The Effect of a Distinct Diameter Variation on the Thermoelectric Properties of Individual $Bi_{0.39}Te_{0.61}$ Nanowires

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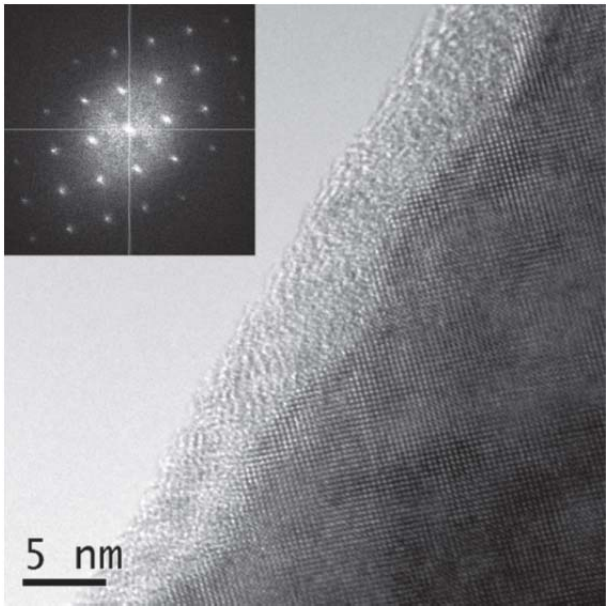
Highlight Article

Short Abstract

The reduction of the thermal conductivity induced by nano-patterning is one of the major approaches for tailoring thermoelectric material properties. Here, we chose two individual bismuth telluride nanowires (NWs), one with a strong diameter variation (NW1) and the other with smooth sidewalls (NW2). We investigated the role of the diameter variation by means of a combined full-thermoelectrical, structural and chemical characterisation on single nanowires. The electrical conductivity of both NWs exceeds the bulk value indicating the presence of a topological surface state. The thermal conductivity of NW2 compares to the bulk, while NW1 is about half that of NW2.



Above. HRTEM micrograph of the smooth NW side and the amorphous shell of varying thickness of about (5 ± 1) nm. The inset shows a power spectrum of the NW core.