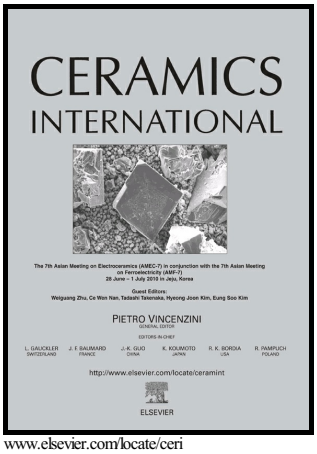

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Abstract

Strontium barium niobate doped with gadolinium, with the stoichiometric formula $Gd_ySr_{(0.53-3y/2)}Ba_{0.47}Nb_2O_6$ (GSBN) was synthesized using the solid-state reaction method, with varied mol % compositions of Gd (y = 0, 0.01, 0.03, 0.05 and 0.07). Gadolinium was chosen as a dopant with the goal of enhancing the ferroelectric and pyroelectric properties of SBN. The X-ray diffraction spectra showed that all compositions exhibit a single-phase tetragonal tungsten bronze structure. The influence of Gd as dopant on the microstructure was examined by using field emission scanning electron microscopy. The dielectric characteristics of the samples showed diffuse phase transitions. The Curie temperature of the samples shifted to lower temperature with increasing Gd concentration. The relaxor characteristic of the GSBN (above and below the Curie temperature) was described using the Curie-Weiss Law, a Gaussian distribution, and a quadratic equation. SBN doped with 3 mol % of Gd exhibits the highest remnant polarization, P_r = 8.8 μC/cm^2, while 1 mol % Gd-doped SBN shows the highest pyroelectric coefficient of 285 μC/m^{2}K. These qualities can be useful in security, healthcare, pollution monitoring, fire sensing, and smart energy system applications.

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