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Electric Field Modulation of Thermoelectric Transport in Carbon Nanotubes and Graphene in the Quantum Transport Limit YURI M. ZUEV, Applied Physics Department, Columbia University, PHILIP KIM, Physics Department, Columbia University — Mesoscopic thermoelectric power (TEP) measurements of nanometer scaled graphitic systems such as single walled carbon nanotubes (SWNTs) and graphene are reported. Highly transparent electrical contact was made to SWNTs using Pd electrodes. TEP was measured in-situ using a micro-fabricated heater and thermometers. Electrical conduction and TEP were observed at low temperature where both quantities were modulated by the gate voltage. At low temperatures, coherent quantum electric transport was observed as the conductance displayed oscillatory Fabry-Perot type interference. Simultaneously measured TEP provided corresponding oscillatory features. Deviations of the low temperature TEP gate dependence from the semiclassical Mott relation allows us to gain insight into the quantum transport regime in this one dimensional conductor. We compare these results with TEP measurements of the two dimensional graphitic conductor, graphene.

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