Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Effects of Fluorine Termination of Carbon Nanowall Edges on Their Electrical Properties by Ar/NO/F_2 Mixture Gas Treatments
HYUNG JUN CHO, SATOMI TAJIMA, KEIGO TAKEDA, HIROKI KONDO, KENJI ISHIKAWA, MAKOTO SEKINE, Graduate school of engineering, Nagoya University, MINEO HIRAMATSU, Faculty of Science and Technology, Meijo University, MASARU HORI, Institute of innovation for future society research and development center of human and mobility society, Nagoya University — Carbon nanowalls (CNWs) are one of graphene materials. They consist of multiple graphene sheets grown vertically on the substrate and form a maze-like wall structures. Therefore, a chemical termination of high-density graphene edges on the top regions is essential to control their unique properties. In this study, irradiation effects of fluorine (F) atoms generated using Ar/NO/F_2 gas mixture on changes in chemical bonding structure, crystallinity, and electrical properties of the CNWs, fabricated by a radical injection-plasma enhanced CVD (RI-PECVD) system, were investigated. In the Raman spectra, decrease in relative intensity of D-band peak was found after the Ar/NO/F_2 treatment, which indicates crystallinity improvement of CNWs. According to XPS, F incorporation into the CNWs and formation of related C-F bonds obviously occurred. As the exposure temperature increased, both the F contents in the CNWs and crystallinity improvements were enhanced. Furthermore, the higher electrical conductivities were obtained after the Ar/NO/F_2 gas treatment at a higher temperature. We demonstrated that the electrical properties could be controlled by the F termination of the graphene edges without degradation of the crystallinity.

Hyung Jun Cho
Graduate school of engineering, Nagoya University

Date submitted: 19 Jun 2015 Electronic form version 1.4