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Ionization processes in the high power impulse magnetron sputtering discharge (HIPIMS) JON T. GUDMUNDSSON, University of Iceland, JOHAN BOHLMARK, Chemfilt Ionsputtering AB, ARUTIUN P. EHIASARIAN, Sheffield Hallam University, ULF HELMERSSON, Linkoping University — High power impulse magnetron sputtering (HIPIMS) is a technique that utilizes ionized physical vapor deposition (IPVD). High density plasma is created by applying a high power pulse to a planar magnetron discharge. The plasma parameters in the HIPIMS discharge will be reviewed and discussed as well as some applications of the HIPIMS technique. Measurements of the temporal and spatial behavior of the plasma parameters indicate peak electron density of the order of 10^{19} m^{-3}, that expands from the target with a fixed speed that depends on the gas pressure and the gas type. The high electron density results in a high degree of ionization of the deposition material. Furthermore, the ionization processes and the fractional ionization of the sputtered material is explored using a time dependent global (volume averaged) model. The model calculations give integrated ionized flux fraction in the range of 80 - 90% for Al, Cu and C targets and average power 300 W at 10 mTorr argon pressure.

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