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Synthesis of Lead-Free Ceramicsof the Perovskite Type for PiezoelectricApplications by Conventional Solid-StateReaction

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Abstract: Structural properties of BaTiO3, CaTiO3 and Ba0.85Ca0.15Ti0.9Zr0.1O3 prepared by conventional solid state reaction technique, at different calcinations temperatures 1100, 1150 and 1280 °C and sintering temperatures (1200and 1300 °C) are studied. These compositions were selected because of their interesting piezoelectric properties. To follow the decomposition process of the precursor, a differential thermal analysis coupled with thermogravimetric analysis (ATG-ATD) was performed. Structural parameters are analyzed by X-raydiffraction (XRD) and scanning electron microscopy (SEM). The obtained results howed clearly the synthesis of the perovskite phase. The diffractogram illustrates that BCTZ symmetry is both cubic with a Pm-3 m space group and orthorhombic with a R3m space group, the calculated phase rates are respectively 10% and90%. The results allowed us to specify the effect of sintering temperatures on the structural properties of ceramics.

Keywords : Lead free ceramics, synthesis, ;, microstructure, Perovskite