Modelingof Optical Emission Spectroscopy for low temperature Argon plasma

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Acollisional-radiative (CR) model has been used as a critical tool for theanalysis of optically measured spectra from a low-temperature plasma. NOMAD isa time-dependent collisional-radiative code that provides spectroscopicdiagnostics modeling of non-equilibrium plasma. In this study, we use NOMAD tointerpret measured spectra from a low temperature weakly ionized argon plasmacontaining mostly neutral atoms. The CR model considers electron collisionalionization and excitation, collisional de-excitation, radiational decay,radiational recombination and 3 body-recombination. The model includes 426 ofAr I and 419 of Ar II energy states provided by the NIST Database. For electroncollisional excitation, the reaction to all energy levels is considered. Electron-impactexcitation cross-sections of argon I ground state, 4s, 4p, 3d, 5s state set aretaken from BSR-500 data set and those of 5p state set from NGFSRDW data set inthe LXCat database. For other states, van Regemorter-Seaton formula is applied.Radiation transition probabilities are also taken from NIST database forspectroscopically accurate calculations. In this work, we present argon opticalspectra calculated in the temperature range of 3eV to 5eV and electron densityrange of $10^{10}m^{-3}$ to $10^{11}m^{-3}$, whichare characteristic plasma conditions of capacitive coupled produced plasmas.The effect of a non-Maxwellian electron energy distribution function on opticalspectra in the wavelength region from 350nm to 750nm will be investigated.