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The material dependency of the (reactive) HIPIMS discharge: an experimental approach.Filip Moens¹, Diederik Depla²¹UGent, Gent, Belgium ²Ghent University, Gent, Belgium

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To get a better insight in the material dependency of HIPIMS and reactive HIPIMS there is a need of comparative studies which study the current-voltage-time diagrams (CVT) under identical conditions. This kind of studies are scarce in literature as most papers focus on the modelling, and the understanding of the HiPIMS discharge and/or study the influence of the deposition conditions on the film properties. In this study the first step was to find conditions such as duty cycle, working gas pressure, and frequency where the magnetron discharge for different target materials is operational. This asks for a repetition of the experiments to find a sufficient wide parameter interval. Two different pulse regimes were selected: one with a short on-time to avoid gas rarefaction, and another where the on-time is sufficiently long to allow rarefaction and self-sputtering to occur. An overview of CVT for different target materials (such as Al, Cu, Cr, Mg, Nb, and Zn) opens the possibility to link the obtained results with material properties such as ion-induced electron yield, and material sputter yield. The influence of the reactive gas addition on the CVT for these materials will also be presented. As all measurements were performed with the same magnetron, in the same vacuum chamber and with the same power supply (Melec Sipp 2000 in combination with a ADL DC power supply), the material dependency is the real parameter studied in this paper. The overview will widen our fundamental understanding of HiPIMS discharge in general, and more specific on its behavior in reactive mode.

Keywords

HiPIMS

reactive HiPIMS