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Physical and chemical interactions at the interface between atmospheric pressure plasmas and aqueous solutions ALEXANDER LIND-SAY, BRANDON BYRNS, DETLEF KNAPPE, North Carolina State University, DAVID GRAVES, University of California Berkeley, STEVEN SHANNON, North Carolina State University — Transport and reactions of charged species, neutrals, and photons at the interface between plasmas and liquids must be better quantified. The work presented here combines theoretical and experimental investigations of conditions in the gas and liquid phases in proximity to the interface for various discharges. OES is used to determine rotational and vibrational temperatures of OH, NO, and N_2^+ ; the relationship between these temperatures that characterize the distribution of internal energy states and gas and electron kinetic temperatures is considered. The deviation of OH rotational states from equilibrium under high humidity conditions is also presented. In contradiction with findings of other groups, high energy rotational states appear to become underpopulated with increasing humidity. In the aqueous phase, concentrations of longer-lived species such as nitrate, nitrite, hydrogen peroxide, and ozone are determined using ion chromatography and colorimetric methods. Spin-traps and electron paramagnetic resonance (EPR) are investigated for characterization of short-lived aqueous radicals like OH, O_2^- , NO, and ONOO⁻. Finally, experimental results are compared to a numerical model which couples transport and reactions within and between the bulk gas and liquid phases.

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