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$(Bi_2Te_3)_{0.96}(Bi_2Se_3)_{0.04}$ crystal growth by zone melting method and the chemical composition variation study of the crystal in growth direction

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Abstract: The $(Bi_2Te_3)_{0.96}(Bi_2Se_3)_{0.04}$ 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 (Bi_2Se_3 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, Bi_2Se_3 concentration of Bi_2Te_3-Bi_2Se_3 quasi binary solid solution system was eminent.

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

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