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Time resolved measurements of electron and heavy particle kinetics in a short pulse excited helium DBD FENG LIU, GEORGE HUANG, Center For Advanced Power and Energy Conversion, Department of Mechanical and Materials Engineering, Wright State University, BISWA GANGULY, Air Force Research Laboratory — A fast rise time ($\leq$20 ns) high voltage pulse excited DBD in helium has been investigated in the pressure range from 10 up to 100 Torr. Time resolved emission intensities of helium (3^3S-2^3P), (3^3D -2^3P), and $He_2(d^3\Sigma_u - b^3\Pi_g)$ along with 1083 nm diode laser absorption by metastable state (2^3S-2^3P) have been measured. The influence of different applied voltages and pressures on the atomic helium metastable production and emission intensities was investigated. We observed two temporal peaks in both the 1083 nm laser absorption spectrum and also in the He_2 emission, as opposed to a single temporal peak in the atomic helium transitions corresponding to the peak current value of the DBD. The second temporal peaks in the dimer emission as well as in the laser absorption spectrum occur in the afterglow. These excited states are presumably formed through helium dimer kinetics. A comparison of time resolved measurements of discharge current, atomic and dimer emission intensities along with the laser absorption of 2^3S-2^3P state will be used to determine the relative efficiency of atomic helium metastable production by direct electron impact versus through dimer kinetics of as functions of pressure and applied voltage.

Biswa Ganguly
Air Force Research Laboratory

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