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In situ Raman microspectroscopy of liquid water in contact with a DC glow discharge in ambient atmospheric-pressure air[1] DAVID PAI, CNRS Institut Pprime, Universite de Poitiers — The study of the plasma-water interfacial region is critical to gaining an understanding of how atmospheric-pressure plasmas transform water into plasma-activated water. We investigate plasma-water interaction using in-situ Raman microspectroscopy, both at the plasma-water interface and in depth, with a spatial resolution as high as several tens of microns. The plasma reactor of choice is a DC glow generated in ambient air using a pin electrode placed above an optical cell filled with deionized water. The Raman spectra tracked in real time include the –OH stretch, bend, and librational bands of water. In particular, the –OH stretch band experiences increasing intensity of the fundamental frequency distribution around 3400 – 3500 cm^{-1}, which is weakly coupled to other hydrogen bonds. The peak around 3200 – 3300 cm^{-1}, resulting from intermolecular coupling and strong hydrogen bonding, experiences decreasing intensity. We will discuss both rapid and gradual changes to the Raman spectra over the course of plasma treatment, as well as the reversibility of these changes once the plasma is switched off. The effect of depth below the plasma-water interface will also be discussed: the changes to the Raman spectra become more pronounced as the detection volume approaches the interface.

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