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Hydrated Electrons at the Plasma-Water Interface[1] DAVID GRAVES, RANGA GOPALAKRISHNAN, EMI KAWAMURA, MICHAEL LIEBERMAN, University of California at Berkeley — When atmospheric pressure plasma interacts with liquid water surfaces, complex processes involving both charged and neutral species generally occur but the details of the processes are not well understood. One plasma-generated specie of considerable interest that can enter an adjacent liquid water phase is the electron. Hydrated electrons are well known to be important in radiation chemistry as initiating precursors for a variety of other reactive compounds. Recent experimental evidence for hydrated electrons near the atmospheric pressure plasma-water interface was reported by Rumbach et al. [1]. We present results from a model of a dc argon plasma coupled to an anodic adjacent water layer that aims to simulate this experiment. The coupled plasma-electrolyte model illustrates the nature of the plasma-water interface and reveals important information regarding the self-consistent electric fields on each side of the interface as well as time- and space-resolved rates of reaction of key reactive species. We suggest that the reducing chemistry that results from electron hydration may be useful therapeutically in countering local excess oxidative stress.

[1] Rumbach et al., The solvation of electrons by an atmospheric-pressure plasma, Nature Communications, in press, 2015.

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