

Title : Phase Formation and Microstructural Analysis of ZnFeO Oxide System

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ABSTRACT

ZnO is a promising n-type thermoelectric material due to its relatively high-temperature stability and high figure of merit. However, its performance is limited by low electrical conductivity and high thermal conductivity. To address these limitations, this study has systematically investigated the dopant effects and found a possible combination of doping elements which may enhance thermoelectric performance of ZnO. Therefore, this project intends to focus on investigating the co-doped system of $Zn_{1-x-y}Fe_xSn_yO$ (ZFSO) composition. ZFSO powders and ceramics were synthesized by solid reaction, where $x = 0, 0.001, 0.002, 0.003, 0.004, 0.005$ mol fractions, and $y = 0.00, 0.01$ mol fractions. After being calcined at $800\text{ }^{\circ}\text{C}$ for 6 h and sintered at $900\text{ }^{\circ}\text{C}$ for 8 h in a normal atmosphere, all samples were characterized for phase and crystal structure using X-ray diffractometry (XRD). The microstructure and chemical composition were investigated by scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDS). The results were compared to those reported in literature and the quality was analyzed for further thermoelectric property determination.

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