

High-Efficiency MgSn TE Material

$zT > 0.8$ with MgSn Thermoelectric Material

Overview

Thermoelectric (TE) materials, which have the ability to convert heat into electricity, play a significant role in the utilization and management of thermal energy. Mg₂Sn is a potential thermoelectric (TE) material that exhibits environmental compatibility since it is not-toxic and .not contains rare materials. However, as existing Mg₂Sn materials have low electric conductivity and high thermal conductivity, it results in low zT value.

This invention is related to Mg₂Sn material contains Sb and B as doping materials, and Mg vacancies with high Power Factor and low thermal conductivity, which contribute to improve zT value.

$zT > 0.8$ are achieved by our materials mentioned above.

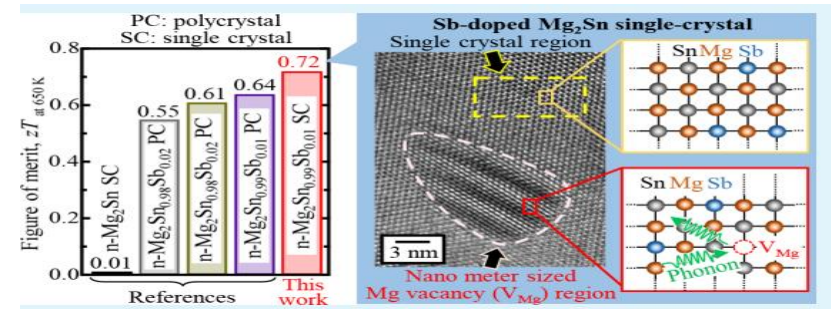
Product Application

- ❑ Thermoelectric Material
- ❑ Thermoelectric Module
- ❑ Thermal Co-Generaetion

IP Data

IP No. : JP Application No. 2021-023528
 Inventor : Wataru SAITO, Kei HAYASHI, Yuzuru MIYAZAKI
 Admin No. : T20-641

Features・Outstandings



Single Crystal	$\mu V/K$	σ (S/cm)	κ (W/Km)	PF ($10^{-3} \times W/K^2m$)	zT
Mg ₂ Sn	-49.1	403	4.69	0.0972	0.0135
Mg ₂ (Sn _{0.99} Sb _{0.01})	-171	1680	4.43	4.91	0.72
(Mg _{1.995} B _{0.005})(Sn _{0.99} Sb _{0.01})	-173	1250	2.98	3.74	0.81

Related Works

[1] W.Saito et al. Enhancing the Thermoelectric Performance of Mg₂Sn Single Crystals via Point Defect Engineering and Sb Doping, ACS Appl. Mater. Interfaces 2020, 12, 52, 57888–57897

Contact