

Investigated stiffness of high performance superconductivity with nanoceria incorporated into polycrystalline magnesium diboride

Abstract

Polycrystalline MgB_2 was prepared with different amounts of nano-sized CeO_2 inclusions, subjected to X-ray diffraction, scanning electron microscopy and atomic force microscopy characterisation. The nano- CeO_2 inclusions were found to affect the lattice parameters because of nanoinclusions up to 2wt. The stiffness was investigated and the morphology of pure powders reveals randomly oriented grains and cleans grain boundaries, whereas with nanoinclusions, grain surfaces and boundaries were decorated with nano-sized CeO_2 particles. Significant enhancement of the superconducting critical current density J_c was observed because of nano- CeO_2 addition. The obtained results are in good agreement with other experimental and theoretical results.