Effect of deposition rate and thickness on the structural and electrical properties of evaporated Ni/glass and Ni/Si (1 0 0) thin films

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Publication date
2008/12/1

Journal
Microelectronics journal

Volume
39

Issue
12

Pages
1545-1549

Publisher
Elsevier

Description
We have studied the effect of substrates [glass and Si(1 0 0)], of Ni thickness (t_{Ni}) and of the deposition rate [v_1=13 nm/min and v_2=22 nm/min] on the structural and electrical properties of evaporated Ni thin films. The Ni thickness, measured by the Rutherford backscattering (RBS) technique, ranges from 28 to 200 nm. From X-ray diffraction, it was found that all samples are polycrystalline and grow with the <1 1 1> texture. From the measure of the lattice constant, we inferred that Ni/Si samples are under a higher tensile stress than the Ni/glass ones. Moreover, in Ni/glass deposited at v_1, stress is relived as t_{Ni} increases while those deposited at v_2 are almost stress-free. The grain size (D) in Ni/glass with low deposition rate monotonously increases (from 54 to 140 Å) as t_{Ni} increases and are lower than those corresponding to Ni/Si. On the other hand, samples grown at v_2 have a constant D, for small t_{Ni} with D in Ni …