

Vector Photonics demos free space optical communication using a PCSEL for the first time outside of a lab

Scottish start-up and Fraunhofer UK prove real-world practicality of PCSEL technology, enabling secure, long distance, fast communications

GLASGOW, SCOTLAND, April 8, 2026 /EINPresswire.com/ -- [Vector Photonics](#), the Scottish start-up which is pioneering the use of photonic crystal surface emitting lasers (PCSEL) in secure communications, has announced the first successful public demonstration of PCSEL technology for optical communication outside of a lab. On 31st March 2026, Vector Photonics' PCSELS were used to transmit data across the Clyde from the Glasgow Science Centre to the Clydeside Distillery, using a system designed and built by Fraunhofer UK.



Dr Richard Taylor, CEO and Founder of Vector Photonics, with the PCSEL and optical communications system at the successful demo across the Clyde.

Dr Richard Taylor, Chief Executive Officer and Founder of Vector Photonics said: "This is a major step forward for Vector Photonics, proving that our technology is a commercial reality in real-world applications. We believe that the demo is the most advanced application of a PCSEL to date, advancing it from a Technology Readiness level (TRL) of 4/5 to 6/7." Employing the technology in open space means that it can perform successfully under different environmental conditions – temperature, humidity, precipitation, wind turbulence – and over a considerable distance. Previously, only lab experiments using ideal conditions and simulations, have been attempted.

PCSELS are a new type of laser, combining the high power of edge emitting lasers with the speed and surface emission of vertical cavity surface emitting lasers (VCSEL). They are highly advantageous for secure, free-space optical communication systems due to their ability to emit narrow, high-brightness beams with excellent beam quality and low divergence, which is critical for minimizing signal loss over long distances. Unlike conventional laser sources, PCSELS



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combine the benefits of surface emission with coherent, single-mode output, enabling efficient coupling into free-space optics without the need for complex beam-shaping elements. These properties position PCSELS as a next-generation laser source for compact free space optical communication systems and the Vector Photonics' breakthrough will enable faster, secure internet connections between buildings, campuses, and even satellites, without relying on cables or radio signals. With its wide wavelength flexibility spanning ultra-violet to far infra-red, PCSEL technology can also be applied to artificial

intelligence (AI) data centres, Lidar systems and additive manufacturing (3D printing).

The free-space optical communication system was designed and constructed using Vector Photonics' PCSELS by Fraunhofer Centre for Applied Photonics, part of Fraunhofer UK. Data transfer at 50 Mbps was demonstrated over 500m, with error rates below standard forward error correction thresholds. This was twice the system spec required for the experiment, but well below the figure achievable by PCSELS which have a naturally high data rate.

Dr Gerald Bonner, Principal Researcher at Fraunhofer CAP, said: "This project has been a great opportunity to deploy Fraunhofer CAP's capabilities in the development of optical systems to assist Vector Photonics in demonstrating the growing maturity of PCSELS and the potential of this important new diode laser technology in optical communications."

About Vector Photonics

Vector Photonics Limited was incorporated in Glasgow in 2020 and is based in the West of Scotland Science Park. The company has proven its revolutionary, proprietary, PCSEL technology in R&D, laboratory environment and commercial fabs. The company is now transferring key design and process knowledge into an industrial environment, for high-volume manufacture.

Further information can be found at:

<https://www.vectorphotonics.co.uk/>

About Fraunhofer Centre for Applied Photonics

Fraunhofer Centre for Applied Photonics was established in Glasgow in 2012 in partnership with the University of Strathclyde and is based in Glasgow City Innovation District, in the Technology & Innovation Centre.

Fraunhofer CAP is a not-for-profit research and technology organisation (RTO) offering industry a professional development capability in the fields of photonics, lasers and quantum technologies.

Based in the UK, Fraunhofer CAP is a legally independent affiliate of Europe's leading independent research organisation.

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