Abstract Submitted
for the GEC06 Meeting of
The American Physical Society

Atomic oxygen and $O_2(a^1\Delta_g)$ density measurements in a Micro-Cathode Sustained Discharge in oxygen and rare gases/oxygen mixtures.
L. MAGNE, G. BAUVILLE, P. JEANNEY, B. LACOUR, V. PUECH, Laboratoire de Physique des Gaz et des Plasmas, Université Paris 11, bât 210, 91405 Orsay cedex, France — This work presents first experimental investigations of atomic oxygen density and $O_2(a^1\Delta_g)$ production in a Micro-Cathode Sustained Discharge (MCSD) in pure O_2 and in argon (or helium)/O_2 mixtures for a total pressure up to 130 Torr. A micro-hollow cathode discharge (MHCD), 200 micron in diameter, is used as plasma cathode for a discharge between the MHCD and a third electrode placed 8 mm away. In pure oxygen, the absolute atom density was measured by Two-photon Absorption Laser Induced Fluorescence (TALIF). It will be shown that, for a current of 1 mA and a pressure of 50 Torr, an atomic density of 3 10^{15}cm^{-3} is obtained near the micro-hollow cathode, and it decreases to 5 10^{14} cm^{-3} near the third electrode. If the MCSD is switched off while the MHCD is still on, the atom density decreases by an order of magnitude. 2D cartography of the atom distributions will be presented for different operating conditions. The density of the $O_2(a^1\Delta_g)$ metastable state was evaluated from the intensity of the 1.27 μm transition measured with a calibrated InGaAs detector. It will be shown that $O_2(a^1\Delta_g)$ densities up to 10^{16} cm^{-3} have been obtained for 10% O_2 in an argon/oxygen mixture at 50 Torr. Work is in progress to determine conditions for generating higher $O_2(a^1\Delta_g)$ densities.

Magne Lionel
Laboratoire de Physique des Gaz et des Plasmas,
Université Paris 11, bât 210, 91405 Orsay cedex, France

Date submitted: 15 Jun 2006 Electronic form version 1.4