

## **Thermal Characterization of PZT Ceramics Obtained by Mechanically Activated Mixed Oxides Using Different Pb Sources**

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Enhanced ferroelectric properties are well known from a binary solid solution of  $\text{PbZrO}_3$  and  $\text{PbTiO}_3$  ( $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$ ) at compositions close to the morphotropic phase boundary (50/50 ratio of Zr/Ti). Characterization of thermal properties is important since these materials are commonly used as pyroelectric sensors. In this work sets of PZT samples with compositions 57/43, 55/45 (rhombohedral phase), 53/47 and 51/49 (tetragonal phase) were prepared by a mechanochemical activation of powder mixtures. The three set of compositions were prepared using different Pb sources, (A-PbO, B-PbO<sub>2</sub> and C- Pb<sub>3</sub>O<sub>4</sub>). The powders mixtures were milled under high energy conditions at three different milling times (4, 8 and 12 h) and sintered at 1200°C. Thermal characterization of sintered samples was carried out by a combination of techniques such as photoacoustic spectroscopy and differential scanning calorimetry, to obtain data of thermal diffusivity and specific heat ( $c_p$ ) following a method based on the ASTM norm E 1269-90, respectively. The DSC thermograms also allowed the determination of the Curie temperature of the ferroelectric samples. Finally, thermal conductivity of all samples was calculated combining the results of diffusivity, specific heat and density, which was itself determined by the Archimedes principle. The samples obtained with Pb<sub>3</sub>O<sub>4</sub> showed a density higher than 95 % of theoretical density, whereas those obtained from PbO precursors showed a lower densification rate (89 -93 % of theoretical density). This behavior is related with the mechanochemical activation process. As expected the samples with the highest density (Pb<sub>3</sub>O<sub>4</sub>) also showed the maximal values of thermal diffusivity. The samples closest to the MPB from the side of the tetragonal phase showed higher thermal diffusivity values, 0.007 and 0.006 cm<sup>2</sup>/s for 53/47 and 51/49 samples respectively.