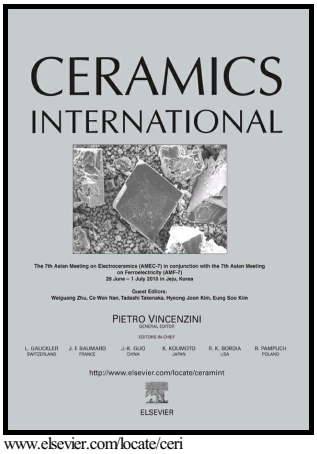

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Enhancement of Magnetic Relaxation Behavior by Texturing in Bi-2212 Superconducting Rods

M.Ozabaci[1*], O. Kizilaslan[2], G. Kirat[3], M.A. Aksan[3], M.A. Madre[4], A. Sotelo[4], M.E. Yakinci[1,2]

[1]Scientific and Technological Research Center, SEM/EDX Lab. İnönü University, Malatya, Turkey
[2]Faculty of Engineering, Department of Biomedical Engineering, İnönü University, Malatya, Turkey
[3]Faculty of Arts and Sciences, Department of Physics, İnönü University, Malatya, 44280, Turkey
[4]Instituto de Ciencia de Materiales de Aragón (ICMA), CSIC-Universidad de Zaragoza, Maria de Luna, 3, 50018, Zaragoza, Spain

*Corresponding author. Tel.:+90 4223774956. E-mail address: muratozabaci@yahoo.com (M.Ozabaci)

Abstract

Time decay of magnetization, known as magnetic relaxation, is crucial for both fundamental and applied point of view in bulk high temperature superconductors (HTS) by setting the limits to the HTS devices stability. Melt-processed $Bi_2Sr_2Ca_1Cu_{2-x}Ga_xO_{8+\delta}$ rods (Bi-2212, x = 0, 0.1) were used to study the effect of both grain alignment and substitution on the samples critical current density, relaxation and pinning behavior. The magnetic field has been applied both perpendicular and parallel to the rods growth axis to determine the effect of grain alignment. It has been found that Ga substitution reduces grains orientation and sizes leading to lower magnetic properties. The peaks of the curves, which indicate the temperature dependence of the samples magnetic relaxation rate (S), have been observed in the 7-35 K temperature range. Characteristic pinning energy (U_e/k_B) of samples was determined using the formalism developed by Maley. The change of pinning energy as a function of magnetization has been found to be exponential between 3 and 60 K, which is in agreement with the collective creep theory.

Keywords: BSCCO superconductors, Magnetic relaxation, Pinning energy, Texturing, Laser processing, Alignment.