
FOREWORD

Special Section on Superconducting Signal Processing Technologies

Recent progressive development of both fabrication process and circuit design techniques in superconducting integrated circuits made considerable advances on superconducting signal processing technologies based on superconducting single-flux-quantum (SFQ) circuits. Until now SFQ integrated circuits composed of more than thousands of Josephson junctions were designed and fabricated, and their high-speed and low-power operations were successfully demonstrated. It was proven that their energy efficiency was three or four orders of magnitude better than that of semiconductor integrated circuits.

Superconducting devices such as superconducting quantum interference devices (SQUIDs) and superconductor-insulator-superconductor (SIS) junctions are well known as outstanding sensors with high detection ability, which are inimitable by other devices. Especially superconducting radiation sensors such as superconducting single-photon detectors (SSPD) and transition-edge sensors (TES) are opening new application fields which include terahertz wave imaging, quantum information communication and time-of-flight mass spectroscopy of molecules due to their extremely high sensitivity.

The fusion of superconducting sensor devices and SFQ signal processing circuits enables us to make larger sensor array systems and brings about tremendous improvement of their efficiency and performance. The purpose of this Special Section is to make an opportunity to publish the latest research results in the field of superconducting signal processing technologies and to stimulate these research fields in Japan. On behalf of the editorial committee, I would like to express our great thanks to all the authors of invited and contributed papers submitted to this Special Section and to all reviewers. I expect this Special Section to contribute to further progress in these new fields.

Finally, I would like to thank all the editorial committee members listed below for their devoted efforts to this editorial work.

Special Section Editorial Committee

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Nobuyuki Yoshikawa (*Member*) received the B.E., M.E., and Ph.D. degrees in electrical and computer engineering from Yokohama National University in 1984, 1986, and 1989, respectively. Since 1989, he has been with the Department of Electrical and Computer Engineering, Yokohama National University, where he is currently a Professor. His research interests include superconductive and semiconductor devices and their application in digital and analog circuits. He is also interested in single-electron-tunneling devices and quantum computing devices. Prof. Yoshikawa is a member of the Japan Society of Applied Physics, the Institute of Electrical Engineering of Japan, and the Institute of Electrical and Electronics Engineers.

