Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

ArI and H_β Line Broadening in Microplasma Jet and DC Microhollow Cathode Plasmas at Atmospheric Pressure BOGOS SISMANOGLU, JORGE CORRÊA, CARLOS OLIVEIRA, MARCELO GOMES, JAYR AMORIM, Departamento de Física, Instituto Tecnológico de Aeronáutica — Direct current microplasma jet and microhollow cathode discharges are studied in argon at atmospheric pressure. The microplasma jet consists of tungsten-carbide needle and a metallic plate. Various needle diameters (150 to 1000μm) were used. The needles are operated as the cathode or anode. Microhollow cathode is a sandwich of metal-dielectric-metal with a micro hole (200 to 1000μm diameter). Charged plasma particles induce broadening of lines due to Stark effect. The electric microfield also induces broadening of ArI 603.213nm and 565.070nm lines. These two lines are sensitive to Van der Waals and Stark broadening. The broadening of these two lines enables us to evaluate gas temperature, electron temperature and density. These parameters are dependent on discharge operating mode: abnormal (low and high current) and normal. Calculations take into account the characteristic of two-temperature plasma and the ion dynamic effect in lines broadening The results for microjets are well similar to those obtained also with Balmer H_β and $H_\alpha$lines in Ar-2%H_2 mixture gases: n_e from 4.0x10^{14} to 2.0x10^{15}cm^{-3} and $T_e \cong$ 0.6eV. As anode, the needle generates microjets with T_g from 400 to 900K, at high current (from 20 to 130mA).

Jayr Amorim
Departamento de Física, Instituto Tecnológico de Aeronáutica

Date submitted: 16 Jun 2008 Electronic form version 1.4