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Optical measurements of reactive oxygen species in atmospheric pressure plasma jets J.S. SOUSA, LPGP, CNRS-UPS, Orsay, France and IPFN-LA, IST, Lisboa, Portugal, V. PUECH, LPGP, CNRS-UPS, Orsay, France, Q. ALGWARI, L.J. COX, K. NIEMI, T. GANS, D. O'CONNELL, CPP, Queens University, Belfast, United Kingdom — Atmospheric pressure plasma jets (APPJs) have great technological potential, notably in biomedicine. For a better understanding of the fundamentals of these stable non-equilibrium plasmas, two different APPJs have been experimentally studied. The first, formed inside a cylindrical glass tube (ø=4mm) between two external ring electrodes driven at a 20kHz excitation frequency, produces relatively long pulsed plasma jets (few cm). The second is a homogeneous glow discharge sustained between two parallel plates (electrode spacing: 1mm) at radio-frequency (rf) excitation of 13.56MHz Both APPJs are operated in He/O_2 mixtures (O_2 <1.5%), and the effluent is emitted into ambient air. Various energy carrying species suitable for biomedical applications are produced. Optical diagnostics of the discharge volumes and the effluent regions have been performed, allowing the measurement of O_3 (UV OAS) and O_2(a) (IR OES) densities. High concentrations of O_2(a), up to 6 10^{15}cm^{-3}, have been obtained at 5-10cm downstream. Our results show that the rf APPJ generates one order of magnitude more O_2(a) molecules. The effect of different parameters, such as gas flows and mixtures, and power coupled to the plasmas, are discussed in the study.

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