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Session FTP1: Poster Session I: Plasma Sources I; Plasma Modeling/Simulation I; Basic Plasma Phenomena I; Plasma Applications I; Charged Particle Collisions I; Plasma Diag. I; Control of Distribution Functions

3:30 PM–3:30 PM, Tuesday, November 15, 2011
Room: Exhibit Hall AB

Abstract: FTP1.00021 : Capacitively coupled radio-frequency discharges in nitrogen at low-pressure

Preview Abstract

Authors:
L.L. Alves
(IPFN/IST-UTL, Portugal)

L. Marques
(IPFN/IST-UTL, Portugal)

C.D. Pintassilgo
(IPFN/IST-UTL, Portugal)

G. Wattieaux
(GREMI/CNRS, France)

J. Berndt
(GREMI/CNRS, France)

L. Boufendi
(GREMI/CNRS, France)

E.T. Es-Sebbar
(LATMOS-UVSQ/ CNRS, France)

N. Carrasco
(LATMOS-UVSQ/ CNRS, France)

G. Cernogora
(LATMOS-UVSQ/ CNRS, France)

This paper studies capacitively coupled radio-frequency discharges (13.56 MHz frequency) in pure nitrogen, produced within the LATMOS and the GREMI cylindrical parallel-plate reactors, surrounded by a lateral grounded grid, at 2-30 W coupled powers and 0.2-1 mbar pressures. Simulations use an hybrid code [1] that couples a 2D (r,$z)$ time-dependent fluid module for the charged particles and a 0D kinetic module for the nitrogen (atomic and molecular) neutral species. The coupling between these modules adopts the local mean energy approximation to define space-time dependent electron parameters for the fluid module and to work-out space-time average rates for the kinetic module. The model gives good predictions for the self-bias voltage and for the intensities of radiative transitions (average and spatially-resolved OES measurements) with the nitrogen SPS and FNS, and with the argon 811nm atomic line (present as an actinometer). Model results underestimate the experimental electron density (average resonant-cavity measurements) by a factor of 3-4. \\[4pt] [1] L. Marques et al, J. Appl. Phys. 102, 063305 (2007).