

## A special issue on *High-Speed Optical Transmission and Processing*

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The rapid growth in network capacity and traffic rates raises the significance of high-speed optical transmission and processing. Recent progress in optical communication systems in relation to multiplexing technologies in different degrees of freedom, advanced multi-level modulation formats, coherent detection and digital signal processing has facilitated dramatic increases in transmission capacity. To be compatible with high-speed optical transmission, high-speed optical processing has gained increased interest to enable fast data manipulation in the optical domain and avoid cumbersome optical-electrical-optical conversions at network nodes. Recent progress in nonlinear-optical devices has led to enhanced efficiency, flexibility and functionality of ultrafast nonlinear-optical signal processing. It is expected that these advances in high-speed optical transmission and processing will pave the way to achieve superior performance of high-speed optical networks. It is our intention to bring the research community's attention to these hot topics in optical communication systems and networks. In this "Special Issue on *High-Speed Optical Transmission and Processing*", 8 review articles and 2 research articles focusing on relevant subjects by internationally active groups in the field are specially presented.

In the review articles, Dr. Xiang Zhou at AT&T Labs—Research in USA reviewed the recent progress in transmission of 400 Gb/s wavelength-division multiplexing (WDM) channels for optical networks with standard 50 GHz grid. The enabling modulation, coding, line system technologies, and the existing challenges were discussed. Dr. Zhengxuan Li at Shanghai Jiao Tong University talked about the key technologies and system proposals of time and wavelength-division multiplexing passive optical networks (TWDM-PON). Dr. Thomas G. Brown at University of Rochester in USA presented light field manipulation in the spatial degree of freedom, showing fascinating effects in focusing, propagation, illumination, and imaging. Dr. Chaotan Sima at University of Southampton in UK summarized progress and recent developments of photonic Hilbert transforms. Dr. Claudio Porzi at the TeCIP Institute of Scuola Superiore Sant'Anna di Pisa in Italy reviewed on the use of semiconductor optical amplifier-Mach-Zehnder interferometer (SOA-MZI) for photonic add/drop and switching operations. Dr. Li Huo at Tsinghua University reported recent works in 100 Gb/s signal regeneration and processing. Dr. Wei Jin at the Hong Kong Polytechnic University discussed different types of air-silica photonic crystal fibers (PCFs) and their wide applications. Dr. Sigang Yang showed recent development of fiber optical parametric oscillators (FOPO) based on highly nonlinear dispersion-shifted fiber.

In the research articles, Dr. Xia Guo at Beijing University of Technology targeted scalable light-emitting diodes (LEDs) and vertical-cavity surface-emitting lasers (VCSELs) with tunnel-regenerated multi-active-region (TRMAR) structure. Dr. Muhammad Idrees Afridi at Beijing University of Posts and Telecommunications analyzed the impact of Rayleigh backscattering on single/dual feeder fiber wavelength-division multiplexing passive optical network (WDM-PON) architectures.

Overall, articles in this special issue cover the recent achievements of high-speed optical transmission and processing, particularly the latest emerging technologies and wide applications. We hope the readers will find them interesting and inspiring.

Finally, we would like to sincerely appreciate all authors for their intriguing articles and reviewers for their constructive comments.



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