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Dielectric and ferroelectric properties of $\text{SrTiO}_3\text{-Bi}_{0.54}\text{Na}_{0.46}\text{TiO}_3\text{-BaTiO}_3$ lead-free ceramics for high energy storage applications

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Abstract

The need of lead-free ceramics with excellent dielectric behaviors and high energy storage properties have been extensively studied. In this study, $(1-x)\text{SrTiO}_3\text{-}x(0.94\text{Bi}_{0.54}\text{Na}_{0.46}\text{TiO}_3\text{-}0.06\text{BaTiO}_3)$ ((1-x)ST-xBNBT) lead-free ceramics were designed and fabricated using the conventional solid state sintering method. The results demonstrate that the dielectric constant of (1-x)ST-xBNBT ceramics increases gradually and reaches the maximum value (~ 3940) with $x = 0.6$ at 100 Hz, which is 11.94 times as large as that of pure SrTiO_3 (~ 330), and the dielectric loss is lower than 0.20 at the measured frequencies for all the samples. Meanwhile, the dielectric measurements reveal an intensified diffusion and relaxor behavior. All the samples show slim polarization-electric field (P - E) loops, and the

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