Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Spectroscopic diagnostics of Ar atmospheric-pressure plasmas using optical emission spectroscopy and collisional-radiative modelin R. GANGWAR, V. DUMONT, L. STAFFORD, Universite de Montreal, Montreal (Canada), UNIVERSITE DE MONTREAL, MONTREAL (CANADA) TEAM — Recently, we have studied the physics driving atmospheric-pressure, dielectric barrier discharges applied to the functionalization of wood substrates. In this context, a collisional-radiative (CR) model was developed to describe the evolution of the optical emission spectra and thus to analyze the evolution of the average electron energy in presence of wood outgassing. In this work, a similar approach is used to describe atmospheric-pressure Ar plasmas sustained by either the propagation of a 915 MHz electromagnetic surface wave or controlled by dielectric barrier. In both systems, the measured $2p_{\mathrm{x}} \rightarrow 1s_{\mathrm{y}}$ line intensities in the 500-900 nm range were compared to those predicted by the model accounting for direct excitation, stepwise excitation, energy transfer processes, radiation trapping, and collisional quenching losses. In the microwave plasma, the average electron temperature was found to be slightly larger than that the excitation temperature determined from the Boltzmann plot using levels 3p, which are generally believe to be in thermal equilibrium with the electrons.

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Date submitted: 10 Jun 2013 Electronic form version 1.4