

Abstract Submitted  
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**Vibrational kinetics in Cl<sub>2</sub> and O<sub>2</sub> low-pressure inductively-coupled plasmas**<sup>1</sup> JEAN-PAUL BOOTH, MICKAEL FOUCHER, DANIIL MARINOV, PASCAL CHABERT, LPP-CNRS, Ecole Polytechnique, Palaiseau, France, ANNA ANNUSOVA, VASCO GUERRA, IPFN, IST, Universidade de Lisboa, Portugal, ANKUR AGARWAL, SHAHID RAUF, Applied Materials, Sunnyvale, CA — Low energy electron interactions with molecules via resonances can cause vibrational excitation (affecting chemical kinetics), electron energy loss and modification of the EEDF. However, with the exception of N<sub>2</sub> and H<sub>2</sub> plasmas, very little attention has been paid to this subject. We have implemented a novel high-sensitivity ultra-broadband UV absorption bench, allowing spectra to be recorded with noise as low as  $2 \times 10^{-5}$  over a 250nm wavelength range, and recording of complete vibronic bands. We applied this to radiofrequency inductively-coupled plasmas in low pressure (5-50 mTorr) pure O<sub>2</sub> and pure Cl<sub>2</sub>. In O<sub>2</sub> plasmas we surprisingly observe highly vibrationally excited O<sub>2</sub> ( $v''$  up to 18) via B-X Schumann-Runge bands. Cl<sub>2</sub> molecules show a broad UV absorption spectrum in the region 250-400nm, with distinctly different absorption spectra for vibrationally excited molecules. However, only a small fraction of the Cl<sub>2</sub> molecules were observed in vibrationally excited states and the vibrational temperature is close to equilibrium with the local gas translational temperature (up to 1000K), in contrast to O<sub>2</sub>. We are currently working on global models with vibrational kinetics to explain these results.

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