Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Tuning Thermoelectric Properties of Chirality Selected Single Wall Carbon Nanotubes KAZUHIRO YANAGI, YUKI OSHIMA, YOSHIMASA KITAMURA, YUTAKA MANIWA, Dept. of Physics, Tokyo Metropolitan University — Thermoelectrics are a very important technology for efficiently converting waste heat into electric power. Hicks and Dresselhaus proposed an important approach to innovate the performance of thermoelectric devices, which involves using one-dimensional materials and properly tuning their Fermi level (PRB 1993). Therefore, understanding the relationship between the thermoelectric performance and the Fermi level of one-dimensional materials is of great importance to maximize their thermoelectric performance. Single wall carbon nanotube (SWCNT) is an ideal model for one-dimensional materials. Previously we reported continuous p-type and n-type control over the Seebeck coefficients of semiconducting SWCNT networks with diameter of 1.4 nm through an electric double layer transistor setup using an ionic liquid as the electrolyte (Yanagi et al, Nano Lett. 14, 6437 2014). We clarified the thermoelectric properties of semiconducting SWCNTs with diameter of 1.4 nm as a function of Fermi level. In this study, we investigated how the chiralities or electronic structures of SWCNTs influence on the thermoelectric properties. We found the significant difference in the line-shape of Seebeck coefficient as a function of gate voltage between the different electronic structures of SWCNTs.

Kazuhiro Yanagi
Dept. of Physics, Tokyo Metropolitan University

Date submitted: 06 Nov 2015 Electronic form version 1.4