

TITLE

Nitrogen plasma treatment effect on graphene sheathed vertically aligned carbon nanofibers

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We report the optical and structural properties of nitrogenated Cylinder -shape carbon nanofibers prepared by DC plasma CVD system at low deposition temperature. Cylinder-shape graphene sheathed vertically aligned carbon nanofibers (V-CNFs) with metal tips have been synthesized by DC plasma chemical vapor deposition using CH_4 and H_2 gases at room temperature. For nitrogen plasma treatment, we used nitrogen (N_2) 20 sccm by using microwave surface wave plasma. During the experiment microwave power was fixed at 500 W and chamber vacuum pressure is fixed about 8×10^{-4} Pa. The pulse frequency was fixed at 500 Hz and duty was fixed at 50%. The nanofibers grown on Ni-coated Cu substrates were studied by scanning electron microscopy, high-resolution transmission electron microscopy, XPS and Raman measurements. The CNF's are composed of cylindrical pure graphite sheets, and have nanometer-sized tips and roots. The nitrogen plasma treatment affects causes nitrogen chemical etching on the graphene sheathed carbon nanofibers. N_2 -plasma treatment effect on graphene sheathed carbon nanofibers also found with unique composition of multiwall graphitic latic with N_2 groups.

Accordingly, (HR-TEM) images of nitrogen plasma treated and non-treated CNFs exhibit similar fibril morphology with 20-40 nm diameters and $> 5 \mu\text{m}$ length. Suitable structural difference are found between nitrogen plasma treated and non-treated CNFs. Disruptions and irregular curve in graphene stacking in N-plasma treated CNFs contain more dislocations and discursions in the graphene stacking (turbo static disorder). It is due to the propensity of incorporated nitrogen to form pentagonal defects in the graphene sheets. The detailed of all the experimental results and complete analysis will be presented during the presentation.

Biography

Dr. Dilip Chandra Ghimire , Research Professor in Chubu University Aichi Japan and PhD from Florida USA and conducting postdoctoral studies in Chubu University School of Electrical and Electronics Engineering. He has published more than 25 papers in reputed journals.