Effect of Dry and Wet Mixing Methods of MgB_2 Bulks with Phenol-formaldehyde Resin as a Carbon Source

G. C. Park[a], C. M. Lee[a], J. H. Park[a], J. H. Choi[a], K. Sung[a], J. H. Lim[a], J. Joo[*,a], B. -H. Jun[b], C. -J. Kim[b]

[a] *School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Gyeonggi, Korea*
[b] *Neutron Science Division, Korea Atomic Energy Research Institute, Daejeon, Korea*

We investigated the effect of two different mixing methods in MgB_2 bulks with phenol-formaldehyde (PF) resin as a carbon source on the microstructure, lattice parameters, and critical properties of MgB_2 bulks. One of the mixing methods is a dry mixing and the other is a wet mixing. The precursor powders using dry and wet mixing methods are prepared by the ball mixing with Mg, B, PF resin in Ar atmosphere and conventional solution process in alcohol, respectively. The precursor powders were compacted into the compacts, followed by annealing at 900°C for 1 hr in Ar atmosphere.

The microstructure and phase identification of the MgB_2 bulks were observed by scanning electron microscopy (SEM) and x-ray diffraction (XRD), respectively. The critical temperature (T_c) and critical current density (J_c) were determined with magnetic property measurement system (MPMS) in applied magnetic field. The MgB_2 bulk made by wet mixing method had a higher J_c (8.9×10^3 A/cm^2 at 6.6 T and 5 K) than those of pure MgB_2 and MgB_2 made by dry mixing method.

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