Special Issue

Quantum and Integrated Photonic Technologies for Advanced Optical Sensing

Message from the Guest Editor

The convergence of quantum and integrated photonic technologies is ushering in a new era of optical sensing, enabling enhanced sensitivity, miniaturization, and scalable manufacturing. Quantum photonics exploits nonclassical light states, such as entanglement and squeezing, to overcome classical limits in measurement precision. When combined with silicon and heterogeneous photonic integration, these advantages can be realized in compact, stable, and energy-efficient devices suitable for real-world applications. Integrated photonics provides scalable platforms for on-chip light generation, manipulation, and detection, enabling sensing modalities such as interferometric, thermal, and biochemical sensing with improved signal-to-noise ratios and faster processing. Advances in nanofabrication, low-loss waveguides, and on-chip quantum light sources are accelerating the development of room-temperature, chip-scale quantum sensors with mass-production potential. These technologies promise broad impact across environmental monitoring, healthcare, industry, and defense, while ongoing efforts continue to address challenges in system integration, noise control, and standardization.

Guest Editor

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Sensors is a leading journal devoted to fast publication of the latest achievements of technological developments and scientific research in the huge area of physical, chemical and biochemical sensors, including remote sensing and sensor networks. Both experimental and theoretical papers are published, including all aspects of sensor design, technology, proof of concept and application. Sensors organizes Special Issues devoted to specific sensing areas and applications each year.

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