

## Impact of the Applied Potential on the Copper Nucleation

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Molybdenum substrates are mainly used for photovoltaic applications, and specifically as backside contact for absorber deposition, for thin film solar cells. For these applications, one of the technologic key points is the deposition of a copper layer, by electrochemistry.

The purpose of this research work is to study, on molybdenum substrate, the impact of the applied potential on the copper nuclei formation and growth. We have chosen to work using commercial chemistry based on CuSO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub> bath (OMniCu™ High Copper, from OM Group Ultra Pure Chemicals (OMG UPC)), enhanced by organic additives (OMniCu™ additives series).

The influence of potential was followed by chrono-amperometric experiments and then copper nuclei were physically and chemically analyzed. Thanks to SEM-FEG observations, the nuclei formation and growth has been finely depicted for a large range of applied potentials. Auger investigations have allowed the chemical determination of the nuclei composition and XPS measurements the determination of the global copper layer composition. Analyses by Atomic Absorption Spectroscopy have completed this study by an of a mean copper layer thickness.

Thanks to the combination of these different characterization techniques, the influence of the potential on the copper nucleation has been determined. The final aim of this study is to optimize the best plating parameters to obtain a homogeneous, uniform, hiding and adherent copper layer on molybdenum substrates, with a controlled thickness, lower than 100nm.

### ACKNOWLEDGMENTS

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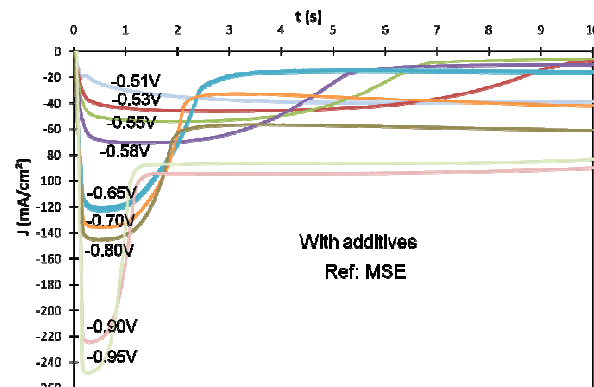


Figure 1: Impact of the applied potential on the chrono-amperometric curves.

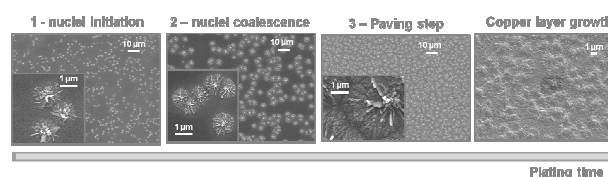


Figure 2: Evolution of the copper nuclei with the plating time.

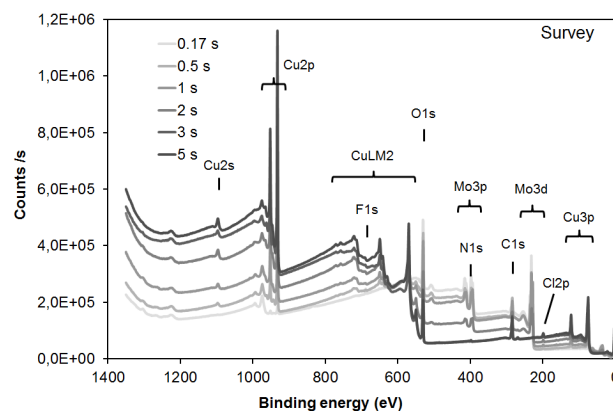


Figure 3: Surface XPS analyses of the copper layers obtained after different deposition durations.