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On the relation between deposition rate and ionized flux fraction in high power impulse magnetron sputtering JON TOMAS GUDMUNDSSON, HAMIDREZA HAJIHOSEINI, University of Iceland, Reykjavik, Iceland, MARTIN RUDOLPH, Leibniz Institute of Surface Engineering (IOM), Permoserstr. 15, 04318 Leipzig, Germany, NILS BRENNING, MICHAEL A RAADU, KTH Royal Intstitute of Technology, Stockholm, Sweden, DANIEL LUNDIN, Linkoping University, Linkoping, Sweden — The deposition rate in high power impulse magnetron sputtering (HiPIMS) is known to be lower than for dc magnetron sputtering (dcMS) operated at the same average power. Back-attraction of ions of the sputtered species to the cathode target is believed to be the main cause for this, while some other mechanisms have also been suggested. We discuss how the magnetic field strength $|\mathbf{B}|$ and geometry (degree of balancing) influences the deposition rate and ionized flux fraction $F_{\rm flux}$ in dcMS and HiPIMS operation both axially [1] and radially [2]. We relate the deposition rate and the ionized flux fraction to the ionization probability $\alpha_{\rm t}$ and the back attraction probability of the sputtered species $\beta_{\rm t}$. A significant transport of the film forming material is found to travel radially or parallel to the target surface for both sputter techniques. and a significantly higher number of ions traveling radially in the HiPIMS discharge. We discuss the tradeoff between a high ionized flux fraction of the sputtered species and a high deposition rate referred to as the HiPIMS compromise, and approaches to optimize the sputter process. [1] Hajihoseini et al., Plasma **2** (2019) 201, [2] Hajihoseini et al., J. Vac. Sci. Technol. A **38** (2020) 033009

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