Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Modeling of electron beam-generated plasmas produced in Ar/N2 mixtures[1] TZVETELINA PETROVA, EVGENIA LOCK, GEORGE PETROV, DAVID BORIS, RICHARD FERNSLER, SCOTT WALTON, Naval Research Lasboratory — We discuss a non-equilibrium collisional-radiative model coupled with electron kinetics developed to study the population dynamics in electron beam-generated plasmas produced in low pressure Ar/N_2 mixtures. Generally, these plasmas are characterized by low electron temperatures (1 eV), low plasma potentials, and plasma densities in the range 10^9-10^{11} cm^{-3}. We have shown both experimentally[2] and theoretically[3] that small admixtures of nitrogen to argon leads to changes in the electron energy distribution function (EEDF) resulting in a lowering of the electron temperature from 1.0 to 0.4 eV. The modeling results show that these changes strongly impact the production of argon excited states via changes in the collisional excitation rates. The contribution of different production and destruction mechanisms of 1s and 2p argon excited states is discussed in detail. The results of the modeling are compared with the experimentally measured EEDF, electron temperature, and the optical emission spectra in 700-850 nm range.

[1]Work supported by NRL Base 6.1. Program.
[2]D. R. Boris, G. M. Petrov, E. H. Lock, Tz. B. Petrova, R. F. Fernsler, and S. G. Walton, Plasma Sources Sci. Technol. 22 (2013) 065004.
[3]G. M. Petrov, D. R. Boris, Tz. B. Petrova, E. H. Lock, R. F. Fernsler, and S. G. Walton, Plasma Sources Sci. Technol. 22 (2013) 065005.

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Date submitted: 13 Jun 2014 Electronic form version 1.4