

## **< 001 > textured (K<sub>0.5</sub>Na<sub>0.5</sub>)Nb<sub>0.97</sub>Sb<sub>0.03</sub>)O<sub>3</sub> piezoelectric ceramics with high electromechanical coupling over a broad temperature range**

Author(s): Chang YF (Chang, Yunfei)<sup>1,2,3</sup>, Poterala SF (Poterala, Stephen F.)<sup>1,2</sup>, Yang ZP (Yang, Zupei)<sup>3</sup>, Trolier-McKinstry S (Trolier-McKinstry, Susan)<sup>1,2</sup>, Messing GL (Messing, Gary L.)<sup>1,2</sup>

Addresses:

1. Penn State Univ, Dept Mat Sci & Engr, University Pk, PA 16802 USA
2. Penn State Univ, Mat Res Inst, University Pk, PA 16802 USA
3. Shaanxi Normal Univ, Sch Chem & Mat Sci, Xian 710062, Shaanxi Peoples R China

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Abstract: < 001 >-oriented (K<sub>0.5</sub>Na<sub>0.5</sub>)Nb<sub>0.97</sub>Sb<sub>0.03</sub>)O<sub>3</sub> (KNNS) ceramics with a narrow orientation distribution (full width at half maximum= 7.0 degrees) were produced by templated grain growth using NaNbO<sub>3</sub> templates. Excellent electromechanical properties were obtained from -70 degrees C to the polymorphic phase transition (PPT) at 160 degrees C. Textured KNNS ceramics show very high electromechanical coupling factors  $k_p=0.64$  and  $k_{31}=0.37$ , high piezoelectric constants  $d_{33}=208-218$  pC/N and  $d_{31}=-82$  pC/N, and modest strain hysteresis (6.3%) at room temperature. These properties are superior to those of randomly oriented KNN-based ceramics with similar PPT temperatures. c 2009 American Institute of Physics. [doi: 10.1063/1.3271682]