OPTICAL EMISSION SPECTROSCOPY MEASUREMENTS OF ELECTRON BEAM-GENERATED PLASMA IN ARGON, NITROGEN AND THEIR MIXTURES*

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The NRL electron beam-generated plasma source uses magnetically collimated sheet-like beam of high energy electrons to ionize the gas, providing control over critical plasma parameters including plasma density, ionization region, electron temperature, ion and radical fluxes. Perhaps, the most important advantages of the system are its inherently low electron temperature, typically below 1 eV, resulting in very low incident ion kinetic energies at adjacent surfaces, thereby providing unique opportunities in the processing of ion energy-sensitive materials, e.g. polymers and graphene. However, there remain many unresolved questions regarding the mechanisms of surface modifications induced by electron beam-generated plasmas, most notably, the influence of excited species. In this work, we apply optical emission spectroscopy in order to understand the spatial and temporal distribution of excited species in pure argon, nitrogen and their mixtures.

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