

Seminar

Institute for Plasma Research

Title : Carbon nanotubes influencing ampacity enhancement of graphite by virtue of significant improvement in electrical conductivity in arc plasma treated graphite disk

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Date : 14th June 2017 (Wednesday)

Time : 03.30 PM

Venue : Seminar Hall, IPR

Abstract :

Circular graphite disc samples have been treated by arc plasma (Ar) under varying experimental conditions. Analyses of these plasma treated discs by transmission electron microscopes reveal the growth of carbon nanotubes on the disc surfaces. Bunches/bundles of carbon nanotubes grow in situ on and around the discs. Characterizations of treated and untreated discs have been carried out with x-ray diffraction, micro raman spectroscopy, x-ray photoelectron spectroscopy, scanning electron microscopy, scanning electron microscopy, transmission electron microscopy and energy dispersive spectra of x-ray. The electrical resistivity measurements have been done with four probes. In comparison, the conductivity values for graphite with the values (for multi wall carbon nanotubes) of that shown in Ashby plot (conductivity vs ampacity), the ampacity is found to be significantly increased (up to 104 times) with arc plasma treatment. The ampacity enhancement is attributed to the contribution of the carbon nanotubes grown on graphite discs surface by arc plasma treatment. This piece of work shows a simple technique to experimentally ascertain the large current carrying capacity of the carbon nanotubes. The magnetic field on the surface of a typical six nanometer diameter carbon nanotube is estimated to be in excess of 500 G (using the experimental data). These works are possible prelude to micro and nano sensors of future.
