Nanometrology: Absolute Seebeck coefficient of individual silver nanowires

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Short Abstract

A method to determine unambiguously the absolute Seebeck coefficient of individual metallic nanowires and its application to single silver nanowires is presented. Both the thermodiffusion and phonon drag contributions to the absolute Seebeck coefficient of single crystalline silver nanowires are reduced compared to bulk silver. In particular, the thermodiffusion part is reduced more than the phonon drag part, which can be attributed to size effects like surface scattering, leading to an electron mean free path comparable to the nanowire diameter. Knowledge of the absolute Seebeck coefficient by design of nanopatterned metallic interconnects is important for low-noise applications.
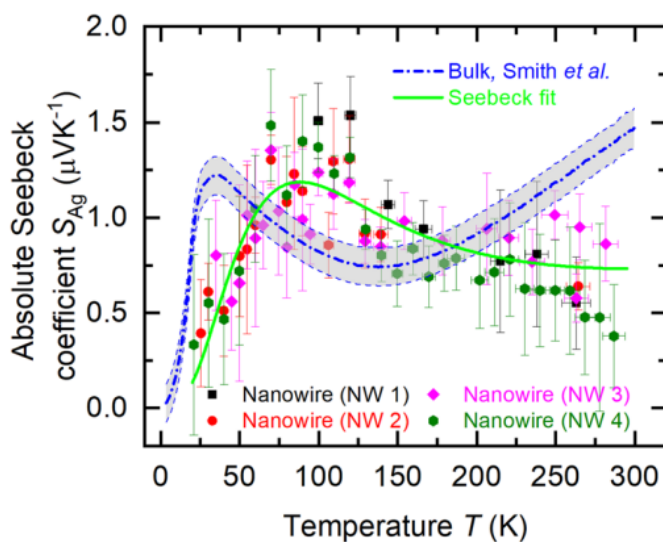
Above. Absolute Seebeck coefficient of four individual silver nanowires versus bath temperature T. The thick dashed blue line indicates the absolute Seebeck coefficient of bulk silver. The solid green line depicts the temperature-dependent fit of the absolute Seebeck coefficient of the silver nanowires.