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Electron Temperature of the Arc Discharge for Nanomaterial Synthesis[1] MATTHEW FEURER, VLADISLAV VEKSELMAN, BRENTLEY STARTTON, YEVGENY RAITSES, Princeton Plasma Phys Lab, LABORATORY FOR PLASMA NANOSYNTHESIS TEAM — Since the discovery of different allotropes of carbon in the twentieth century many uses have been found for carbon based nanomaterials such as buckyballs, nanotubes (CNTs), and graphene. An atmospheric pressure arc discharge with graphite electrodes is a promising technique for producing large volumes of these carbon nanostructures. Plasma drives the synthesis providing carbon feedstock by anode ablation and sustaining required composition and temperature of nanomaterial species, as such it is important to characterize the plasma used in this process in order to control the quality and attributes of the resulting carbon nanostructures. In work we present detailed in-situ measurements of spatial distribution of arc plasma parameters obtained with optical emission spectroscopy (OES) diagnostics. The plasma temperature has been determined using Boltzmann diagram method with collisional radiative modeling due to plasma deviation from complete local thermodynamic equilibrium (LTE). Results of these measurements demonstrate a strong correlation between arc plasma and synthesis processes.

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