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PII: S0257-8972(18)30295-0
DOI: doi:10.1016/j.surfcoat.2018.03.044
Reference: SCT 23224

To appear in: *Surface & Coatings Technology*

Received date: 9 December 2017
Revised date: 13 March 2018
Accepted date: 14 March 2018

Please cite this article as: Frederico Goncalves de Cerqueira Lima, Ulrich Mescheder, Gábor Katona, Harald Leiste, Emre Özel, Claas Müller, Holger Reinecke , Influence of silicon doping type on the adhesion of seedless electrodeposited copper layers. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi:10.1016/j.surfcoat.2018.03.044

Influence of Silicon Doping Type on the Adhesion of Seedless Electrodeposited Copper Layers

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Abstract

The influence of silicon doping on the adhesion of copper layers electroplated directly on (100) silicon without a seed layer was investigated in this work. The adhesion of Cu layers on Si(100) was derived from scratch tests where the critical loads and the types of failures of these layers on phosphorous- and boron-doped silicon were obtained. The maximum loads supported until complete layer removals were about twice as large for Cu layers electrodeposited on p-Si(100) than those deposited on n-Si(100). The Cu layers were also visually inspected using images taken with scanning electron microscopes, their topography was obtained by atomic force microscope measurements and crystal orientations by X-ray diffraction. Secondary neutral