
FOREWORD

Special Section on Josephson Junctions — Past 50 years and Future —

Josephson junction is based on Josephson effect which was discovered at 1962 by Brian Josephson. This special section was planned in commemoration of the 50th anniversary of the Josephson effect discovery. Josephson junction is the device that two superconductors are weakly coupled. DC current flows between the two superconductors in proportion to the sine of their phase difference (DC Josephson effect) and the phase varies with time depending on voltage across the Josephson junction (AC Josephson effect). The DC and AC Josephson effects in Josephson junctions have been applied to various applications, such as digital circuits, voltage standards and SQUIDs, and implemented high-performance devices whose performances were never achieved with other technologies. A number of superconductors, for example Nb, NbN and oxide superconductors, have been used for the superconductor materials in Josephson junctions and several types of configurations, such as tunnel junction and micro bridge, also have been employed. Four invited papers and one contributed paper are included in the section. Nb/AIO_x/Nb junction, NbN/TiN/NbN junction, ramp-edge junctions using oxide superconductors and intrinsic junctions using Bi₂Sr₂CaCu₂O_{8+δ} oxide superconductors are described in each invited paper. This special section will open the latest results in the field of Josephson junction research to readers.

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Mutsuo Hidaka (*Member*) received B.E. degree in physics and M.E. degree in applied physics from Kyusyu University in 1980 and 1982. He also received Ph.D. degree in 1998 in electronics engineering from the University of Tokyo. He joined the NEC Corporation in 1982, where he worked on various researches in superconducting digital electronics, such as investigation of Nb/AIO_x/Nb Josephson junctions and development of high- T_c superconductor sampler. From 1990 to 1991, he was with the Arizona State University, as a visiting scientist. In 2002, he temporarily moved to the Superconductivity Research Laboratory, International Superconductivity Technology Center, Tokyo, Japan, where he has been working on the research and development of Nb-based single flux quantum (SFQ) circuits. He is currently Director of Low Temperature Superconducting Device Laboratory and Visiting Professor of National Institute of Informatics. Dr. Hidaka is a member of the Japan Society of Applied Physics.

