Paper ID: 6761
student

40th STUDENT CONFERENCE (E2)
Student Conference I (1)

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PROSPECTIVE THERMOELECTRIC TELLURIDES

Abstract

Nowadays, we observe increasing interest in power supply technologies for space programs. The thermoelectricity is one of the candidates. Thermoelectric (TE) generators are used in deep space probes to supply spacecrafts with electricity for many years and can be also used as a source of energy for future planetary base. The results of the research on TE materials might be useful for construction of more efficient alternative power sources or coolers. In this work the TE materials based on tellurium compounds are examined for their potential usage in room temperature range (300K).

Synthesized materials (focused on ,,novel ternary telluride" comparing with Bi2Te3), were identified by XRD. After hot-pressing the samples were characterized by the measurement of Seebeck coefficient (thermopower), Hall coefficient and electrical and thermal conductivity with the aim to calculate so-called figure of merit ZT. This coefficient parameterizes the efficiency of thermoelectric devices.

The results of measurements of undoped ,,novel ternary telluride" show high Seebeck coefficient but rather low electrical conductivity. Thus the aim was to increase the conductivity and eventually develop TE material with higher efficiency then the state-of-the-art materials. In following step the original ,,home-made" Peltier element is going to be constructed from these materials and the conversion efficiency of this element is going to be measured.

This project has the significance in exploration of new TE materials, which can prospectively replace nowadays used materials based on tetradymite structure.