

Accepted Manuscript

A comparative study of copper thin films deposited using magnetron sputtering and supercritical fluid deposition techniques

B. Giroire, M. Ali Ahmad, G. Aubert, L. Teule-Gay, D. Michau, J.J. Watkins, Cyril Aymonier, A. Poulon-Quintin



PII: S0040-6090(17)30659-4
DOI: doi: [10.1016/j.tsf.2017.09.002](https://doi.org/10.1016/j.tsf.2017.09.002)
Reference: TSF 36202

To appear in: *Thin Solid Films*

Received date: 10 February 2017
Revised date: 28 August 2017
Accepted date: 1 September 2017

Please cite this article as: B. Giroire, M. Ali Ahmad, G. Aubert, L. Teule-Gay, D. Michau, J.J. Watkins, Cyril Aymonier, A. Poulon-Quintin , A comparative study of copper thin films deposited using magnetron sputtering and supercritical fluid deposition techniques, *Thin Solid Films* (2017), doi: [10.1016/j.tsf.2017.09.002](https://doi.org/10.1016/j.tsf.2017.09.002)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A comparative study of copper thin films deposited using magnetron sputtering and supercritical fluid deposition techniques

B. Giroire^{1,2}, M. Ali Ahmad^{1,2}, G. Aubert^{1,2}, L. Teule-Gay^{1,2}, D. Michau^{1,2}, J. J. Watkins³, Cyril Aymonier^{1,2}, A. Poulon-Quintin^{1,2*}

¹ CNRS, ICMCB, UPR 9048, 87 Avenue Dr A. Schweitzer, F-33600 Pessac, France

² Univ. Bordeaux, ICMCB, UPR 9048, 87 Avenue Dr A. Schweitzer, F-33600 Pessac, France

³ Department of Polymer Science and Engineering, University of Massachusetts Amherst, 120 Governors Drive, Amherst, Massachusetts 01003, United States

Abstract

A comparison of crystallinity, microstructure, surface morphology and electrical conductivity is proposed for the deposition of copper films, using SuperCritical Fluid Deposition (SFCD) and RF magnetron sputtering techniques. Both preparation methods yield nanocrystalline Cu films (< 100 nm) but SFCD gives access to a higher crystallinity for the same AlN substrate temperature during the deposit. Based on the film characteristics, a comparison of the evolution of electrical properties is done for RF magnetron sputtered copper films and SFCD ones with H₂ as reducing agent. Uniform strain values are significantly reduced when SFCD technique is used and crystallinity is highly increased leading to lower resistivity values for a same crystallite size. This study demonstrates the viability of the SFCD technique to produce high quality nanostructured copper thin films with low resistivity values.

Keywords: Copper, Thin Films, Supercritical fluid chemical deposition, Sputtering, Resistivity, Microstructure.

* Corresponding author, e-mail: angeline.poulon@icmcb.cnrs.fr, Tel/fax: +33(0)540006260.

Download English Version:

<https://daneshyari.com/en/article/8033341>

Download Persian Version:

<https://daneshyari.com/article/8033341>

[Daneshyari.com](https://daneshyari.com)