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Room Temperature Single-Photon Emitters in Silicon Nitride

Single-photon emitters in silicon nitride films scale easily for quantum circuits and communication.

Researchers at Purdue University have developed new single-photon emitters in silicon nitride (SiN) films that can operate at room temperature. Single-photon emitters are used in quantum information technology, quantum sensing, quantum communication, and quantum integrated circuit applications. Traditional heterogeneous and hybrid techniques for creating quantum devices require complex geometries and a combination of different materials for use of single-photon emitters with on-chip platforms. Purdue researchers have fabricated new SiN films on silicon dioxide substrates containing single-photon emitters to enable scalability for quantum on-chip devices. In testing using photophysical analysis, the brightness of greater than 105 counts per second, as well as stability and high purity of quantum emitters in SiN films, were observed. Specifically, a second-order autocorrelation function at zero time delay below 0.2 at room temperatures was achieved. Single-photon emitters in SiN material show promise to reduce integration losses and to allow for direct, scalable integration of quantum light sources with the well-established photonic platforms.

Advantages:

-Adaptable with On-Chip Platforms

-Room Temperature Stability

Potential Applications:

-Quantum Information Technology

-Quantum Sensing

-Quantum Communication

-Quantum Integrated Circuit

Technology ID

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Category

Computing/Quantum Technologies
Materials Science & Nanotechnology/Composites & Hybrid Materials
Computing/Photonic & Optical Computing Technologies

Further information

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Technology Validation:

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TRL: 3

Intellectual Property:

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