Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Hydroxyl and hydrogen radicals in the active plasma and plasma effluent of an atmospheric pressure plasma jet[1] YUANFU YUE, JINGKAI JIANG, SANTOSH KONDETI, PETER BRUGGEMAN, University of Minnesota — Non-equilibrium atmospheric pressure plasma jets (N-APPJs) have received a lot of attentions in the last decade due to promising biomedical applications. Reactive species (such as OH and H) generated by plasmas play essential roles in these applications. In this work, we studied both H and OH density profiles temporally along the axis of symmetry of a N-APPJ from the ionizing plasma inside the jet to the jet effluent by laser induced fluorescence (LIF). The plasma jet is driven by a nanosecond pulser with helium and H_2O mixture. We found that the dominant generation of H/OH locates between the electrodes inside the jet tube rather than by the guided streamer in the effluent. In the afterglow period, H/OH is convectively transported to the downstream while recombining. The effect of the pulse repetition rate on the generation of H/OH shows a significant memory effect, different for H and OH. This is attributed to different production mechanisms of H and OH. The work also suggests that the plasma kinetics inside the jet, often not considered in many experimental studies, may ultimately determine the reactivity in the jet effluent.

[1]This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Fusion Energy Sciences General Plasma Science program under Award Number DE-SC- 0016053.

Yuanfu Yue
University of Minnesota

Date submitted: 29 May 2020 Electronic form version 1.4