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A quantification evaluation of the depth resolution of AES depth profiling data of Cu/Ni multilayer thin films using the MRI model

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Abstract content
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Auger electron spectroscopy (AES) in combination with ion beam sputtering is widely used for determination of the composition–depth profiles of thin films. The quality of this depth profiling can be characterized by the so-called depth resolution ΔZ , which defines the depth range to which a certain composition has to be assigned. [1] During AES sputter depth profiling of polycrystalline thin metal films, the surface roughening induced by the ion bombardment is the main source of the degradation of the depth resolution upon sputtering.[2] A depth profiles of as-deposited Cu/Ni multilayer thin film has been investigated using AES in combination with Ar⁺ ion sputtering. The Cu/Ni multilayer structures were deposited on a SiO₂ substrate by means of electron beam evaporation in a high vacuum. The measured AES depth profiles of the as-deposited Cu/Ni multilayer is quantitatively fitted by the MRI model assuming that the roughness parameter linearly increased with the sputtered depth. The roughness values extracted from the depth profiling data fits, agree well with those measured by Atomic force microscopy (AFM). The depth-dependent depth resolution upon depth profiling of the as-deposited sample are quantitatively evaluated accordingly.

References:

[1] S. Hofmann, Surf. Interface Anal. 21 (1994) 673.

[2] J.Y. Wang, S. Hofmann, A. Zalar, E.J. Mittemeijer, Thin Solid Films 444 (2003) 120.

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Terblans JJ; terblansjj@ufs.ac.za; Physics Department, University of the Free State, Bloemfontein, 9300, South Africa

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Primary author: Mr YAN, XinLiang (University of the Free State)

Co-authors: Prof. SWART, Hendrik (University of the Free State); Prof. TERBLANS, JJ (Koos) (UFS); Prof. WANG, Jiang-Yong (Shantou university,China); Mr LIU, Yi (Shantou University, China)

Presenter: Mr YAN, XinLiang (University of the Free State)

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