Mg2Si0.6Sn0.4 열전재료의 열전특성과 미세조직
Thermoelectric properties and microstructures of $Mg_2Si_{0.6}Sn_{0.4}$-based thermoelectric materials

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초 록

Thermoelectric materials can convert directly waste heat to electricity and vice versa. The improvement of the thermoelectric efficiency strongly depends on the dimensionless figure of merit, $ZT=S^2\sigma T/\kappa$, where S is the Seebeck coefficient, σ is the electrical conductivity, T is the absolute temperature, and κ is the thermal conductivity. The thermal conductivity consists of the electronic contribution (κ_e) and phonon contribution (κ_{ph}). It is very challenge to increase the power factor, $S^2\sigma$ and to reduce the thermal conductivity simultaneously because the power factor and electronic thermal conductivity are coupled. One strategy is to decrease the phonon thermal conductivity. The phonon thermal conductivity can be decreased by controlling the grain size and structural defects such as dislocations and twinning. In order to achieve enhancements in thermoelectric efficiency, microstructures that can form numerous interfaces have been investigated intensively for controlling the transport of charge carriers and heat carrying phonons. In this presentation, we report the heterogeneous microstructure of $Mg_2Si_{0.6}Sn_{0.4}$ thermoelectric materials and investigation of its influence on thermoelectric properties.