

Effects of nano-SiC addition on the superconducting properties of magnesium diboride

ABSTRACT

In this study, we report the results on phase formation, microstructures, and superconducting properties of a series of MgB₂ samples with different level of SiC additions. The polycrystalline samples were prepared via solid state reaction by mixing magnesium, boron and silicon carbide powders according to the ratio of Mg:B:SiC = 1:2:x. XRD spectra showed that MgB₂ is the primary phase while Mg₂Si, MgO and MgB₄, together with some unreacted SiC are the secondary phases as the addition increases. The presence of Mg₂Si became more significant as the addition level increased. SEM images showed smaller grains as the addition level increases indicating more grain boundaries were formed. The T_c was as low as 30.5K for x=15wt%. The field dependence of J_c showed that x=1wt% sample gave the best performance at both 5K and 20K.

Keyword: MgB₂; MgO; MgB₄; Superconducting properties