

Abstract Submitted  
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**Formation of Nanosize-Needle and Nanosize-Cauliflower on Carbon Surface with Cold Plasma and its Applications** MASAOKI KATOH, TAKASHI KANO, ATSUSHI SUZUKI, MICHIIYA OTA, TAKEO OHTE, Gunma National College of Technology, EIICHI YASUDA, Tokyo Institute of Technology Nanofiber Strategic Research Initiative — By oxygen plasma treatment of glass-like carbon, nano-sized needle-shaped structure (carbon nano needles) was formed on GC surface placed at power-electrode connected to high-frequency power source through matching circuit. On the other hand, nano-sized cauliflower-shaped structure was formed on GC surface connected to earth-electrode. This difference of formation between power-electrode and earth-electrode is whether or not self-bias voltage is generated by. In case of self-bias voltage generation, oxygen ions play an important role in formation the carbon nano needles. On the contrary, no self-bias voltage generation, radicals play an important role in formation the carbon nano cauliflowers. From the experimental results, length of needles shortens from 3.6 to 2.5 [ $\mu\text{m}$ ] and diameter of them get thin from 120 to 43 [nm] when treatment pressure was increasing from 9.31 to 66.5 [Pa]. Length of needles lengthen from 0.30 to 3.5 [ $\mu\text{m}$ ] and diameter of them get thin from 120 to 70 [nm] when treatment power increasing from 30 to 200 [W]. Field-emission (FE) measurements showed that the carbon nano needles were excellent electron field emitters which indicate that the carbon nano needles are employed as field emitters.

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