

ETH Zurich, Polariton, and NLM Report Cryogenic EO Modulation Record Low-voltage, high-bandwidth operation at 4K

Seattle, WA, USA and Zürich, Switzerland — ETH Zurich and Polariton Technologies demonstrate for the first time the high-speed, low-voltage operation of a plasmonic modulator under challenging cryogenic conditions required for most quantum computing and networking applications. Standard electro-optic modulation technologies struggle at these temperatures due to changes in material properties as they are cooled. However, organic electro-optic (OEO) materials from NLM Photonics have shown promise for avoiding these challenges.

In the demonstration [presented by Patrick Habegger](#) at ECOC Exhibition 2022, Polariton's modulator on their Plasmonic PIC (Photonic Integrated Circuit) platform with a maximum bandwidth of over 100 GHz was used to transmit data at an operating temperature <4 K. Data rates at up to 64 GBd PAM2 with bit error rates (BER) below the hard-decision forward error correction (HD-FEC) limit and an operating voltage (V_p) of only 200 mV were demonstrated. The low-BER operation was also demonstrated below 100 mV at 16 GBd. The device utilized NLM's patent-pending HLD OEO material and demonstrates that the material can be effectively utilized at low temperatures.

These results represent an exciting step forward for efficient interfaces for quantum applications. "Hybrid OEO has long seemed like a good fit for quantum applications but required in-device proof, now shown with Polariton's modulator," says Dr. Lewis E. Johnson, NLM's Chief Scientific Officer. "By providing scalable interfaces with low switching energies, we see great potential for scaling the number of qubits, which remains crucial to enable complex quantum systems," says Wolfgang Heni, co-CTO at Polariton Technologies.

Beyond this exciting work, the companies continue to drive scaling of the technology, including rigorous stability and reliability testing, and further performance advances utilizing Polariton's devices and NLM's HLD material. The cryogenic operation brings a potential new market for plasmonic PICs and organic materials to deliver their unique advantages.

About NLM and Polariton

NLM Photonics develops cutting-edge photonics solutions for transforming networking, computing, and sensing alongside our global partners and is based in Seattle and Paris. Follow us at nlmphotonics.com and on LinkedIn [@nlm-photonics](#) and Twitter [@NLMPHOTONICS](#).

Polariton Technologies Ltd. designs and manufactures plasmonic PICs, featuring the world's fastest and smallest electro-optic modulators, thus creating a solution that overcomes the interconnect bottleneck in optical communications. Follow us on LinkedIn [@polariton-technologies](#) and visit us at polariton.ch.

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