

(Bi₂Te₃)_{0.96}(Bi₂Se₃)_{0.04} crystal growth by zone melting method and the chemical composition variation study of the crystal in growth direction

M. A. Karami, L. Seyed Faraji, K. Ahmadi, G. Kavei*

Thermoelectric Lab, Semiconductor Device Fabrication Division, Material and Energy Research Center (MERC), Meshkin Dasht, Karaj, Iran, P.O. Box: 31787-316

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Abstract: The (Bi₂Te₃)_{0.96}(Bi₂Se₃)_{0.04} is an n-type thermoelectric semiconductor for using in thermoelectric cooling systems. Single crystal of this composition was grown by Zone Melting Method and thermoelectric power ($\alpha^2 \sigma$) along the crystal growth where α is the Seebeck coefficient and σ is the electrical conductivity was measured. In this measurement a gradient along length of the prepared crystalline ingot was observed. The structures were characterized by XRD system. The obtained results for compositional variation (Bi₂Se₃ distribution function) were in good agreement with tentative value of the thermoelectric power measured along the crystal growth. The experimental processes were analytically simulated. Simulation of the growth confirms that, Bi₂Se₃ concentration of Bi₂Te₃-Bi₂Se₃ quasi binary solid solution system was eminent.

Keywords: *thermoelectric semiconductor, crystal growth, thermoelectric power, quasi binary solid solution.*

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*Corresponding author, Tel.: +98 (0261) 6280038, Fax: +98 (0261) 6201888, E-mail: g-kavei@merc.ac.ir