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A modified high-resolution TEM for thermoelectric properties measurements of nanowires and nanotubes C. DAMES, C. T. HARRIS, Mechanical Engineering, MIT, S. CHEN, J. Y. HUANG, Z. F. REN, Physics, Boston College, M. S. DRESSELHAUS, Physics and EECS, MIT, G. CHEN, Mechanical Engineering, MIT — Nanowires are interesting candidates for thermoelectric applications because of their potentially low thermal conductivity and high Seebeck coefficient. However, measurements at the single-wire level are challenging and tend to lack detailed information about the atomic-level structure of the sample and contacts. We are modifying a high-resolution transmission electron microscope (HRTEM) with integrated scanning tunneling microscope (STM) for in-situ measurements of thermoelectric properties. A slender Wollaston wire is used to make electrical and thermal contact to the free end of a single nanowire or nanotube. The electrical conductance of the sample can be measured with the usual STM mode of operation. The Seebeck coefficient of the sample can be extracted from the transient voltage response to a step change in the joule heating of the Wollaston wire. These measurements are combined with detailed HRTEM observations.

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