

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Low-temperature

thermal conductance in nanostructures NAOAKI KONDO, Tokyo University of Science, CREST-JST, TAKAHIRO YAMAMOTO, Tokyo University of Science, CREST-JST, KAZUAKI MII, Tokyo University of Science, KAZUYUKI WATANABE, Tokyo University of Science, CREST-JST — Controlling thermal transport as well as electronic transport is a key issue for modelling nano-sized electrical devices. In contrast to a number of studies on the electronic transport properties at room temperature, only a few works have been done about low-temperature (low- T) properties of thermal transport thus far. We study low- T thermal transport in one-dimensional (1D) nanostructures, such as carbon nanotubes, graphitic ribbons, and metallic nanowires, by using Landauer formula of heat transport. Three major findings in this study are the following. (1) Thermal conductances in the present nanostructures are quantized and have the form of $n \times \pi^2 k_B^2 T / 3h$ at low- T , where n is the number of excited phonon mode depending on the structural geometry. (2) The temperature range where the quantization is observable is unexpectedly large for metallic nanowires. (3) Interestingly, phonon modes highly localized at open edges contribute to the quantized thermal conductance in graphitic ribbons.

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Date submitted: 01 Dec 2004

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