Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Investigations of negative oxygen ions in pulsed rf plasmas[1]
MICHAEL KATSCH, ALEXANDER WAGNER, University of Duisburg-Essen, MICHAEL KRÄMER, Ruhr-University, Bochum — The spatial and temporal distributions of electrons and ions in ICP GEC reference cell and a large diffusion chamber connected to a helicon plasma source were investigated. The investigations were focussed on the production and loss processes of negative oxygen ions in argon-oxygen mixtures. Laser-induced photodetachment of the negative oxygen ions using of a frequency-doubled Nd:Yag laser along with a Langmuir probe was applied to detect the O^- ions. An increase of the negative ion density in the early afterglow is found at high plasma densities in the GEC cell as well in the diffusion chamber. There is, apparently, a formation channel for negative ions that becomes efficient with reduced electron temperature. Dissociative attachment of electrons to highly excited metastable oxygen molecules are suggested as a negative oxygen ion source. Comparative measurements of the temporal behavior of the negative ions in Ar/O_2, Kr/O_2 and Ne/O_2 mixtures indicate that metastable noble gas atoms do not play an essential role in the formation process of negative ions during the afterglow. A simple global model supports the experimental results.

[1]This work was supported by the Deutsche Forschungsgemeinschaft through the Sonderforschungsbereich SFB 591 (Project A7).

Michael Katsch
University of Duisburg-Essen

Date submitted: 06 Jun 2007 Electronic form version 1.4