Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

The role of recycling in pulsed sputtering magnetrons JON TOMAS GUDMUNDSSON, University of Iceland, Reykjavik, Iceland and Department of Space and Plasma Physics, KTH-Royal Institute of Technology, Stockholm, Sweden, DANIEL LUNDIN, LPGP, UMR 8578 CNRS, Universit Paris-Sud, Orsay Cedex, France, MICHAEL A. RAADU, NILS BRENNING, Department of Space and Plasma Physics, KTH-Royal Institute of Technology, Stockholm, Sweden — In high power impulse magnetron sputtering (HiPIMS), high power is applied to the magnetron target (cathode) in unipolar pulses at low duty cycle. This results in a high plasma density (electron density) and a high ionization fraction of the sputtered material. The time-dependent plasma discharge ionization region model (IRM) allows us to explore the temporal variation of the various parameters of the discharge process. Here we use the model to explore both non-reactive and reactive discharges. For high currents the discharge with Al target develops almost pure self-sputter recycling, while the discharge with Ti target exhibits close to a 50/50 combination of self-sputter recycling and working gas-recycling [1]. For a reactive operation we find that when the discharge is operated in the metal mode Ar^+ and Ti^+-ions contribute most significantly (roughly equal amounts) to the discharge current while in the poisoned mode the Ar^+-ions contribute almost solely to the discharge current [2]. In the metal mode self-sputter recycling dominates and in the poisoned mode working gas recycling dominates. [1] C. Huo et al., J. Phys. D: Appl. Phys. (submitted 2017). [2] J. T. Gudmundsson et al. Plasma Sources Sci. Technol. 25, 065004 (2016).

Jon Tomas Gudmundsson
Univ of Iceland

Date submitted: 01 Jun 2017 Electronic form version 1.4