

**Piezoelectric Property Relationships for Lead-Free Compositions in the Piezoceramic  
 $\text{Bi}_{0.5}\text{Na}_{0.5}\text{TiO}_3\text{-BaTiO}_3\text{-K}_{0.5}\text{Na}_{0.5}\text{NbO}_3$  System**

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Lead zirconate titanate solid solutions with the perovskite structure have long been the materials of choice for piezoelectric applications. The investigation of lead-free piezoelectric ceramic compositions has recently gained an increased level of interest and considerable effort has been devoted to the development of lead-free piezoceramics due to the high toxicity level of the heavy metal lead. The focus vehicle of this work is in the piezoceramic  $\text{Bi}_{0.5}\text{Na}_{0.5}\text{TiO}_3\text{-BaTiO}_3\text{-K}_{0.5}\text{Na}_{0.5}\text{NbO}_3$  system, particularly near the 'so-called' morphotropic phase boundary, due to its consideration as a promising candidate material as a lead-free option to some lead-based compositions. A conventional mixed-oxide approach from raw oxides and solid-state sintering technique has been employed to produce analysis samples. Efforts on characterizing processing induced variations, crystal structure, microstructure and dielectric, ferroelectric and piezoelectric behavior for compositions in this lead-free ternary system will be presented.

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