Contribution ID: **888** Contribution code: **THU-PO3-605-06** Type: **Poster**

Influence of premix condition on the microstructure and trapped field properties of MgB2 bulk magnets by Mg Vapor Transportation (MVT) method

Thursday, 18 November 2021 10:00 (20 minutes)

MgB2 has the highest Tc of 39 K among metallic superconductors [1] and is expected for applications at 10-20 K. MgB2 bulk permanent magnet [2] is interesting for compact, high field magnet applications. Recently, we developed the Magnesium Vapor Transportation (MVT) method [3] that transports magnesium vapor to precursor boron pellets. By using the MVT method, we have succeeded in obtaining MgB2 bulks with higher purity and higher density compared to those of the conventional in-situ bulks. On the other hand, the formation of secondary phases and cracks is sometimes observed in bulks prepared by the MVT method. Such structural defects would limit the current flow and the trapped magnetic field. In this study, the premix method [4] in which prereacted MgB2 is premixed in the precursor boron powder was introduced to suppress the formation of cracks during the MVT process. The effects of premix ratio x (xMgB2+B) on the superconducting properties of the MgB2 bulks after the MVT process were evaluated. Cracks were found on the surface of the bulk with the smallest premix ratio x=0.1, whereas macroscopic cracks were not observed in the bulks with x=0.3 and 0.5. Jc of all samples was improved compared to the in-situ bulks, especially Jc of the bulk with x=0.3 reached 770,000 A/cm2 at 20 K. Trapped field measurement was performed on the disk shaped bulk (20 mm in diameter, 2 mm in thickness). The bulk fabricated by the premix MVT method with x=0.3 trapped 2.3 Tesla at 10 K at the center of the bulk surface.

[1] J. Nagamatsu et al., Nature 410, 63 (2001).
[2] A. Yamamoto et al., Appl. Phys. Lett. 105, 032601 (2014).
[3] Y. Sanogawa et al., J. Japan Inst. Met. Mater. 83, 341-345 (2019).
[4] I. Iwayama et al., Physica C 460-462, 581-582 (2007).

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Session Classification: THU-PO3-605 MgB2 and Iron-based Wires and Cables