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A New Method to Improve the Electrical Properties of KNN-based Ceramics: Tailoring Phase Fraction

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Abstract: Although both the phase type and fraction of multi-phase coexistence can affect the electrical properties of (K,Na)NbO_3 (KNN)-based ceramics, effects of phase fraction on their electrical properties were few concerned. In this work, through changing the calcination temperature of $CaZrO_3$ powders, we successfully developed the $0.96K_{0.5}Na_{0.5}Nb_{0.96}Sb_{0.04}O_3$-$0.01CaZrO_3$-$0.03Bi_{0.5}Na_{0.5}HfO_3$ ceramics containing a wide rhombohedral-tetragonal (R-T) phase coexistence with the variations of T (or R) phase fractions. It was found that higher T phase fraction can warrant a larger piezoelectric constant (d_{33}) and d_{33} also showed a linear variation with respect to tetragonality ratio (c/a). More importantly, a number of domain patterns were observed due to high T phase fraction and large c/a ratio, greatly benefiting the piezoelectricity. In addition, the improved ferroelectric fatigue behavior and thermal

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