Accepted Manuscript

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PII: S0925-8388(17)31980-1

DOI: 10.1016/j.jallcom.2017.06.006

Reference: JALCOM 42074

To appear in: *Journal of Alloys and Compounds*

Received Date: 15 February 2017

Revised Date: 24 May 2017

Accepted Date: 1 June 2017

Please cite this article as: W. Wang, L. Ji, H. Li, H. Zhou, J. Chen, Self-organized formation of nano-multilayer structure in the carbon-copper thin film during reactive magnetron sputtering deposition process, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.06.006.

Self-organized Formation of Nano-multilayer Structure in the Carbon-Copper Thin Film during Reactive Magnetron Sputtering Deposition Process

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ABSTRACT: Fabrication of Nano-multilayered structure film is often complex owing to its fabricated process which needs to regulate a certain deposition parameter periodically. Here, we demonstrated a self-organized nano-multilayered structure in carbon–copper thin films only using one single sputtering target of copper in a conventional DC reactive sputtering deposition process. The influence of methane concentration on the microstructure, especially on the self-organized nano-multilayer, of the films were investigated by X-ray photoelectron spectroscopy (XPS), Raman spectroscopy, field emission scanning electron microscopy (FESEM) and high-resolution transmission electron microscopy (HRTEM). The results showed that the film deposited at low methane concentration was consisted of disorder copper grains with higher copper content. With increasing methane concentration, the copper content in the films decreased