Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Ignition voltage of atmospheric-pressure dielectric barrier discharges in argon with admixtures of HMDSO and TMS[1] D. LOFFHAGEN, M. M. BECKER, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany, J. PHILIPP, A. K. CZERNY, C.-P. KLAGES, TU Braunschweig, Institute for Surface Technology, Bienroder Weg 54, 38108 Braunschweig, Germany — Hexamethyldisiloxane (HMDSO) and tetramethylsilane (TMS) are frequently used as monomers in dielectric barrier discharges (DBD) for the deposition of silicon-organic films. Already small admixtures of few ppm of these monomers to the carrier gas lead to drastic changes of the discharge characteristics due to Penning ionization processes. In the present contribution, the impact of HMDSO and TMS on the ignition behavior of an atmospheric-pressure DBD in argon is analyzed experimentally and by means of numerical modeling. Rate coefficients for Penning ionization and quenching due to collisions of excited argon atoms with HMDSO and TMS, respectively, are specified by an experimental validation of results of a time-dependent, spatially one-dimensional fluid model. The experimentally observed decrease of the ignition voltage with increasing monomer admixture in the range from 0 to 200 ppm by about 60% can be reproduced with very good agreement by the validated model.

[1]The work was supported by the German Research Foundation under grants LO 623/3-1 and KL 1096/23-1 and within the SFB-TRR 24.

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Date submitted: 31 May 2017 Electronic form version 1.4