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Manipulating Plasma Surface Interaction STEPHAN REUTER, KARI NIEMI, Queen's University Belfast, VOLKER SCHULZ-VON DER GATHEN, Ruhr University Bochum, TIMO GANS, Queen's University Belfast — A low temperature rf-powered atmospheric pressure plasma jet (APPJ) operated with helium and a small oxygen admixture is investigated. The study aims at a better understanding of reactive oxygen species production and annihilation processes in the APPJ's effluent. Optical emission spectroscopy (OES) measurements reveal the existence of excited atomic oxygen even at considerable distance from the jet's nozzle. In order to gain insight into energy transport mechanisms from core plasma to the effluent, (V)UV-optical emission spectroscopy measurements and chemical model calculations are performed and oxygen species densities (O, O_3, $O_2(b^1\Sigma_g^+)$) derived from two-photon absorption laser-induced fluorescence (TALIF) spectroscopy [1], UV-absorption spectroscopy, and optical emission spectroscopy measurements are compared with the chemical model calculations, showing excellent agreement. The chemical model allows to investigate the possibility to influence the APPJ's chemistry and enhance the oxygen output – e.g. by laser radiation. The ultimate prospect is to design the properties of a plasma according to the specifications required by respective surface treatment applications.
[1] S. Reuter, K. Niemi, V. Schulz-von der Gathen, and H. F. Döbele, Plasma Sources Sci. Technol., **18**, 015006 (2009)

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