Abstract Submitted
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Student Award Finalist: Reactive species generated in atmospheric-pressure plasmas with water admixtures for biomedical applications: Absolute measurements and numerical simulations[1] SANDRA SCHRÖTER, J. BREDIN, A. WEST, K. NIEMI, J. DEDRICK, University of York, N. DE OLIVEIRA, D. JOYEUX, L. NAHON, Synchrotron SOLEIL, M. FOUCHER, J.-P. BOOTH, LPP-CNRS, E. WAGENAARS, T. GANS, D. O'CONNELL, University of York — We investigate the production of atomic oxygen (O), hydroxyl (OH) and atomic hydrogen (H) in an rf atmospheric-pressure plasma operated in helium with water admixtures. These species, and their longer-lived products, are known to influence biological systems. Absolute measurements of species densities are required to develop these plasmas for therapeutics. Accurate determination of radical densities is challenging at elevated pressures in complex gas mixtures due to collisional quenching. We measure radical densities using VUV high-resolution Fourier-transform absorption spectroscopy with synchrotron radiation, UV broadband absorption spectroscopy, and picosecond two-photon absorption laser induced fluorescence (ps-TALIF). These diagnostics are the most suitable techniques allowing direct, absolute and 2-dimensional spatial resolution measurements at atmospheric pressure. Ps-TALIF also enables measurements of the lifetimes of laser-excited states of O and H, providing insight into the chemical kinetics and ambient air diffusion into the plasma jet region. Good agreement has been found between the measurements and a numerical chemical-kinetic simulation.

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