Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Variation of spatial distribution of excited species in He/Ar/O_2 admixtures in an atmospheric pressure plasma jet SARAH TAYLOR, None, ROBERT LEIWEKE, Ues, Inc, BISWA GANGULY, Air Force Research Laboratory — Variation of cathode directed streamer initiated pulsed glow current and spatial distribution of excited species outside the 4 mm capillary of a He/Ar/O_2 plasma jet have been measured using a partially optically transmitting conducting cathode. For 18 mm inter-electrode gap, 15 ns rise time unipolar 12.5 kV pulsed applied voltage with 6 kHz repetition rate, the pulsed glow current peaked at 150 mA with 1% Ar added to He flow, compared to 100 mA in pure He, into ambient air at 1.6 SLM. Spatiotemporally and spectrally resolved head-on emission images from He $3^3D \rightarrow 2^3P$, Ar $2p_1 \rightarrow 1s_2$, O $^5P \rightarrow ^5S$, and N_2^+ $B^2\Sigma \rightarrow X^2\Sigma$ transitions were acquired along the discharge propagation axis using a 5 ns gate ICCD camera. A fiber-couple PMT lens viewing normal to the propagation axis collected the same species emission, at 4 and 8 mm from the capillary tip, in order to correlate temporal emission profiles from streamer to glow transition. For each admixture, the ICCD radial emission profile for each excited species peaks on axis with a mean FWHM of $\sim$1.5 mm, whereas for pure He the intensity distribution of all excited species is annular. Concurrent with the increased discharge conductivity with 1% Ar admixture, the 777 nm O atom emission intensity increased in both streamer and glow phases.

Biswa Ganguly
Air Force Research Laboratory

Date submitted: 04 Jun 2012 Electronic form version 1.4