Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

A global model of microwave induced hexametyhldisiloxane/oxygen coaxial surface wave discharge[1] EFE KEMANECI, FELIX MITSCHKER, Ruhr-University Bochum, JAN BENEDIKT, Christian-Albrechts-Universit Kiel, DENIS EREMIN, PETER AWAKOWICZ, RALF PETER BRINKMANN, Ruhr-University Bochum — A volume-averaged global model is developed for a microwave induced coaxial hexamethyldisiloxane/oxygen surface wave discharge. Positive ion and neutral flux at the coaxial walls are analytically estimated [Efe Kemaneci et al 2017 J. Phys. D: Appl. Phys. 50 245203]. A total number of 1200 homogeneous and heterogeneous gas phase reactions are identified for a set of 100 different plasma species and implemented in the model. The simulation results are benchmarked against a variety of measurements for a variation of input power, pressure and oxygen to hexamethyldisiloxane flow ratios. An agreement is obtained between the simulation results and the measurements of electron temperature, electron density as well as of hexamethyldisiloxane, carbonmonoxide, carbondioxide and various hydrocarbon concentrations. Hexamethyldisiloxane, pentamethyldisiloxanyl, methane, carbonmonoxide, water, hydrogen and oxygen molecules are the most dominant species in the discharge. A significant amount of positive charge is formed by pentamethyldisiloxanyl ion ($Si_2OC_5H_{15}^+$) via electron impact dissociative ionization of the hexamethyldisiloxane molecule. Underlying reaction mechanisms in the plasma are identified and their relative contributions are quantified.

[1]Tha authors acknowledge the suport by German Research Foundation via SFB 1316, SFB-TR 87 and Pluto+.

Efe Kemaneci
Ruhr-University Bochum

Date submitted: 06 Jun 2018 Electronic form version 1.4