

Abstract Submitted
for the GEC06 Meeting of
The American Physical Society

Deposition of vertically oriented single-walled carbon nanotubes in highly collisional atmospheric pressure plasma KUMA OHNISHI, Dept of Mechanical and Control Engineering, Tokyo Institute of Technology, TOMOHIRO NOZAKI, KEN OKAZAKI, JOACHIM HEBERLEIN, Dept of Mechanical Engineering, The University of Minnesota, UWE KORTSHAGEN — We succeeded synthesis of vertically aligned single-walled carbon nanotubes (SWNTs) in atmospheric pressure radio frequency discharge (APRFD). This is because ion bombardment to the substrate, which causes cohesion or diffusion of catalyst nano-particles as well as growing SWNTs, can be minimized in highly collisional plasma sheath at atmospheric pressure. In this process (Carbon source; CH₄, Wafer temperature; 700°C), it is essential for growth of SWNTs to supply radicals produced by plasma. Higher power supply causes higher growth rate. However, maximum power input was limited to 80 W because of the stability of the plasma. The higher substrate temperature up to 700°C means better yield (G band / D band) of SWNTs, and causes faster growth rate. The catalyst particles maintained their activities at least 20 minutes and the initial growth rate of SWNTs was about 4.0 μ/min at the condition of 60 W. The catalysts lost their activities, not because of the damage caused by plasma but because of the thermal sintering which was caused by high temperature like 700°C.

Kuma Ohnishi
Dept of Mechanical and Control Engineering, Tokyo Institute of Technology

Date submitted: 12 Jun 2006

Electronic form version 1.4