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Effect of Magnetic Doping on Electrical and Thermal Conductivities and Seebeck Coefficient of Suspended Bismuth Telluride Nanoplates
INSUN JO, Department of Physics, The University of Texas at Austin, Austin, TX78712, USA, MICHAEL THOMPSON PETTES, Department of Mechanical Engineering, The University of Texas at Austin, Austin, TX78712, ZHEN YAO, Department of Physics, The University of Texas at Austin, Austin, TX78712, USA, LI SHI, Department of Mechanical Engineering, The University of Texas at Austin, Austin, TX78712 — Bismuth telluride has been investigated intensively as a model system for topological insulators. In this work, we have studied electrical and thermal transport properties of suspended bismuth telluride nanoplates grown by the vapor-solid method. The thin crystals were transferred onto micro-fabricated suspended structures with built-in electrodes and thermometers, which allowed us to measure electrical (σ) and thermal (κ) conductivities as well as the Seebeck coefficient (S). The through-etched hole in the devices enabled us to evaporate Cr layers on both surfaces of the crystal. After H_2 annealing at 500 K, we measured enhanced σ, κ, and S values by 40, 10, and 20%, respectively. In comparison, H_2 annealing without Cr evaporation resulted in 10, 10, and -8% changes of σ, κ, and S values, respectively. The effect of magnetic doping by Cr will be discussed. Additionally, magneto-transport measurements were performed on the samples to resolve the transport properties of the surface states. We observed a pronounced weak antilocalization feature in undoped samples. Changes in this feature after Cr doping will be presented.

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