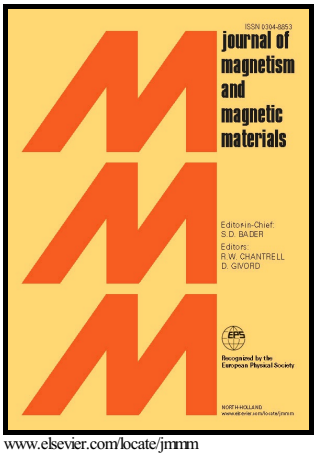

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Abstract

Multiferroic $xBa_{0.95}Sr_{0.05}TiO_3$-$(1–x)BiFe_{0.9}Gd_{0.1}O_3$ [xBST-(1–x)BFGO], where x=0.00-0.40, have been synthesized by the conventional solid-state reaction method. The crystalline phase, microstructure, relaxor behavior, ac conductivity, impedance spectroscopy, dc magnetic properties, complex initial permeability and magnetoelectric coefficient of these solid solutions have been investigated. The crystal structure is found to change from rhombohedral in BFGO rich compositions to cubic when $x \geq 0.30$. Room temperature dielectric properties are investigated within the frequency range of 1 kHz -1 MHz and found to increase with BST content. The frequency dependence of high temperature dielectric measurements indicated that the composites with $x \geq 0.20$, exhibit relaxor ferroelectric behavior. The ac conductivity obeys the Jonscher's universal power law and BST helps to enhance the electrical conductivity of the composites. Studies of impedance spectroscopy suggest that only grains have the contribution to the conductivity mechanism in this material. Magnetizations as a function of applied magnetic field measurements show weak ferromagnetism for $0.10 \leq x \leq 0.30$ composites. The maximum value of remnant magnetization is found to be 0.565×10^3 A/m (=0.08 emu/g) for x =0.25 which is better than previously reported $BaTiO_3$ - $BiFeO_3$ systems. The complex initial permeability is found to improve with the increase in BST concentration due to the reduction of oxygen vacancies. In addition, an enhanced