

A Study on C-doped MgB₂ Bulk Using Polyacrylonitrile (PAN) as a Carbon Source

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We fabricated the C-doped MgB₂ bulk using polyacrylonitrile (PAN) as a carbon source and studied its effect on the microstructural evolution and superconducting properties. The precursor powders of B and 0~10 wt% PAN were mixed by wet mixing method using an organic solvent and uniformly mixed with appropriate Mg powder. The mixed powders were compacted into pellets using a uniaxially pressing and were then sintered at 900°C for 1 h in an Ar flowing atmosphere.

We performed phase identification by x-ray diffraction (XRD) and microstructural observation by scanning electron microscopy (SEM). The critical temperature (T_c) and critical current density (J_c) were estimated by magnetic property measurement system (MPMS). As the PAN content increased, T_c decreased, on the other hand, field dependence of J_c was improved. For the 5 wt% PAN-added sample, the J_c was 3.65×10^2 A/cm² at 20 K and 4 T, which was approximately 3-fold higher than that of the pure sample.

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