

Abstract Submitted  
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**The self scattering regime of reactive high power impulse magnetron sputtering of chromium and nitrogen** WOLFGANG BREILMANN, CHRISTIAN MASZL, ANTE HECIMOVIC, JAN BENEDIKT, ACHIM VON KEUDELL, Ruhr-University Bochum — High power impulse magnetron sputtering (HiPIMS) is a technique for deposition of thin films. It is essential to understand the plasma dynamics in reactive HiPIMS to improve the process of thin film deposition. In this work we investigate the influence of nitrogen admixture to an argon-chromium HiPIMS discharge. Time resolved ion energy distribution functions (IEDF) were measured by means of time and energy resolved mass spectrometry with a temporal resolution of  $2 \mu s$ . The measurements were performed for  $150 \mu s$  long HiPIMS pulses with a repetition frequency of 20 Hz. A 2" target was used. The working gas mixture was varied from pure argon to pure nitrogen with a constant pressure of 0.5 Pa. Peak current densities of  $1.5 A/cm^2$  and  $4 A/cm^2$  were chosen. When operating at high current and pure nitrogen atmosphere the IEDFs of chromium show that only a small amount of ions reaches the mass spectrometer, while for the low current case this is not observed. It is postulated that self-scattering of chromium ions by chromium ions reduces the flux to the mass spectrometer. This is very pronounced in the case of pure nitrogen due to increased confinement of the discharge, and thus a higher density of charged particles in front of the target.

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