Abstract Submitted for the DPP16 Meeting of The American Physical Society

The layered structure of the carbon arc discharge plasma.¹ VLADISLAV VEKSELMAN, BRENTLEY STRATTON, YEVGENY RAITSES, Princeton Plasma Phys Lab, LABORATORY FOR PLASMA NANOSYNTHESIS TEAM — The arc discharge with a consumed anode is commonly used for synthesis of nanomaterials such as fullerenes, nanotubes [1] and, more recently, graphene [2]. The role of the arc plasma in nanosynthesis processes, including ablation of the graphite anode, nucleation and growth of nanostructures remains unclear. Our recent fast frame camera measurements revealed arc oscillations associated with the ablation processes at the anode. More sophisticated measurements using optical emission spectroscopy and spectrally resolved fast framing imaging revealed the complex, layered structure of plasma species distribution, which is dynamically changing. The results of this research include time- and space- resolved distributions of plasma species, plasma electron density and temperature. The obtained experimental data suggest a strong correlation between arc plasma parameters and nanosynthesis processes. [1] S. Iijima, Helical Microtubules of Graphitic Carbon, Nature 354, 56 (1991). [2] A. Shashurin and M. Keidar, Synthesis of 2D materials in arc plasmas, J Phys D Appl Phys 48 (2015).

¹This work was supported by US Department of Energy, Office of Science, Basic Energy Sciences, Materials Sciences and Engineering Division

Vladislav Vekselman Princeton Plasma Phys Lab

Date submitted: 15 Jul 2016

Electronic form version 1.4