Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

Selective Encapsulation of Heterogeneous Fullerene Ions Into Single-Walled Carbon Nanotubes[1] TOSHIRO KANEKO, YOHEI HANABUSA, TAKATSUGU NAGAI, RIKIZO HATAKEYAMA, Department of Electronic Engineering, Tohoku University — A plasma consisting of ionic heterogeneous fullerenes such as C_{60} negative ions and lithium endohedral fullerene positive ions ($Li@C_{60}$) is generated by means of an electron beam impact to a sublimated $Li@C_{60}/C_{60}$ composite. These C_{60} negative ions and $Li@C_{60}$ positive ions are selectively irradiated and encapsulated in single-walled carbon nanotubes (SWNTs) put on a substrate which is positively and negatively biased, respectively. It is found that the amount of $Li@C_{60}$ irradiation to SWNTs depends on the energy of the electron beam E_e which ionizes the $Li@C_{60}$, and has the maximum for $E_e \sim 200$ eV. The electrical transport properties of the C_{60} and $Li@C_{60}$ encapsulated SWNTs are investigated by fabricating them as the channels of field-effect transistor devices. The C_{60} encapsulated SWNTs show the p-type electrical transport property. On the other hand, the $Li@C_{60}$ encapsulated SWNTs exhibit the ambipolar conduction or the n-type property. This result indicates that the electrical properties of the SWNTs can be controlled by the kinds of encapsulated fullerenes.

[1]This work was supported by a Grant-in-Aid for Scientific Research from the Ministry of Education, Culture, Sports, Science and Technology, Japan.

Toshiro Kaneko
Department of Electronic Engineering, Tohoku University

Date submitted: 10 Jun 2009 Electronic form version 1.4