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Thermoelectric Properties of Nanostructured Bismuth Antimony Telluride with Different Alloy Compositions[1] ARASH MEHDIZADEH DEHKORDI, DARYOOSH VASHAEE, Oklahoma State University — We have investigated the thermoelectric (TE) properties of nanostructured (BixSb1-x)2Te3 alloys with different x values of 0.25,0.20,0.16, and 0.14. The nanostructured alloys were prepared via two different methods: mechanical alloying and melt alloying. In both methods we have started with pure elements and synthesized samples with different compositions. The materials prepared in both methods have undergone a consequent grinding process in order to make nanoscale crystallites. Powders were pressed into rod-like samples using a hot-press technique. We investigated the effect of different growth process parameters such as pressure, heating rate, and holding time on the TE material properties. Our results indicate that the melt alloying method is significantly less time-consuming in achieving the desired material composition and with higher compositional precision in comparison to the mechanical alloying approach. EDS and XRD analysis data show that the final composition of powders which were prepared by mechanical alloying deviates from the starting materials. Furthermore, melt alloying offers significant degrees of freedom to manipulate the composition of materials to optimize the TE properties.

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