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Effects of overvolting on direct electron impact and heavy particle excitations of Ar and N_2 electronic states in a pulsed DBD ROBERT LEIWEKE, UES, Inc., BISWA GANGULY, Air Force Research Laboratory — The pressure dependence of direct electron impact and heavy particle resonant energy transfer kinetics within a pulsed- excited N_2/Ar DBD have been studied using two different pulsed applied voltage rise times ($\sim$20 ns and $\sim$150 ns) in order to measure the effects of over volting upon direct electron impact and heavy particle excitation efficiencies. The DBD was operated from 15-500 Torr, up to 8% N_2, 7.75 kV total applied voltage, and 5 kHz repetition rate. Time-resolved emission spectroscopy was used to obtain the relative intensities of the N_2^+ (B-X), Ar^+ (4P-4D), Ar ($2p_1$-$1s_2$), N_2 (C-B) transitions which have differing excitation thresholds of $\sim$19 eV, 19 eV, 13.5 eV, and 11 eV, respectively. Absolute total Ar metastable (Ar^M, 11 eV) column densities were obtained using Diode Laser Spectroscopy. The Ar^M column densities can be used to calibrate the relative emission intensities from the other four excited state species, once the pressure scaling for the pure argon case has been established. These reported results will show that the relative excitation efficiencies peak at different pressures depending upon both the excitation thresholds and overvolting, except for the $Ar^M + N_2 \rightarrow Ar + N_2$(C-B) excitation.

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