Abstract Submitted
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Spectroscopic studies of plasma in a carbon arc discharge for synthesis of nanomaterials[1] VLADISLAV VEKSELMAN, Princeton Plasma Physics Laboratory, MATTHEW FEURER, Seton Hall University, YAO-WEN YEH, BRENTLEY STRATTON, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, LABORATORY FOR PLASMA NANOSYNTHESIS TEAM — An atmospheric pressure arc discharge with graphite electrodes is commonly used for synthesis of carbon nanomaterials such as buckyballs, nanotubes and graphene. In operation, the graphite anode ablates providing a feedstock material for synthesis these carbon nanostructures. Existing models [1] predict that nucleation and growth of these nanomaterials in an arc discharge are governed by spatial distributions of density and temperature of plasma species. Control of these distributions can potentially enable optimization of nanosynthesis processes, to achieve the best combination of synthesis selectivity at the synthesis yield. In this work, we report first detail measurements of spatial distribution of arc plasma parameters obtained with a set of in-situ diagnostics, including optical emission spectroscopy and fast framing imaging. These parameters were measured in low- and high- anode ablation modes [2]. Results of these measurements demonstrate a strong correlation between arc plasma and synthesis processes. [1] M. Keidar, A. Shashurin, O. Volotskova, Y. Raitses, and I. I. Beilis, Phys Plasmas 17, 057101 (2010). [2[J. Ng and Y. Raitses, J Appl Phys 117 (2015).

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