Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Mass spectrometric study of O, $O_2(a^1\Delta_g)$ and O_3 in time-modulated RF driven atmospheric pressure plasma jets[1] JINGKAI JIANG, YOLANDA ARANDA GONZALVO, PETER BRUGGEMAN, University of Minnesota — A molecular beam mass spectrometer (MBMS) was established to measure fluxes of neutral and ionic species from atmospheric pressure plasma at a substrate. In this work, we report the first measurements of absolute densities of $O_2(a^1\Delta_g)$ in an atmospheric pressure plasma jet (APPJ) by MBMS. The ability to measure spatial profiles of $O_2(a^1\Delta_g)$ impinging on a substrate in the effluent of the APPJ is a key advantage of the MBMS over previously reported optical methods. The measured large $O_2(a^1\Delta_g)$ densities in the APPJ effluent, up to one order of magnitude higher than the O density, underline the potential importance of $O_2(a^1\Delta_g)$ in many applications. In addition, we also investigate the change of species fluxes impinging on a dielectric substrate for touching and non-touching conditions by equipping the MBMS with a dielectric sampling plate. Spatially resolved measurements of neutral and ionic species in an He+1% O_2 RF-driven APPJ are reported. The spatially resolved distribution of O, $O_2(a^1\Delta_g)$ and O_3 is dominated by convection and, remarkably shows minimum differences between touching and non-touching conditions.

[1]This work was supported by the National Science Foundation (CBET 1703439) and US Department of Energy, Office of Fusion Energy Sciences under award number DE-SC0001939, DE-SC0016053 and DE-SC0020232.

Jingkai Jiang
University of Minnesota

Date submitted: 30 May 2020 Electronic form version 1.4