

HARDNESS AND ASSESSMENT OF ADHESION OF MONOLAYER AND
MULTILAYER NICKEL THIN FILMS ELECTROCHEMICALLY DEPOSITED ON
SILICON SUBSTRATES WITH AND WITHOUT THE ULTRASONIC AGITATION

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Abstract: Composite systems of monolayer and multilayer nickel films electrochemically deposited on single crystal (100)-oriented silicon wafers were fabricated with and without the ultrasonic agitation. The hardness and adhesion behaviour of these composite structures were characterized by Vickers microindentation test. The dependence of composite microhardness and film adhesion on the structure of the film and mixing conditions of electrolyte were analysed. Mathematical models of Chicot-Lesage and Chen-Gao were applied to experimental data in order to obtain the film hardness and adhesion parameter respectively. It is confirmed that the mechanical properties of composite systems of nickel thin films on silicon substrate can be enhanced by formation of multilayer film structure by ultrasound-assisted electrodeposition and by reducing the layer thickness in the multilayer film.
Keywords: composite hardness, film adhesion, ultrasound-assisted electrodeposition, multilayer nickel films.

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