

Abstract Submitted
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Kinetics of charged particles and nonlocal control of plasma properties in a pulsed rf icp in argon-oxygen mixtures¹ J.C. BLESSINGTON, V.I. DEMIDOV, M.E. KOEPKE, WVU, Morgantown, WV, C.A. DEJOSEPH, JR., Air Force Research Laboratory, WPAFB, OH — Previously [1], we showed that a simple, three-level model could explain the rapid growth of charge particles following application of rf power to a noble gas. In this work we show experimentally that addition of a small amount of oxygen can significantly reduce the rate of growth of charged particle density, indicating the simple three-level model is no longer applicable. Even in this case, the positive ion density (measured by probes) reaches a stationary value much faster than the atomic oxygen density (estimated from plasma emission). Thus, by changing the duration of the rf pulse, the ratio of fast electron production, by the reaction $O + O^- \rightarrow O_2 + e$ (3.6 eV), compared to the ambipolar flux of positive ions to the discharge walls, can be controlled. This effect can be used for nonlocal regulation of plasma properties [2].

[1] V. I. Demidov, C. A. DeJoseph, Jr. et al, PSST, 2004, 13, 600.

[2] C. A. DeJoseph, Jr. et al, Phys. Plasmas, 2007, 14, 057101.

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