Effect of Vibro-Milling Times on Phase Formation and Particle Size of Lead Titanate Powders

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Abstract

Ferroelectric lead titanate (PbTiO3 or PT) nano-powders have been synthesized from commercial PbO and TiO2 precursors using a rapid vibro-milling technique. The formation of perovskite PT phase and the particle size in the calcined PT powders have been investigated as a function of milling times and calcination conditions by TG-DTA, XRD, SEM and EDS methods. Even though the single-phase PT powders are successfully obtained in all conditions after calcination above 600 ๐C, the milling time is found to have pronounced effects on the particle size of the calcined powders and the optimum firing temperature. Furthermore, a smaller particle size and a lower reaction temperature can be achieved after a longer milling time. Finally, SEM studies also display that the nano-sized PT particles with significant agglomerations are readily obtainable using the rapid vibro-milling technique.