Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Comparison between micro hollow cathode discharges and atmospheric pressure plasma jets working in Ar/O_2 CLAUDIA LAZZARONI, LSPM-CNRS, Institut Galilee, Universite Sorbonne Paris Cite, Universite Paris 13, PASCAL CHABERT, LPP-CNRS, Ecole Polytechnique, UPMC, Universite Paris 11, MP4 (LSPM) TEAM, PLASMAS FROIDS (LPP) TEAM — A global model of a Micro Hollow Cathode Discharge (MHCD) in argon (Ar) with an admixture of oxygen (O_2), working at several hundreds of Torr, is presented. MHCDs operate in steady state and in self-pulsed mode both captured by the model. This discharge is a source of high reactive oxygen species (ROS) densities, a key parameter in many applications such as medicine. The Atmospheric Pressure Plasma Jet (APPJ), which consists in the application of a radio frequency (RF) voltage across two parallel electrodes separated by one millimeter, is another micro-plasma source which is widely used in medicine. The global model of the MHCD is compared to an analytical-numerical global model of the APPJ. Seventeen species are considered and 130 reactions are taken into account in the plasma volume. The species densities oscillate in time during the self-pulsing regime of the MHCD, following the discharge current oscillations, and we will compare the peak and the time-averaged densities to the APPJ densities. This comparison shows that in both regimes, the MHCD produces preferentially reactive oxygen excited species, O* and O_2*, whereas the APPJ produces preferentially reactive oxygen stable species, O and O_3. This is due to the higher plasma densities produced in the MHCD.

Claudia Lazzaroni
LSPM-CNRS, Institut Galilee,
Universite Sorbonne Paris Cite, Universite Paris 13

Date submitted: 18 Jun 2015 Electronic form version 1.4