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Negative magnetoresistance and s-f scattering in $Pb_{1-x}Eu_xSe$[1]
SUNPHIL KIM, YIBIN GAO, BIN HE, Department of Mechanical and Aerospace Engineering, Ohio State University, Columbus, OH, GLORIA LEHR, Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, MI, YESEUL LEE, MERCOURI KANATZIDIS, Department of Chemistry, Northwestern University, Evanston, IL, DONALD MORELLI, Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, MI, JOSEPH P. HEREMANS, Department of Mechanical and Aerospace Engineering, Deaprtment of Physics, Ohio State University, Columbus, OH — PbSe is cost effective over PbTe and has been a good potential p-type thermoelectric material, showing zT >1.[2] Also, addition of Eu increases the band gap.[3] The valence band of $Pb_{1-x}Eu_xSe$ appears theoretically favorable generating degeneracy between L-points and Σ-points. Here, we synthesize and characterize p-type doped $Pb_{1-x}Eu_xSe$:Na using combination of co-melting and Spark Plasma Sintering methods. Thermoelectric, thermomagnetic, and galvanomagnetic properties (electrical resistivity, Seebeck, and Hall) are measured and reported, along with Magnetization and Magnetoresistance. We found out that magnetic scattering is dominant in $Pb_{1-x}Eu_xSe$, showing negative magnetoresistance.

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[2]Yeseul Lee et al., J. Am. Chem. Soc. 135, 2013, 5152-5160.
[3]Arnim Lambrecht et al., J. Cryst. Growth 108, 1991, 301-308.

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