Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

In situ analysis of formation of carbon nanostructures in arc discharge by optical spectrometry JIAN LI, GEORGE HWANGBO, ALEXEY SHASHURIN, MICHAEL KEIDAR, Department of Mechanical and Aerospace Engineering, The George Washington University — Arc discharge supported by the erosion of anode materials is one of the most practical and efficient methods to synthesize various high-quality carbon nanostructures due to its relatively high growth temperature. By introducing a non-uniform magnetic field with the component normal to arc current, graphene flakes and single-walled carbon nanotubes can be synthesized in one step. In contrast to the growth processes without magnetic field, the magnetically-enhanced arc is confined by the Lorentz force, which generates the plasma jet and makes effective delivery of carbon particles and heat flux. However, there are still unresolved questions concerning the location of the region of nanoparticle synthesis and growth steps of carbon nanostructures. In this work we carried out in situ analysis of the optical spectrum which can provide a unique investigation of the different transformation processes of the carbon and metal catalyst vapors generated from the vaporization of the anode in arc. The experiments were taken for various electrode gaps and different conditions of external magnetic field. Moreover, SEM, TEM, EDX and Raman spectroscopy were employed to characterize the properties of carbon nanotubes and graphene.

Jian Li
Department of Mechanical and Aerospace Engineering,
The George Washington University

Date submitted: 20 Jul 2011 Electronic form version 1.4