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FOREWORD

Special Section on Leading-Edge Technologies of Superconducting Measurement Systems

Superconducting technologies, for example superconducting magneto for MRI, have gradually infiltrated our lives without us noticing. Measurement systems using superconducting sensor devices have been intensively studied recently because of their highly sensitive characteristics that cannot be obtained by other normal conducting devices. There are two types of superconductor: low temperature superconductor and high temperature superconductor. Operation of the measurement system using the low temperature device is easy because of the refrigeration progress, and moreover the high temperature device can be operated by all users even for those not superconducting specialists.

Measurement systems using highly sensitive superconducting sensors are widely used in many fields such as astronomy, geophysics, medical science, and information technology. In astronomy, many types of superconducting sensor are used, for example for the detection of soft-X rays and terahertz waves using STJ, and X-rays using TES. As nondestructive testing, TEM using SQUID is used for geological exploration, and metallic contaminant detector using SQUID is used for food safety. In medical science, MEG and MCG systems are used as diagnostic tools for the brain and heart. MPI, immunoassay using magnetic nanoparticles, and mass spectrometer using SSID are being developed. High performance superconducting digital measuring circuits for superconducting sensors are also being developed. This Special Section is dedicated to collecting current topics of Leading-Edge Technology of Superconducting Measurement Systems.

Finally, I would like to express my deepest appreciation to all the authors for their submission of interesting papers, and thank the editorial committee for their remarkable contribution to this special section. I hope that this special section will provide an opportunity to raise interest in superconducting electronics among our many readers.

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Keiji Tsukada *(Member)* received Dr. Eng. and the Ph. Dr. degrees from Tsukuba University in 1990, and 2001, respectively. He joined the Central Research Laboratory, Hitachi Ltd. in 1982, where he was involved in the study of integrated solid-state chemical sensor for blood analyses. He was with the Superconducting Sensor Laboratory from 1991–1996. He was involved in the research and development of SQUID's and multichannel SQUID system. He was with the Central Research Laboratory, Hitachi Ltd. from 1996–2003. He is presently a Professor of Graduate School of Natural Science and Technology, Okayama University. He is involved in the research of superconducting sensor devices, and their applications.