

R&D of Bi-2223 Superconducting Joint

Keywords: HTS, persistent current mode magnets, energy saving



National Institute for Materials Science

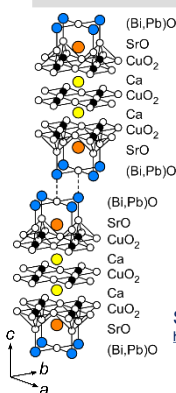
Background

Superconducting (SC) magnets are widely used for various applications. To improve magnet performance and achieve energy-saving systems, R&D of high temperature superconductor (HTS) progressed. In the last decade, significant progress on developing “SC joint” for HTSs has been made to achieve persistent current mode HTS magnets.

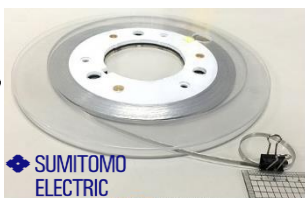
Aim

We successfully developed SC joint between Bi-2223 HTSs. My motivation is to contribute to facilitating development of full-scale & energy-saving persistent current mode Bi-2223 HTS magnets. To achieve this, aim of my research is to improve Bi-2223 SC joint technology through materials research.

Advanced Research Topics



Commercially available Bi-2223 HTS wire



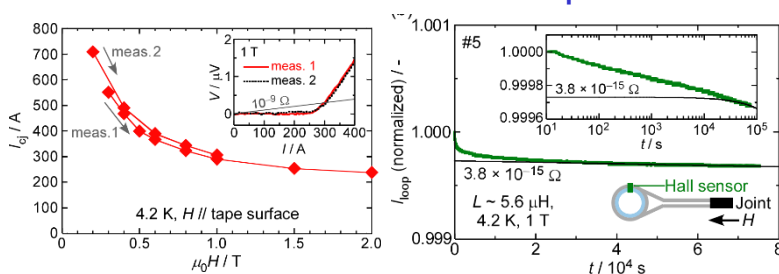
Sumitomo Electric Industries, Ltd.
<https://global-sei.com/company/press/2016/02/prs012.html>

Our development: Bi-2223 SC joint

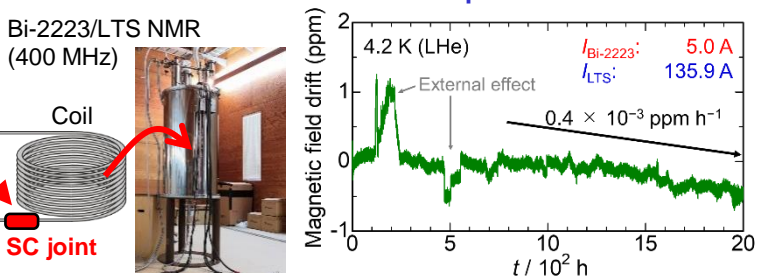


Materials research is promising to improve SC joint technology for practical applications

High current carrying capacity & ultra-low resistance demonstrated in small samples



Persistent current mode operation of Bi-2223 magnet Issue: Low current in a practical coil



Publications

- Y. Takeda *et al.*, *Appl. Phys. Express* **12** (2019) 023003.
- Y. Takeda *et al.*, *Supercond. Sci. Technol.* **35** (2022) 02LT02.
- Y. Takeda *et al.*, *IEEE Trans. Appl. Supercond.* **32** (2022) 4301005.

Summary

- We successfully developed Bi-2223 SC joint.
- High joint performance was demonstrated.
- Primitive persistent current mode Bi-2223 magnet was developed using the SC joint.

Research outcome

- Performance improvement in Bi-2223 SC joint
- Establishment of materials science of HTS joint
- Development of energy-saving magnet systems using persistent current mode HTS magnets



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