Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Global model of oxygen plasmas: A benchmark study and the role of the vibrational quanta of O2[1] EFE KEMANECI, Ruhr University Bochum, JAN VAN DIJK, Eindhoven University of Technology, THOMAS MUSSENBROCK, RALF BRINKMANN, Ruhr University Bochum, INSTITUTE FOR THEORETICAL ELECTRICAL ENGINEERING COLLABORATION, DEPARTMENT OF APPLIED PHYSICS COLLABORATION — Oxygen plasmas are investigated based on a global modelling approach with a focus on the inductive radio-frequency discharges in both continuous and pulse-modulated modes. A throughout benchmark study is performed mainly with respect to the experimental data available in literature. The experimental data is preferred to cover a wide range of energy coupling modes: (asymmetric) capacitive, inductive as well as microwave modes; and an agreement is obtained in both continuous and pulse-modulated power inputs. In a benchmark case of a microwave-induced reactor plasma, a spatially-resolved plasma fluid model is also developed that is self-consistently coupled to the microwave propagation and the data is compared with the results of the corresponding global model simulation. The role of the vibrational quantum levels of molecular oxygen is analysed, where a set of chemical kinetics is proposed. The chemical kinetics includes 41 vibrational quanta as well as the e-V, V-V and V-T interactions. A ladder-like dissociation mechanism is also incorporated, where the highest vibrational quanta are set to be a pseudo-level and it is assumed to dissociate immediately.

[1]Deutsch Bundesministerium fur Bildung und Forschung via PluTO+

Efe Kemaneci
Ruhr University Bochum

Date submitted: 22 May 2015 Electronic form version 1.4