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Development Thermoelectric Properties of Al-doped ZnO Materials for Thermoelectric Module and Power Generator

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The main objective of this work is to synthesized $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ thermoelectric materials for fabrication thermoelectric modules and invention thermoelectric generator. The $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ sample was prepared by a conventional solid state reaction method. The formation of structure was proved by X-ray diffraction and the thermoelectric properties were measured. The results showed that the $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ displayed thermoelectric materials and showed thermoelectric properties as higher than that of ZnO based. The $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ thermoelectric modules displayed the power output was increase with number of module, increase difference temperature and operating at high temperature. The $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ thermoelectric generator showed high performance for electric generator at high temperature. The sixteen $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ legs thermoelectric generator of this work produced electric power at 1.4 mW at 800 (when $T = 600\text{ }^{\circ}\text{C}$). The $\text{Zn}_{0.96}\text{Al}_{0.04}\text{O}$ materials can be applied for application of thermoelectric generator at high temperature.

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