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Link between changes in *ZT* and microstructure in $AgSbTe_2$ PETER SHARMA, JOSHUA SUGAR, DOUGLAS MEDLIN, Sandia National Laboratories — The best thermoelectric alloys have complex microstructures. For example, the LAST alloys, $(AgSbTe_2)_{1-x}(PbTe)_x$, possess $ZT \sim 1.5$-2 but have a great variety of inclusions with different chemistry at different length scales. How does microstructure affect thermoelectric efficiency? Since the phase diagram of this and most quaternary alloys is poorly known, transport properties have not been systematically connected to microstructure. We are attacking this problem by studying the simple ternary alloy $AgSbTe_2$, a component of the LAST system, in order to show how thermoelectric transport changes with a known, controlled microstructure. $AgSbTe_2$ forms within the well-studied Ag_2Te-Sb_2Te_3 pseudobinary phase diagram. We have found that Sb-rich $AgSbTe_2$ is composed of Sb_2Te_3 precipitates embedded in a homogeneous rocksalt $Ag_{16}Sb_{30}Te_{54}$ matrix. The precipitates are plate-like and crystallographically aligned along their close packed planes parallel to that of the matrix. The size of these Sb_2Te_3 plates can be tuned from the nanometer to micron scale. In this work, the formation and growth of precipitates over a wide length scale is linked to changes in thermoelectric properties for the first time. This study is useful for understanding the complexity of LAST, or any bulk thermoelectric where second phase precipitation occurs.

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