
FOREWORD

Special Section on Terahertz Waves Coming to the Real World

In near future, since trillions of things such as mobile smart devices, M2M platforms, and sensors are connected to the Internet and huge amount of data flood cloud networks, wireless systems that have much higher throughputs, i.e. 100 Gbit/s, are demanded. The terahertz-wave band (100 GHz – 10 THz) is attractive for developing high-throughput wireless systems due to the use of wide bandwidths. The world first 10-Gbps data transmission in the 120-GHz band was reported by NTT in 2002. Since then, excellent results have been obtained in terahertz-wave communication systems developed by photonics-based approach. Moreover, these days, steady-step advance in III-V devices and Si devices has started to show fruitful results in the terahertz-wave systems developed by electronics-based approach. According to this trend, standardization activities in IEEE and ITU-R are also rising. Terahertz waves for wireless communication systems are coming to the real world!

This special section was projected to introduce state-of-the-art topics of the terahertz-wave systems achieved by both photonics-based and electronics-based approaches. Not only that, it also offers brand-new results in essential devices and components including solid-state devices, terahertz ICs, antennas, and packaging.

Four invited papers, 3 regular papers, and 2 brief papers are contained in the special section. The first invited paper contributed by Prof. Nagatsuma reviews recent progress in photonics-based terahertz-wave systems and discusses their future prospect. The second invited paper submitted by Dr. Kanno proposes high-speed coherent transmission techniques using advanced photonics for applications to future mobile backhaul and fronthaul links. The third invited paper written by Prof. Kallfass unveils state-of-the-art electronics-based terahertz-wave system for indoor communication. In the fourth invited paper, Prof. Fujishima reviews recent progress in terahertz CMOS design for low-power and high-speed wireless communications.

On behalf of the editorial committee of this special section, I would like to heartily show thanks to all the authors and reviewers for their contribution to the publication of this special section. Also, I appreciate reliable support and cooperation of the members of the IEICE publication departments. Finally, we expect this special section will contribute to further development and progress in terahertz-wave high-throughput communication systems.

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Yasuhiro Nakasha (*Member*) received the B.E. and M.E. degrees in electrical engineering from Nagoya University, Nagoya, Japan in 1987 and 1989, respectively. He received a Ph.D degree in electrical engineering from Tokyo Institute of Technology, Tokyo, Japan in 2011. He joined Fujitsu Laboratories Ltd., Atsugi, Japan in 1989 and has been engaged in research and development of compound semiconductor ICs for high-speed and high-frequency wireless communication systems.

