Press Release

Cambridge, United Kingdom
27 January 2025

Wave Photonics Announces Silicon Nitride Process for Quantum Photonics with the World's Most Expansive PDK

Wave Photonics, a Cambridge-based Deep Tech start-up specialised in integrated photonics design, announces the availability of the SiNQ process – a silicon nitride process fabricated by CORNERSTONE for quantum systems and emitters. The process is supported by Wave Photonics' 1056-element PDK, supporting 33 wavelengths from 493nm to 1550nm. The PDK is based on Wave Photonics core computational design technology, which enables the production of designs which account for fabrication imperfections – wafer-scale measured data from the Compound Semiconductor Applications Catapult shows a 2x improvement in component performance uniformity relative to conventional inverse-designed components.

The PDK includes fabrication-aware S-Parameters for full circuit modelling and works out-of-the-box with GDSFactory and Siemens L-Edit, and will shortly be available in Luceda's IPKISS. It comes with full documentation for every component and is ready to use with the turnkey QPICPAC packaging service, as well as offering built-in compatibility with the PHIX characterisation package.

Technical details and a list of wavelengths and quantum systems supported can be found here.

"The diversity of wavelengths used in quantum technologies, spanning through the visible range and into the infra-red, has long presented a challenge for photonic integration", said James Lee the CEO of Wave Photonics. "With the release of the SiNQ process and PDK, we're demonstrating the power and flexibility of the design technology we've been building and showing that photonics design across the visible range is now a solved problem. Making a quantum photonic integrated circuit is now like playing with Lego and can be done by simply putting pre-designed building blocks together."

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Chris Goodings, VP Engineering, Oxford Ionics said "Integrated photonics are one of the crucial enabling technologies towards building scalable trapped-ion quantum computers. Designing photonic components at the more unusual wavelengths needed for quantum computing remains a challenge, often needing experimental iterations to center the performance over process variation -- so the ability to provide "right-first-time" designs would be of great benefit both to Oxford Ionics and the wider photonic community. We were delighted to work with Wave and the broader consortium on this project, providing input and insights on specs as well as fabricating designs using our own Quantum Processor manufacturing process."

This release builds upon the technology developed in the £500k Innovate UK project, Silicon Nitride for Quantum Computing, in partnership with CORNERSTONE at the University of Southampton, the Compound Semiconductor Applications (CSA) Catapult and Oxford Ionics.

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Quotes

Carson Bradbury, Co-Founder of Siemens Cre8Ventures.
“The release of the SiNQ process and PDK by Wave Photonics is a groundbreaking moment for the quantum photonics community. By addressing the challenges of multi-wavelength integration with fabrication-aware design, Wave Photonics is transforming how quantum photonic integrated circuits are developed, enabling faster innovation with greater reliability. Siemens Cre8Ventures is proud to support such advancements, which align with our mission to foster collaboration and accelerate deep tech breakthroughs that push the boundaries of what’s possible in quantum and beyond.”

Mark Goossens, Business Development Manager CSA Catapult. "We see this innovative new process as a powerful industrial tool for ensuring yield and scale up of product designs for quantum applications”.

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Callum Littlejohns, CORNERSTONE Coordinator. “The mission of the CORNERSTONE Photonics Innovation Centre is to build a pipeline of silicon photonics enabled companies in multiple industries. Two of the challenges to achieving this mission are lowering the barrier to entry for those new to the field and reducing the time to market for products. The release of Wave Photonics’ expansive PDK is a key step in overcoming these challenges”.

Chris Goodings, VP Engineering, Oxford Ionics.
"Integrated photonics are one of the crucial enabling technologies towards building scalable trapped-ion quantum computers. Designing photonic components at the more unusual wavelengths needed for quantum computing remains a challenge, often needing experimental iterations to center the performance over process variation -- so the ability to provide "right-first-time" designs would be of great benefit both to Oxford Ionics and the wider photonic community. We were delighted to work with Wave and the broader consortium on this project, providing input and insights on specs as well as fabricating designs using our own Quantum Processor manufacturing process."