Abstract Submitted
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Oxygen metastable molecule densities in inductively-coupled plasmas in pure O_2 measured by VUV absorption[1] JEAN-PAUL BOOTH, ABHYUDAY CHATTERJEE, OLIVIER GUAITELLA, LPP-CNRS, Ecole Polytechnique, Palaiseau, France, NELSON DE OLIVEIRA, LAURENT NAHON, Synchrotron Soleil, Gif-sur-Yvette, France, COLIN WESTERN, School of Chemistry, Bristol University, UK — Oxygen molecules possess two metastable states (the $a^1\Delta_g$ at 0.98 eV and the $b^1\Sigma^+$ 1.64 eV). Models have suggested that both can play an important role in the neutral and charged particle kinetics plasmas in pure O_2 at low pressures. We have used the DESIRS vacuum ultraviolet beamline and Fourier-Transform spectrometer at Synchrotron Soleil to record the absorption spectra of inductively-coupled plasmas (ICP) in O_2, as a function of gas pressure (5-50 mTorr) and injected RF power. This allowed determination of the absolute line densities of O_2 in the X, a and b states (using a new calculation of the line strength in the case of $b^1\Sigma^+$). At high RF power the $a^1\Delta_g$ state density saturates at 10-15 % of that of the ground state, whereas the $b^1\Sigma^+$ state density remains at less than 1%. The implications of these measurements on the plasma kinetics will be discussed.

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