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Electron and Phonon Transport in SnSe 2D Nanoplatelets FENGJIAO LIU, Department of Physics Astronomy, CNI, Clemson University, LONGYU HU, Department of Chemistry, Clemson University, RAHUL RAO, Air Force Research Laboratory, WPAFB, TAGHI DARROUDI, AMRL, Clemson, PING-CHUNG LEE, Institute of Physics, Academia Sinica, Taipei 11529, Taiwan, SRIPARNA BHATTACHARYA, CNI, Clemson University, YANG-YUAN CHEN, Institute of Physics, Academia Sinica, RAMAKRISHNA PODILA, APPARAO M. RAO, CNI and COMSET, Clemson University, CNI TEAM, AIR FORCE RESEARCH LABORATORY COLLABORATION, EM LABORATORY COLLABORATION, ACADEMIA SINICA TEAM — Bulk single crystalline SnSe is a new promising thermoelectric material with a remarkably low thermal conductivity(κ) at above phase transition temperature (973K). Although the origin of the intrinsically low κ of SnSe was previously attributed to strong anharmonicity in the chemical bonds, our recent work revealed that low density is another cause of the low κ of the reported SnSe single crystals (Nature 539 (7627), E1-E2). Two-dimensional (2D) SnSe single crystalline nanoplatelets (NPs) provide an excellent platform to probe the true anharmonic effects in SnSe, which still remain elusive. A comprehensive array of tools such as EDX, EBSD and micro-Raman spectroscopy were used for characterizing 2D SnSe NPs grown using chemical vapor deposition. SnSe NPs with A1g, B3g, A2g and A3g vibrational modes identified by Raman spectroscopy grow along [100] direction. High-temperature thermopower and electrical conductivity will be presented.

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