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Thermoelectrical devices based on bismuth-telluride thin films deposited by direct current magnetron sputtering process

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Highlights:

The voltage generated by the temperature difference of 36 K was 0.5 V.

The thermal sensitivity is 13.8 mV/K .

Ti is the most performant metal contact to reduce contact resistivity.

Abstract :

Thermoelectrical thin films based on doped bismuth telluride materials have been developed using direct current magnetron sputtering process.

Devices based on multiple thermocouples of n-type and p-type semiconducting Bi₂Te₃ materials processed by photolithographic patterning are presented. Configurations parallel to the substrate have been investigated. A maximum generated voltage of 0.5 V has been obtained using a thermal difference of 36 K for a device made of 35 n-p junctions.

Eventhough the output power with this in plane configuration is too low to envisage cooling or thermogeneration application, the feasibility of thermoelectrical devices based on thin films deposited by direct current magnetron sputtering is proved. The contact resistance of several

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