Abstract Submitted
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**Study of a micro hollow cathode discharge in $Ar/N_2$ used for boron nitride synthesis.**[1] CLAUDIA LAZZARONI, SALIMA KASRI, XAVIER AUBERT, GUILLAUME LOMBARDI, ALEXANDRE TALLAIRE, JOCELYN ACHARD, LSPM - CNRS UPR 3407, NADER SADEGHI, LIPHY - CNRS UMR 5588 — A microplasma is generated in the 400 micron diameter micro hole of a molybdenum-alumina-molybdenum sandwich (MHCD type) at several hundreds of Torr in argon (Ar) with an admixture of nitrogen ($N_2$). MHCDs allow high electron densities and therefore we expect to reach high dissociation degree of nitrogen which is particularly suited for nitride deposition given the high bond energy of molecular nitrogen. A global model of the discharge, that combines the particle and the energy balance equations, is presented. The model is run until the steady state is reached and we obtain the plasma parameters that are the species densities and the electron temperature. A particular focus is given to the electron density and the atomic nitrogen density, a key parameter for the deposition and growth of nitride films. The model predictions are compared to experiments performed during the normal regime, when the plasma is not only confined in the hole but also expands on the cathode backside. Emission spectroscopy is used to infer the electronic density in the micro-hole via the Stark broadening of the $H_\beta$ line. A parametric study is done varying the current, the gas pressure and the $N_2$ fraction in Ar.

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