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Fibre and Integrated Photonics Optical Parametric Amplifiers

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Message from the Guest Editors

Optical fiber technology and integrated optical parametric amplifiers (OPAs) are at the forefront of revolutionizing communication and laser systems. These advancements enable the development of Optical Parametric Oscillators (OPOs) and ultra high-power pulsed laser systems through Optical Parametric Chirped Pulse Amplification (OPCPA), marking significant progress in the field. The integration of Fiber Optical Parametric Amplifiers (FOPAs) and OPAs into Photonic Integrated Circuits (PICs) represents a cutting-edge development, offering unprecedented efficiency and scalability.

FOPAs and integrated OPAs in PICs have the potential to drastically enhance the performance of optical networks by improving signal amplification and noise reduction, which is critical for long-distance communication. Additionally, the application of OPOs and OPCPA in high-power pulsed lasers opens new avenues in materials processing, medical diagnostics, and defense, where precision and power are paramount. These technologies enable the generation of wide bandwidths and high power levels, while maintaining compact and energy-efficient designs.