Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Structural modification of boron nitride nanotubes by plasma irradiation TAKASHI IKUNO, GAVI BEGTRUP, SHAUL ALONI, ANDRAS KIS, DAVID OKAWA, ALEX ZETTL, UC Berkeley, Lawrence Berkeley National Laboratory — Boron nitride (BN) and boron-carbon-nitride (B-C-N) nanotubes (NTs) are candidates for potential nanosized electronic and optical devices due to extraordinary physical and chemical properties. In terms of electronic property, in contrast to the insulating BNNTs with about 5.5 eV band gap, ternary B-C-N NTs has semiconducting property, the band gap of which is primarily determined by their chemical compositions. Although one of the methods to make B-C-N NTs is C doping to BNNTs, it is difficult to modify the structure and composition of BNNTs due to its chemical inertness and strong sp2 bond. In this study, we performed to modify the structure and composition of BNNTs by plasma irradiation for synthesizing B-C-N NTs. Hydrocarbon plasma was utilized for structural modification of BNNTs. The structural properties and the composition were characterized by high-resolution transmission electron microscopy and electron energy loss spectroscopy. After the plasma irradiation, outer several BN layers were modified to wavy structure from straight shape, and the defects were observed in almost BN layers, indicating destruction of crystal structure by collision of energetic particles in plasma and BNNTs. There are 5 – 30 at% of C in BNNTs and C atoms were inhomogeneously distributed in B-C-N NTs. The electron transport property of the modified B-C-N NTs will be reported in our presentation.

Takashi Ikuno
UC Berkeley

Date submitted: 30 Nov 2005 Electronic form version 1.4