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**Integrated Plasma Modeling of High-Pressure Arc.** IGOR KAGANOVICH, ALEXANDER KHRABRY, JIAN CHEN, ANDREI KHODAK[1], Princeton Plasma Physics Laboratory — In order to understand nanomaterial synthesis in carbon arc, we performed atomistic simulations, thermodynamic and fluid dynamics (CFD) modeling of complex processes occurring in the arc. We performed validated arc modeling to predict how the arc can provide feedstock for nanomaterial synthesis. A complicated setup was implemented into ANSYS and included many complex effects: radiation, sheath boundary conditions near emitting electrodes, ablation/deposition of carbon on electrodes, and coupling of the thermal transport through electrodes. In addition, we developed several analytic models for key phenomena: 1) nonlinear dependence of the ablation rate as a function of arc current and interelectrode gap, 2) anode spot formation, in which the arc channel is constricted near anode, 3) radial narrow arc jet emanated from the arc.

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