

Sintering effect on the superconducting properties of nano-SiC added MgB₂.

Abstract

In this work, MgB₂ samples added with different weight percentages (wt%) of nano-SiC additions were synthesized by the conventional solid state method. They were sintered at 650 °C and 850 °C respectively, in order to study the effect of sintering temperature on their phase formation and superconducting properties. XRD spectra show relatively higher intensity of Mg₂Si at lower sintering temperature while Rietveld Refinement shows severe lattice contraction at a-axis but the c-axis remains unchanged with increasing SiC additions and sintering temperatures. The transition temperature degrades with the additions level but higher sintering temperature led to more gradual decrease in T_c. At 5K, samples sintered at lower temperature shows enhanced flux pinning properties with higher J_c. However, at 20K, samples sintered at higher temperature showed improved J_c at high field (>3T) when the addition level exceeds 5 wt%.

Keyword: MgB₂; Superconductor; Sintering temperature; Silicon carbide.