https://optics.org/news/16/4/2>



Photo: Phlux Technology

Spun out of infrared sensor research at the University of Sheffield in the UK in 2020, Phlux Technology was co-founded by CEO Ben White, and Sheffield professors Chee Hing Tan and Jo Shien Ng. The company has developed InGaAs infrared detectors that also incorporate antimony, meaning lower noise and higher sensitivity at 1550 nm.

SPIE.

Make sure you are part of the conversation...

It remains vitally important to stay fully connected with your customers.

As the leading online resource for professionals using photonics-based technologies, applications and for the diverse markets they serve, optics.org offers a comprehensive range of digital and print marketing solutions to support and drive your marketing strategies.

Contact our Sales team today to discuss how optics.org can help you create a targeted customer experience and put your brand and products in front of key decision makers.

...and in touch with your target audience.

Visit us at **Booth #1329**

the business of photonics
optics.org

optics.org
e: rob.fisher@optics.org
t: +44 (0)117 905 5330
e: malaya.plummer@optics.org
t: +44 (0)117 905 5351

