
FOREWORD

Special Section on Recent Advances in Ultra-high-speed Photonic Devices for Next-generation Optical Fiber Communications

With the explosive growth of Internet traffic, there is a constant and pressing demand for highly efficient transmission of increasingly large amounts of data in long-haul and metropolitan networks. Ultra-high density transmission systems at 100-Gb/s rate are being widely studied for long-haul networks. In metropolitan networks, standardization activities of 100-Gb/s Ethernet are in progress, which is scheduled for 2010. To achieve high density transmission, new modulation formats are widely investigated. Accordingly, new functions are strongly demanded for devices in optical transmitters and receivers. Moreover, cost effectiveness and low-power consumption are required. The purpose of this Special Section is to review and discuss recent ultra-high speed optical device technologies for forthcoming optical networks.

The editorial committee of this special section has been supported by the Lasers and Quantum Electronics (LQE) Technical Group of the IEICE Electronics Society. The LQE organizes several technical meetings each year that cover the research and development areas including semiconductor lasers (quantum-effect devices, high-speed modulation, wavelength-tunable, arrays), modulators (semiconductor-based, LiNbO₃-based, electroabsorption-type, Mach-Zehnder-type, modulation formats), photodiodes, semiconductor optical amplifiers, optical switches, coherent optical detection, ultra-fast optical signal processing, integrated devices (monolithic or hybrid integration), high-speed electronics for optical transmitters/receivers, optical interconnects, and novel materials/devices.

This special section is composed of six invited and one contributed papers, each of them is of high quality, covering the state of the art ultra-high-speed photonic devices technologies. We expect the special issue to stimulate progress of semiconductor ultra-fast photonics and related fields. Finally, I would like to express my sincere appreciation to all the authors, the reviewers, the special section editorial committee members, and the editorial staff of IEICE for their efforts to make this special section possible.

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Yoshiaki Nakano (*Fellow*) is the vice director and a professor at the Research Center for Advanced Science and Technology, the University of Tokyo. He is also with the Department of Electronic Engineering, School of Engineering, the University of Tokyo. He received the B.E., M.S., and Ph.D. degrees in electronic engineering, all from the University of Tokyo, Japan, in 1982, 1984, and 1987, respectively. In 1984, he spent a year at the University of California, Berkeley, as an exchange student. In 1987, he joined the Department of Electronic Engineering, the University of Tokyo, became an Associate Professor in 1992, a Professor in 2000, and the Department Head in 2001. He moved to the Research Center for Advanced Science and Technology, the University of Tokyo, in 2002 where he is currently the vice director and a professor in the Department of Information Systems. His research interests have been physics and fabrication technologies of semiconductor distributed feedback lasers, semiconductor optical modulators/switches, and monolithically-integrated photonic circuits. In 1992, he was a visiting Associate Professor at the University of California, Santa Barbara. Dr. Nakano was an elected member of the Board of Governors of IEEE LEOS, a member of the Board of Directors of the Japan Society of Applied Physics (JSAP), and the Editor-in-Chief of Applied Physics Express (APEX) and Japanese Journal of Applied Physics (JJAP). He is currently a member of the Board of Directors of the Japan Institute of Electronics Packaging (JIEP), the chairman of the Optoelectronics Technology Trend Research Committee of the Optoelectronics Industry and Technology Development Association (OITDA), and the chairman of the Optical Interconnect Standardization Committee of Japan Electronics Packaging and Circuits Association (JPCA). He is also a member of IEEE EDS and OSA. He served as the project leader of Japanese National Project on "Photonic Networking Technology" organized by the Ministry of Economy, Trading, and Industry, and as the project leader of SORST Program on "Non-reciprocal Semiconductor Digital Photonic Integrated Circuits and their Applications to Photonic Networking" sponsored by Japan Science and Technology Corporation. He is the recipient of the 1987 Shinohara Memorial Prize from the IEICE, the 1991 Optics Paper Award from the JSAP, the 1997 Marubun Science Prize, the 2007 Ichimura Prize, the 2007 IEICE Electronics Society Award, and the 2007 Sakurai Medal from the OITDA. He was presented the Prime Minister Award in Collaborative Research between Academia and Industry in 2007. He authored and coauthored over 200 refereed journal publications and over 400 international conference papers, and holds 40 patents.

