

## Materials Process and Applications of Single Grain (RE)-Ba-Cu-O Bulk High-temperature Superconductors

Beizhan Li, Difan Zhou, Kun Xu, Shogo Hara, Keita Tsuzuki,  
Motohiro Miki, Brice Felder, Zigang Deng and Mitsuru Izumi\*

Laboratory of Applied Physics,  
Department of Marine Electronics and Mechanical Engineering,  
Tokyo University of Marine Science and Technology (TUMSAT),  
2-1-6, Etchu-jima, Koto-ku, Tokyo 135-8533, Japan

\*E-mail: [izumi@kaiyodai.ac.jp](mailto:izumi@kaiyodai.ac.jp)

**Abstract** - This paper reviews recent advances in the melt process of (RE)-Ba-Cu-O [(RE)BCO, where RE represents a rare earth element] single grain high-temperature superconductors (HTS), bulks and its applications. The efforts on the improvement of the magnetic flux pinning with employing the top-seeded melt-growth process technique and using a seeded infiltration and growth process are discussed. Which including various chemical doping strategies and controlled pushing effect based on the peritectic reaction of (RE)BCO. The typical experiment results, such as the largest single domain bulk, the clear TEM observations and the significant critical current density, are summarized together with the magnetization techniques. Finally, we highlight the recent prominent progress of HTS bulk applications, including Maglev, flywheel, power device, magnetic drug delivery system and magnetic resonance devices.

**Keywords** – rare earth, cuprate, high-temperature superconductor, HTS, bulk superconductor, melt growth process, flux pinning, MAGLEV, MRI, Flywheel, Motor

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