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Next-Generation Optical Communication: Components and Devices

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Message from the Guest Editors

Dear Colleagues,

Ever-emerging services and applications, such as cloud computation, big data, and the Internet of things, have imposed an exponentially growing capacity demand on communication systems and networks on all layers. In particular, conventional single-mode fiber (SMF)-based optical communication technologies, such as wavelength-division multiplexing (WDM), time-division (TDM), and polarization-division (PDM), have confronted fundamental scalability limits. The last decade has seen various technologies emerge as possible solutions for next-generation optical communications for sustainable capacity growth, by exploiting the only known uncultivated degree of freedom of light—the space domain. Space- and mode-division multiplexing (SDM and MDM)-based optical-fiber, free-space, and underwater communications have been extensively investigated at both system and component levels. Multi-core, multi-mode, few-mode fibers (MCF, MMF, and FMF) and the variations as their combinations are explored as the main platforms for SDM and MDM fiber transmissions, while major challenges including optical amplification and inter-channel coupling remain to be fully addressed.