Trapped Field and Levitation Performances of (RE)BCO Bulk Superconductors

TOP GLOBAL UNIVERSITY JAPAN

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Date and time: June 29th, 2023, 15:00~15:45
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Abstract

(RE)BCO (RE=Y, Gd, Sm, Nd) superconducting crystal samples, which have high levitation force and high trapped magnetic field, are used in many applications such as magnetic bearings, flywheels, motors, generators, high magnetic field permanent magnets and conveying systems. One of the most useful (RE)BCO superconducting materials is the YBCO multi-seeded crystal superconductor. Multi-seeded YBCO superconductors (with triangular arrangement) were fabricated by the top-seeded melt growth (TSMG) method. In this study, the magnetic levitation force, guidance force and magnetic stiffness values were determined for triangular-seeded YBCOs on different PMGs at liquid nitrogen temperatures. The results showed that the magnetic levitation properties of TSMG fabricated samples can be enhanced by changing the distance between seeds in a triangular arrangement. Furthermore, the effect of the trapped magnetic field on triangular-seeded YBCO samples was investigated [1]. One of the most useful (RE)BCO superconducting materials is the GdBCO single-crystal superconductor. The GdBCO single crystal superconducting sample was produced by the top-seeded-melting-growth (TSMG) technique at the Cambridge Bulk Superconducting Laboratory at the University of Cambridge. Vertical levitation forces were measured at different temperatures (37, 47, 57, 67 and 77 K) for 150 seconds by using a newly designed magnetic levitation force measurement system. It was observed from the measurement results that the time gradients against magnetic levitation decreased as the temperature decreased. Magnetization measurements were performed at the same temperatures by varying the applied magnetic fields and the critical current densities were calculated [2].

[1] M Abdioglu, SB Guner, K Ozturk, C Yang, I Chen, S Celik International Journal of Applied Ceramic Technology 19 (1), 459-466.
[2] SB Güner, M Abdioğlu, K Öztürk, Ş Çelik, Journal of Alloys and Compounds 822, 153637.

Speaker Biography

Dr. S. Baris Guner (RTEU)

He is a dynamic and accomplished associate professor at the prestigious Recep Tayyip Erdogan University (RTEU) in Turkey. With a passion for superconducting materials, he has made remarkable contributions to the field through his research and academic pursuits. Dr. Guner obtained his Ph.D. degree from RTEU in Rize, solidifying his expertise in the subject matter. During his doctoral studies, he had the privilege of collaborating with esteemed superconducting groups from renowned institutions worldwide. These collaborations broadened his horizons and enriched his understanding of the intricacies of superconductivity. In recognition of his exceptional dedication and achievements, Dr. Guner was honored with the prestigious Academic Encouragement Prize from RTEU in 2017. This award serves as a testament to his commitment to excellence and his significant contributions to the field. Dr. Guner's research has centered around REBCO Bulk Superconductors, Single Grain and Multiseeded Superconducting Materials Processing, Magnetic Levitation, Trapped Field, and Structural Properties. His groundbreaking work has been published in reputable scientific journals, solidifying his reputation as a leading authority in the field. For further details about Dr. Guner's research activities and publications, please visit his profile at https://avesis.erdogan.edu.tr/sbaris.guner/yayinlar.

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