Effect of Post-annealing Temperatures on MgB_2 Thin Films

Hyeong-Jin Kim*, W. N. Kang, Eun-Mi Choi, and Sung-Ik Lee

National Creative Research Initiative Center for Superconductivity, Department of Physics, Pohang University of Science and Technology, Pohang 790-784, Korea

We have fabricated the MgB_2 thin films on (1 $\bar{1}$ 0 2) Al_2O_3 substrates by using a two-step method. Amorphous B thin films were deposited by a pulsed laser deposition technique and sintered in Mg vapor at various temperatures from 800 to 950 °C. The superconducting properties of thin films were investigated by temperature dependences of resistivity, magnetization, and critical current density. The structural studies were carried out an x-ray diffraction and a scanning electron microscope. The films fabricated at 900 °C show the highest transition temperature of 39.3 K and critical current density of ~ 10^7 A/cm^2 at 15 K.

keywords : MgB_2, thin film, superconductor, annealing temperature