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Bottom-Up Strategy for Thermoelectric Nanocomposites¹

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Thermoelectric (TE) materials that incorporate nano-scale domains offer potential control over electrical and thermal properties simultaneously. A bottom-up strategy may provide cost-effective, scalable, and reproducible processing of TE materials with improved TE properties above existing materials. The strategy involves composition and size controlled syntheses of TE materials as nanocrystals by employing facile solution based processes followed by densification into bulk nanocomposite pellets using Spark Plasma Sintering. In this talk an overview of the various solution phase synthesis processes for preparing nanocrystals of different TE materials will be presented. In addition the TE properties after SPS densification will be discussed in relation to composition and grain size within the nanocomposites. Experimental results will be assessed together with theoretical modeling in describing the effect of the nano-scale domains on the TE properties.

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