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## FOREWORD

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### Special Section on Extremely Advanced Optical Transmission Technologies and Transmission Optical Fiber Technologies towards Exabit Era

Over the last twenty years, the optical communication technologies have achieved an increase in transmission capacity per fiber by three orders of magnitude, realizing several Tbit/s transmission systems. If the data traffic continues to increase at a rate of 40%~70% per year, a traffic capacity increase by another three to five orders of magnitude is well anticipated over the next twenty years. This implies that in twenty years, the backbone network should be able to support well over Pbit/s transmission per fiber and Ebit/s network throughput. The present optical communication technologies, primarily based on WDM technologies, however, have begun to see their ultimate physical limitations, i.e., the maximum transmission capacity determined by Shannon's limit and optical nonlinear impairments, the maximum optical power into the optical fibers limited by fiber fuse, the transmission bandwidth determined by those of optical amplifiers and so on. In order to go beyond these limits and to achieve the dramatic leap, therefore, totally new multiplexing and amplification schemes as well as novel transmission optical fibers should be developed, handling well over Pbit/s capacity. This special section is organized to further promote research and development of these future "extremely advanced optical transmission technologies and transmission optical fiber technologies," consisting of four excellent invited papers and four contributed papers which were selected from six submissions on the above topics. Here, I would like to express my sincere appreciation to all the authors for their excellent papers and to the reviewers and editorial committee members for their great effort and commitments to make this outstanding special section possible.

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Masataka Nakazawa, Guest Editor-in-Chief

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**Masataka Nakazawa** (*Fellow*) received his Ph.D. degree from the Tokyo Institute of Technology in 1980. Then, he joined the Ibaraki Electrical Communication Laboratory of Nippon Telegraph and Telephone public corporation (NTT), where he was engaged in research on EDFAs, soliton transmission, and Terabit/s OTDM transmission. He was a visiting scientist at MIT in 1984–1985. In 2001, he became a professor of the Research Institute of Electrical Communication at Tohoku University and was promoted to a Distinguished Professor in 2008. He is now the director of the Institute. He published more than 400 papers and presented 230 international conference presentations. Dr. Nakazawa received many awards including the IEE Electronics Letters Premium Award, IEEE Daniel E. Noble Award, IEEE Quantum Electronics Award, OSA R. W. Wood Prize, and Thomson Scientific Laureate.

