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PREDNÁŠKA

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GISAXS - probe of buried interfaces in vacuum deposited thin films

P. Siffalovic¹, K. Vegso¹, E. Majkova¹, L. Chitu¹, M. Jergel¹, S. Luby¹, J. Keckes², G. A. Maier³, S. V. Roth⁴, A. Hembd⁵, F. Hertlein⁵, J. Wiesmann⁵, B. Szymanski⁶, F. Stobiecki⁶

1Institute of Physics SAS, Dúbravská cesta 9, 84511 Bratislava, Slovakia

2Erich Schmid Institute for Materials Science, Jahnstrasse 12, A-8700 Leoben, Austria

3Materials Center Leoben Forschung GmbH, Roseggerstrasse 12, A-8700 Leoben, Austria

4HASYLAB / DESY, Notkestrasse. 86, 22603 Hamburg, Germany

5Incoatec GmbH, Max-Planck-Strasse 2, 21502 Geesthacht, Germany

6Institute of Molecular Physics PAS, M. Smoluchowskiego 17, 60-179 Poznan, Poland

The quality of buried interfaces is an important issue in development of progressive vacuum deposited thin film systems. The parameters describing buried interface morphology are often difficult to obtain by standard imaging techniques like transmission electron microscopy or scanning probe microscopy. The grazing-incidence small-angle X-ray scattering (GISAXS) is an effective and non-destructive technique giving statistical non-local information on morphology of buried interfaces.

We review GISAXS capabilities on two examples of thin multilayer films. As a benchmark we selected a high quality multilayer system composed of W and B4C with a period of 1.4 nm and 0.2 nm average interfacial roughness. Using GISAXS we demonstrate estimation of multilayer growth model parameters like relaxation parameter, lateral correlation length, Hurst parameter and lateral roughness replication shift. We also introduce a class of mounded interfaces on example of magnetic multilayer system composed of NiFe 2 nm/Au 1.7 nm/ Co 0.7 nm/Au 1.7 nm. This system presents an academic example of preferential replication of specific lateral roughness frequencies characteristic for mounded interfaces.

Further we show that GISAXS technique is not necessarily connected with high-brilliance synchrotron beamlines. A new table-top GISAXS workstation operating in ambient air conditions will be presented and compared to the evacuated BW4 GISAXS beamline of DORIS III synchrotron ring. The footprint of new GISAXS workstation is less than 3 m². The future directions for implementation of compact GISAXS technique for *in situ* monitoring in vacuum deposition systems are discussed.

Kontakt: peter.siffalovic@savba.sk