Change the ferroelectric properties of $Al_{0.01}Ba0_{.99}TiO_3$ ceramics by $Al_{0.01}Sr_{0.99}TiO_3$ doping, Results in Physics

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Abstract

The effect of doping $Al_{0.01}Sr_{0.99}TiO_3$ on the structural, ferroelectric and storage energy properties of $Al_{0.01}Ba_{0.99}TiO_3$, $(1 - x)$ $Al_{0.01}Ba_{0.99}TiO_3$-(x) $Al_{0.01}Sr_{0.99}TiO_3$ (x = 0, 0.005, 0.010, and 0.015) was investigated. The X-ray powder diffraction (XRD) patterns revealed that the studied samples adopt single phase of tetragonal with space group symmetry P4mm. Field emission scanning electron microscopy (FE-SEM) showed that the particle size of pure $Al_{0.01}Ba_{0.99}TiO_3$ (ABTO) was affected by the $Al_{0.01}Sr_{0.99}TiO_3$ (ASTO) content. The dielectric study showed that doping ABTO by ASTO decreased the dielectric permittivity, ac conductivity and Curie-Weiss temperature (TC) of the parent sample. Remnant polarization, saturation, and coercive field were given. Our results show that the ferroelectric behavior of ABTO ceramics is more sensitive to ASTO dopants. Through the ferroelectric hysteresis loops, the energy storage density and the energy-storage efficiency, η of all samples were calculated. The results showed that η for the sample of x = 0.005 is better than that of ABTO.