

Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Surface catalytic contributions to molecule conversion in plasmas

RICHARD ENGELN, RENS ZIJLMANS, ONNO GABRIEL, GÖKSEL YAGCI, DAAN SCHRAM, Eindhoven University of Technology, Eindhoven, The Netherlands, STEFAN WELZEL, JÜRGEN RÖPCKE, FRANK HEMPEL, Institut für Niedertemperatur Plasmaphysik, Greifswald, Germany — The contribution of surface-related processes to the formation of new types of molecules in a recombining plasma with a low electron temperature is investigated. The recombination of a highly dissociated mixture of nitrogen and oxygen is studied with a combination of tuneable diode laser absorption spectroscopy and mass spectrometry. A simulation in CHEMKIN, based on a simplified set of chemical reactions, has been developed to describe the system in detail and to determine the contributions of volume processes and surface-related processes. With a sticking coefficient of 0.1 for the radicals for all studied conditions, a chance of unity for Eley-Rideal processes to be successful, a desorption energy of 0.7 eV for NO molecules and relatively low activation energies, around 0.5 eV, for the Langmuir-Hinshelwood processes gives a good agreement with the measurements. We show that NO₂ can only be formed at surfaces in our system, whereas NO and N₂O are at least for a significant fraction formed at the surfaces of the reactor. Especially at low pressure conditions and at low oxygen admixture, the role of the surfaces is pronounced.

R.A.H. Engeln
Eindhoven University of Technology, Eindhoven, The Netherlands

Date submitted: 16 Aug 2007

Electronic form version 1.4