

SYNTHESIS AND CHARACTERIZATION OF NANOCRYSTALLINE LEAD-ZIRCONIUM TITANATE BY TARTRATE PRECURSOR

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ABSTRACT

The present study aims at synthesis of lead - zirconium titanate (PZT) nanopowders via tartrate precursor methods. All the parameters affecting the synthesis conditions were studied and the optimum conditions were determined. The resultant powders were investigated by thermal analyzer (TG-DSC), X-ray diffraction analysis (XRD), Scanning electron microscope (SEM) and Energy Dispersive x-ray spectroscopy (EDX). The results showed that the perovskite phase was started to form at much lower annealing temperature ($> 490^{\circ}\text{C}$) and the powder consists mainly of PbTiO_3 and minor $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$, and small amounts of unreacted zirconium oxide and lead oxide. PbTiO_3 gradually decreased and $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$ gradually increased with the increase of annealing temperature up to 900°C was $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$ the only detectable phase. Thermal analysis, XRD and EDX analysis indicated that perovskite phase was started to decompose at $> 950^{\circ}\text{C}$ due to the evaporation of lead.

KEYWORDS: Tartrate Precursor, Lead - Zirconium Titanate, PZT, Thermal Analysis, XRD, SEM, EDX