Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Surface Modification of PAN-based Carbon Fiber Using Single and Dual High Frequency RF-PECVD DEMIRAL AKBAR, Karatekin University of Cankiri, Dep. of Physics, 18100, Cankiri, Turkey, UMMUGUL E. GUNGOR, SINAN BILIKMEN, Middle East Technical University, Dep. Of Physics, 06800, Ankara, Turkey — In this work the effects of the pure nitrogen gas plasma on PAN (Polyacrylonitrile) based carbon fiber surfaces are described. The fiber has been treated by using high frequency capacitively coupled single and dual RF-PECVD systems under different processing conditions; exposure times, RF powers and nitrogen gas pressures. Raman spectroscopy technique is used to characterize the surface structure of the fiber before and after the plasma treatment. It was found that the tensile strain increased when the pressure increased from 0.5 to 0.75 Torr in a single RF CCP system. In case of dual RF CCP with a low power discharge; 50 - 50 W and 30 minute processing time, there will be a compressive strain at a pressure of 0.9 Torr. In contrast, the amount of tensile strain decreases with increasing HF-RF (40.68 MHz) power at constant LF (2.1 MHz) power. Thus, by calculating the surface crystalline size according to intensity ratio of D (1340 cm^{-1}) and G (1577 cm^{-1}) bands, ID / IG, in the first order region, the crystallization of the carbon fiber has been demonstrated. In addition, the increase in the intensity ratio shows that the plasma treatment process causes more disorder surface structure as compared with the untreated one until the crystallization takes place.

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Date submitted: 22 Jul 2011 Electronic form version 1.4