Hirosaki Univ. Technology

Method for improving thermoelectric power of thermoelectric semiconductor

Improved thermoelectric power of semiconductors with simple processing

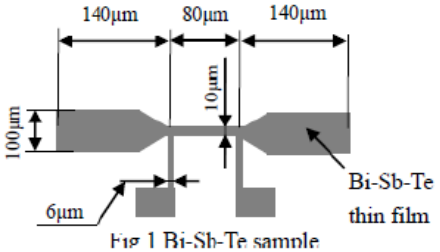


Fig 1 Bi-Sb-Te sample

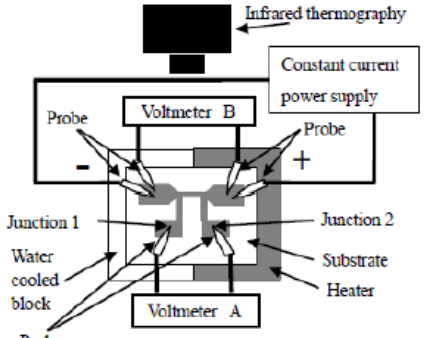


Fig.2 Experimental set-up

Overview

The thermoelectric effect has been applied in a wide range of fields such as thermoelectric power generation and thermoelectric cooling. However, high thermoelectric performance is required for industrial use, and research for the development of new thermoelectric materials is actively carried out.

The influence of the thermoelectric effect by electromigration (EM) has been studied in semiconductor thin films. It is also known that the stress state after the introduction of EM changes depending on the presence or absence of a protective film in metal wiring.

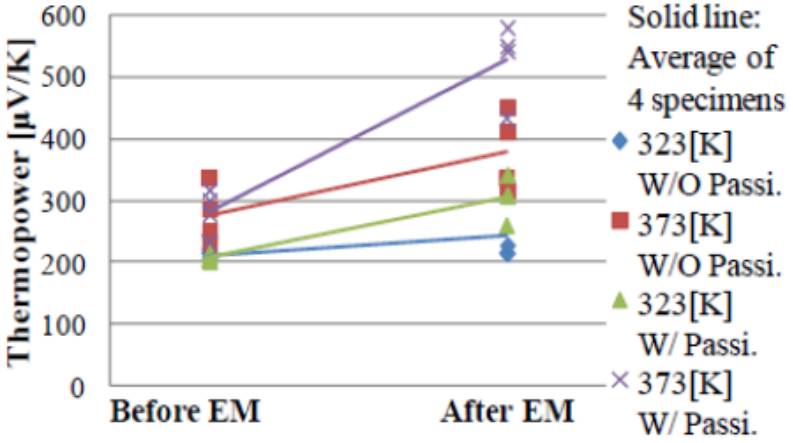
From the above findings, it was found that the thermoelectric performance is improved by introducing EM into metal wiring with a protective film. Metal atoms are moved by the introduction of EM, and by covering the metal wiring with a protective film and introducing EM, the stress distribution is generated inside the wiring, which enables the production of thermoelectric semiconductors with high thermoelectric performance.

Product Application

- Thermoelectric semiconductor material

Effect: Comparison of thermoelectric power before and after introduction of EM

Contact temperature between the extraction electrode and the voltmeter : 323K, 373K
With protective film : W/Passi.
Without protective film : W/Opassi.



"Contact temperature 373 K with protective film" improved thermoelectric power by 86% compared to before introduction of EM.

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