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Investigation of Thermoelectric Transport in Individual Bismuth Nanowires ARDEN MOORE, MICHAEL PETTES, ANASTASSIOS MAVROKEFALOS, LI SHI, University of Texas-Austin — Bismuth is a material of special interest for studying nanoscale transport behavior. Its extremely small effective mass and long electron mean free path suggest that quantum and classical confinement effects might be observed at realistic dimensions and higher temperatures than in other material systems. In addition, the predicted enhancement of the thermoelectric figure of merit ZT due to quantum confinement effects has only served to increase the desire to measure the transport properties of individual bismuth nanowires. However, efforts to measure the thermoelectric properties of bismuth nanowires have been hindered thus far by the presence of a highly stable surface oxide layer, making reliable ohmic contact to individual nanowires problematic. In this work, we present the synthesis and measurement methods used by our group to make electrical contact with individual nanowires in order to measure the thermal conductivity, thermopower, and electrical conductivity of individual bismuth nanowires of varying diameter. The obtained data is presented with comparison to bulk values and analysis of the transport behavior.

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