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Enhancing thermoelectric properties of $FeSb_2$ by altering stoichiometry and nanostructure MANI POKHAREL, HUAIZHAU ZHAO, KEVIN LUKAS, ZHIFENG REN, CYRIL OPEIL, Boston College, BC TEAM — $FeSb_2$ is a strongly correlated semiconductor that has been shown to have an extraordinarily large Seebeck coefficient in single crystal samples. Bentien *et al.* report a Seebeck Coefficient of -45000 microV/K at 10K. The peak value of the dimensionless figure of merit (ZT_{max}) for single crystal samples is calculated to be approximately 0.005 at 10 K and is constrained by its relatively high thermal conductivity. In our previous studies, we find that nanocomposites (NC) tend to decrease thermal conductivity substantially by introducing phonon mismatches between crystal grains. Given that the Seebeck coefficient on the $FeSb_2$ system is quite sensitive to carrier concentration, we focus on the effects of stoichiometric changes that heighten thermoelectric properties of $FeSb_x$ where x=2.04, 2.00, 1.96, 1.92. By tuning the stoichiometry and using the nanocomposite method, the peak value of ZT_{max} was found to be 0.0123 at 43K. Carrier concentration and Hall-mobility measurements will also be discussed.

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