

Dielectric and piezoelectric properties of lead-free (Bi,Na)TiO₃-based thin films

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Abstract: Dielectric and piezoelectric properties of morphotropic phase boundary (Bi,Na)TiO₃-(Bi,K)TiO₃-BaTiO₃ epitaxial thin films deposited on SrRuO₃ coated SrTiO₃ substrates were reported. Thin films of 350 nm thickness exhibited small signal dielectric permittivity and loss tangent values of 750 and 0.15, respectively, at 1 kHz. Ferroelectric hysteresis measurements indicated a remanent polarization value of 30 $\mu\text{C}/\text{cm}^2$ with a coercive field of 85-100 kV/cm. The thin film transverse piezoelectric coefficient $e_{31,f}$ of these films after poling at 600 kV/cm was found to be $-2.2 \text{ C}/\text{m}^2$. The results indicate that these BNT-based thin films are a potential candidate for lead-free piezoelectric devices.