Abstract Submitted
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Reactive species in atmospheric pressure helium-oxygen plasmas with humid air impurities[1] TOMOYUKI MURAKAMI, Tokyo Institute of Technology, KARI NIEMI, TIMO GANS, DEBORAH O'CONNELL, University of York, WILLIAM G. GRAHAM, Queen's University Belfast — In most applications helium-based plasma jets operate in an open air environment. The presence of humid-air in the plasma jet will influence the plasma chemistry and can lead to the production of a broader range of reactive species. We explore the influence of humid air on the reactive species in rf driven atmospheric-pressure helium-oxygen mixture plasmas (helium with 5000 ppm admixture of oxygen) for wide air impurity levels of 0-500 ppm with relative humidities of from 0 to 100% using a zero-dimensional, time-dependent global model. Comparisons are made with experimental measurements in an rf driven micro-scale atmospheric pressure plasma jet and with one-dimensional semi-kinetic simulations of the same plasma jet. The evolution of species concentration is described for reactive oxygen species, metastable species, radical species and positively- and negatively-charged ions (and its clusters). Effects of the air impurity containing water humidity on electronegativity and chemical activity are clarified with particular emphasis on reactive oxygen species.

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