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Spatiotemporal behavior of a dielectric capillary atmospheric pressure plasma jet BRIAN SANDS, BISWA GANGULY, Air Force Research Laboratory, KUNIHIDE TACHIBANA, Kyoto University — We have studied an atmospheric pressure plasma jet utilizing time- and space-resolved emission spectroscopy by flowing helium/argon gas mixtures through a cylindrical glass capillary energized using a $\Delta t_{rise} \sim 15$ ns high voltage pulse. Emission measurements from Ar $2p_1$–$1s_2$ were acquired from both the inner capillary DBD and the outer plasma jet. Just outside the capillary, the jet emission was found to occur up to 20 ns before the emission from the DBD and also exhibited a temporal variation with axial distance of 10^5 m/s. These observations preclude both direct photo-excitation and heavy particle collisional excitation from the DBD as the primary mechanism for external plasma jet formation as the former is expected to be nearly instantaneous and the latter is too slow to account for our measurements. This suggests that the outer plasma jet is not directly coupled to the interior DBD and is more likely the result of a corona discharge set up by surface charging at the capillary edge. Additional results from varying discharge conditions such as driving voltage, repetition rate, and gas mixture ratios will be presented.

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