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Oral 416

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Title: Electromechanical properties of piezoelectric multilayer devices based on BNT-BKT lead free ceramics

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A piezoelectric multilayer device based on a solid solution of bismuth-sodium-titanate and bismuth-potassium-titanate (BNT-BKT) co-fired with Ag/Pd inner electrodes is described and its dielectric and piezoelectric properties are measured. With this example we demonstrate that BNT based ceramics do not interact with palladium during the sintering process as long as free bismuth oxide is not present. This device exhibits a large and temperature independent strain of around 0.19 % between 25 °C and 150 °C. The large strain is due to a field-induced phase transition. Usually this field-induced strain exhibits a more or less pronounced maximum at the ferroelectric/antiferroelectric (nonpolar) phase transition temperature T_d . A broadening of the antiferroelectric (nonpolar) phase by lowering T_d helps to get constant strains within a desired temperature range. Several strategies of structural modifications for lowering T_d are discussed. The mechanical characteristics of the device under high electric field conditions and mechanical load were investigated. Impedance spectroscopy was used to investigate the electrical conductivity of single ceramic layers at various temperatures.

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