



photonics

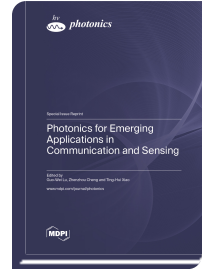


Special Issue Reprint

Photonics for Emerging Applications in Communication and Sensing

www.mdpi.com/books/reprint/7626

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ISBN 978-3-0365-8164-4 (Hardback)
ISBN 978-3-0365-8165-1 (PDF)

Photonics has emerged as crucial for enabling communication and sensing applications, revolutionizing industries such as data centers, autonomous driving, and 5G/6G networks. This reprint includes thirteen articles showcasing the transformative potential of photonics in supporting emerging technologies. It presents the recent advancements and future challenges in these technologies, focusing on optical performance monitoring, photonic sensors and devices, optical signal processing subsystems, and digital signal processing (DSP) for optical transmission systems. Optical performance monitoring encompasses a self-attention mechanism-based quality-of-transmission estimator for optical networks, optical-label-based monitoring for wavelength division multiplexing networks, and a key distribution scheme for enhanced security. Advancements in photonic devices include optimized silicon nitride waveguides and hybrid phase-change metasurface carpet cloaks for efficient optical signal processing. Moreover, plasmonic sensors that utilize plasmons and alternative materials like aluminum nitride are explored for sensing and detection applications. Optical signal processing subsystems, which feature an enhanced optical analog-to-digital converter, two-tone signal generation, and a programmable photonics spectral processor, as well as DSP techniques for chromatic dispersion estimation, coherent communication, are presented to support reliable optical transmission.



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