Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Surface vibrational relaxation of N_2 studied by infrared titration with time resolved Quantum Cascade Laser diagnostics D. MARINOV, O. GUAITELLA, A. ROUSSEAU, LPP, Ecole Polytechnique, UPMC, Universite Paris Sud, CNRS, D. LOPATIK, M. HÜBNER, J. RÖPCKE, INP Greifswald, YU IONIKH, Saint-Petersburg State University Institute of Physics — Relaxation of vibrationally excited nitrogen molecules on reactor walls is the most efficient N_2(v) loss mechanism in laboratory plasmas at pressures up to few tens of mbars. In the present study a new method for determination of the de-excitation probability γ_{N2} of vibrationally excited N_2 on different surfaces has been developed. A short dc discharge pulse was applied to a mixture containing 0.05-1% of CO_2, N_2O or CO in N_2 at 1.3 mbar. Due to a very efficient vibrational coupling between N_2(v) and CO_2 (N_2O, CO), the vibrational excitation of these titrating molecules is an image of the vibrational excitation of N_2. In the afterglow, the vibrational relaxation was monitored *in-situ* using quantum cascade laser absorption spectroscopy. The measurements were performed in a single discharge pulse without signal accumulation. Experimental results were interpreted in terms of a numerical model of non-equilibrium vibrational kinetics. The value of γ_{N2} was determined from the best agreement between the measured and calculated relaxation times. Using new technique the relaxation probability of N_2(v) was measured for SiO_2, TiO_2, Al_2O_3, Pyrex and anodized aluminum.

D. Marinov
LPP, Ecole Polytechnique, UPMC, Universite Paris Sud, CNRS

Date submitted: 18 Jun 2012 Electronic form version 1.4