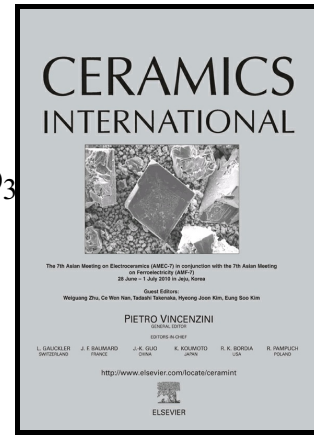


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Enhanced Energy Storage Properties of
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Lead-free Ceramics

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Abstract

Energy storage properties of $\{\text{Bi}_{0.5}[(\text{Na}_{0.8}\text{K}_{0.2})_{1-z}\text{Li}_z]_{0.5}\}_{0.96}\text{Sr}_{0.04}(\text{Ti}_{1-x-y}\text{Ta}_x\text{Nb}_y)\text{O}_3$ (BNKLSTTN- $x/y/z$) lead-free ceramics are investigated. It is found that Ta performs better than Nb in the case of their energy storage density values, and the addition of optimum Li contents can enhance the energy storage properties by enhancing the dielectric breakdown strength (DBS). Enhanced energy storage density of 1.60 J/cm^3 under a low electric field of 90 kV/cm is achieved in BNKLSTTN-0.025/0/0.10 samples, and the fatigue-free properties are also observed. In addition, the BNKLSTTN-0.025/0/0.10 samples show the enhanced temperature dependence of energy storage density. These results indicate that the BNKLSTTN- $x/y/z$ ceramics are one of the most promising lead-free materials for energy storage applications.

Keywords

Lead-free ceramics; $\text{Bi}_{0.5}\text{Na}_{0.5}\text{TiO}_3$; Energy storage; Fatigue behavior

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