

Evolution of HTS Josephson Junctions and their Application at ISTEK and SUSTERA

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Abstract— The evolution of HTS Josephson junction technology and its application during the last twenty plus years is reviewed, mostly focusing on that at ISTEK and SUSTERA. The fabrication technology of oxide multilayer and ramp-edge Josephson junctions was much advanced during the decade from 1995 to 2005 to develop HTS single flux quantum (SFQ) devices. Although the development of SFQ devices resulted in only demonstration of small-scale circuits and a sampler system mainly due to a rather large critical current spread of HTS Josephson junctions, the developed multilayer and the junction technology was applied to fabrication of multilayer HTS SQUIDs with high resistance to external magnetic field. Using these HTS SQUIDs, a variety of systems, in particular, those for field use such as TEM systems for exploration or monitoring of natural resources and a nondestructive testing system for infrastructure have been developed and demonstrated. HTS SQUIDs can now be stably operated in various fields, for example, on the ground, in a borehole, and on an expressway. The application field of HTS SQUIDs is expected to further expand in the near future.

Keywords (Index Terms) — HTS Josephson junctions, ISTEK, SUSTERA, SFQ, SQUIDs.

IEEE-CSC & ESAS SUPERCONDUCTIVITY NEWS FORUM (global edition), September 2019.

Selected August 5, 2019. Reference RP94; distinguished presentation 2-FA-D-1 given at ISEC, 28 July-1 August 2019, Riverside, USA.