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Thermoelectric properties of ZnO nanorods change via piezoelectric effect

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The recent researches revealed the influences of piezoelectric effect of ZnO on photo electrochemical and photoluminescence properties which induced by the change of the band gap. Due to the inseparable relation between thermoelectric properties and the electronic band structure, we consider piezoelectric effect can also change the thermoelectric properties. In this research, we determine the difference of the thermoelectric properties induced by the piezoelectric effect. First, synthesis ZnO nanorod arrays on copper substrate through the hydrothermal method. Next, measure the thermal electric properties such as seebeck coefficient, thermal conductivity and I-V characteristic. Then apply compressive and tensile stress to nanorod arrays by difference bending situations and find out how piezoelectric effect influence on thermoelectric properties. The results showed that when the temperature range is around 300K~400K, piezoelectric effect influences thermoelectric effect. Based on the results, we can think about the probability about the combination between piezoelectric effect and thermoelectric effect when we design thermoelectric devices and nanogenerators.

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