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Paul Michael Barker, Stephanos Konstantinidis, Erik Lewin, Nikolay Britun, Jörg Patscheider

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An investigation of c-HiPIMS discharges during titanium deposition

Paul Michael Barker[1], Stephanos Konstantinidis[2], Erik Lewin[1,3], Nikolay Britun[2], Jörg Patscheider[1]

[1] Laboratory for Nanoscale Materials Science, Empa, Dübendorf, Switzerland

[2] Chimie des Interactions Plasma – Surface (ChIPS), Université de Mons, 23 Place Du Parc, Mons, 7000, Belgium

[3] Department of Chemistry - Ångström Laboratory, Uppsala University, Sweden

E-mail: Paul.Barker@empa.ch

Tel. no.: +41 58 765 4828

1 Abstract

A modified version of high power impulse magnetron sputtering (HiPIMS) has been used to deposit titanium films at higher deposition rates than for conventional HiPIMS whilst maintaining similar pulse voltages and peak currents. This process, named chopped-HiPIMS (c-HiPIMS) utilises pulses decomposed into several short single pulses instead of single HiPIMS pulses. Experiments show that manipulating the pulse sequence during c-HiPIMS, i.e. the $t_{\mu on}$ and $t_{\mu off}$ times (explained in the glossary) allows for an increase of the deposition rate; increases of up to 150 % are reported here for selected conditions. Further, deposition rates higher than those measured using direct current magnetron sputtering are also shown. Investigations by optical emission and optical absorption spectroscopy at the substrate show that the increase of deposition rate is not a consequence of different ion concentrations arriving at the substrate when changing the micro-pulse-off times of c-HiPIMS. Thus