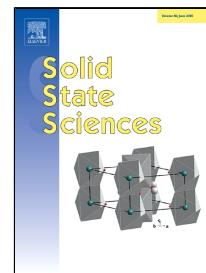


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Study of the effect of stress/strain of mesoporous Al-doped ZnO thin films on thermoelectric properties

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Abstract

In this study, effects of induced stress and strain on the thermoelectric properties of mesoporous ZnO thin films with various Al doping concentrations were investigated. With Al doping in ZnO structure, the hexagonal wurtzite structure of ZnO was distorted owing to an ionic size difference between Al and Zn. With an increase in Al concentration to 4 at%, thermal conductivity unexpectedly decreased from 1.70 to 1.24 W/mK owing to an increase in the tensile strain, and electrical conductivity increased from 4 S/cm to 15 S/cm owing to an increase in the carrier concentration. Based on this study, the relationship between the induced strain owing to lattice distortion and thermoelectric properties was investigated. Thus, 4 at% Al-doped mesoporous ZnO demonstrated best enhanced thermoelectric properties.

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