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Core and afterglow plasma chemistry of a kHz-driven atmospheric-pressure plasma jet operated in ambient air TOMOYUKI MURAKAMI, Tokyo Institute of Technology, KARI NIEMI, TIMO GANS, DEBORAH O'CONNELL, University of York, WILLIAM GRAHAM, Queens University Belfast — When atmospheric-pressure plasma jets (APPJs) are operated under an open-air condition, the plasma tends to produce numerous reactive species and the plasma-induced chemical reactions are complex. The purpose of this paper is to quantify the relevant reactive species, e.g. RONS, HxOy, NOx and HNOx, and to analyse their formation in the core and afterglow regions of helium-based kHz-driven APPJ by using a 0D time-dependent global simulation (comprising 1360 elementary reactions among 65 species) [1] as well as to compare the predictions with independent diagnostics. The interacting kinetics of long-lived and short-lived species is clarified. The metastable species, e.g. He* and He2*, positive ions, negative ions and electrons are strongly modulated at the driving frequency, while the most neutral reactive species are not. Those responses are influenced by the humid air fraction.

[1] T. Murakami et al Plasma Sources Sci. Technol. 22(2013)015003 / 22(2013)015003 / 23(2014)025005.

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