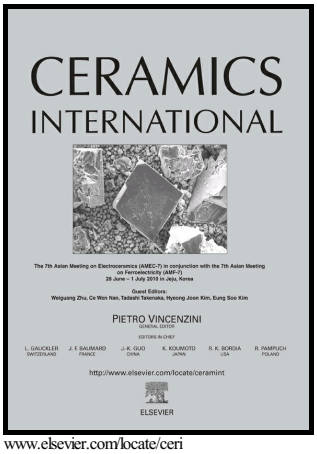

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Dielectric, ferroelectric, and energy storage properties in dysprosium doped sodium bismuth titanate ceramics

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Abstract

In this work, $Na_{0.5}(Bi_{1-x}Dy_x)_{0.5}TiO_3$ ($0 \leq x \leq 15$ %) ceramics were prepared via solid state reaction method and were characterized. A stable and pure perovskite phase was revealed by X-ray diffraction analysis for all compositions and a symmetry change from rhombohedral to orthorhombic phase was detected beyond 10% of Dy substitution. The incorporation of Dy^{3+} into Sodium Bismuth Titanate ($Na_{0.5}Bi_{0.5}TiO_3$) matrix allows a substantial decrease of the coercive field, an increase in the resistivity, and leads to a high stability of the dielectric permittivity ($\Delta\varepsilon/\varepsilon_{(150°C)} \leq \pm 15\%$) over a wide temperature range. Furthermore, this system was found to exhibit improved energy storage properties at high temperatures with a maximum energy density of 1.2 J/cm^3 obtained for 2%Dy composition at 200°C. The obtained results are very promising for energy storage capacitors operating at high temperatures.

Keywords: NBT-based ceramics; Dielectric properties; Ferroelectric properties; Energy storage.

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