o.m8.p9 Regularities of crystallization of thin films of disilicide solid solution. L. Dvorina, *for Problem Materials, 3 Krzizanovsky str, 03142 Kiev, Ukraine. e-mail: dvor@ipms.kiev.ua*
Keywords: thin films, surface crystallography, solid phase interaction.

The mechanism of solid phase interaction of transition metals with silicon in quasi-binary systems $CrSi_2$ -$MeSi_2$ (Me-Ti, Ta, Mo and other) for films structures was examined. The Cr-Me-Si layers have been prepared by sputtering from solid solution disilicide targets, produced by the method of powder metallurgy. The methods of electronography, in situ measurements of electrical resistance, elevation of the annealing temperature are used to establish regularities in formation of films of the studied disilicide solid solution. The sample composition was determined using AES electron spectroscopy. The main factors of the character of proceeding processes influenced on were determined. These are Cr/Me and Cr+Me/Si ration, systems ground state or temperature and time behavior, environment. It is shown that films deposited on the substrate at T<333 K are amorphous. Solid solution disilicide thin films have temperature of crystallization than dicilicide films. The greater temperature of crystallization and structure of the crystalline phase depend on the films thickness and residual gases in the chamber. On examination of disilicide thin films and their composition the narrow range of solid solution, in which the properties are poorly sensitive to change of components ratio has been determined. The high movable holes are the main electricity carrier. Scientific principles are developed and series of materials based on silicides of transition metals and technology of their production are created. These materials of solid solution type do not have any world analogies and the production no possibility to fabrication of single-phase film structures with a specified complex of physical and chemical properties as well as crystal structure in a wide concentration range. They also provide standard production target which is 2 times more than conventional. The complex physical properties are supervised by the ratio of number of atoms for main and substituting metal atom. Developed scientific principles allow to create materials with a specified complex of properties.

o.m8.p10 Direct Phase Determination of Surface In-plane Reflection of Thin films by X-ray Grazing Incident Three-wave Resonance Diffraction. Y.-S. Huang[1], C.-S. Chao[1], C.-H. Hsu[1], Y.P. Stetsko[1,3], C.-Y. Hung,[1] C.-H. Ching,[1] G.-Y. Lin,[1] T.-C. Lin,[1] Y.-R. Li,[1] and S.-L. Chang[1,2] [1]*Department of Physics, National Tsing Hua University &* [2]*Synchrotron Radiation Research Center, Hsinchu, Taiwan, R.O.C. 300,* [3]*Chernovtsy State University, Chernovtsy 274012, Ukraine.*
Keywords: surface in-plane multiple diffraction, dynamical effects, grazing incidence diffraction.

Three-wave resonance grazing incident x-ray diffraction has been realized by tuning the x-ray photon energy to match the incident wavevector with the coplanar momentum transfers of crystal surface in-plane reflections [1]. Near the resonance energy, the specularly diffracted intensities vary according to the phases of structure-factor triplets involved. Very recently, we have applied this technique to investigate the phase-dependence of the diffracted intensities from a GeSi/Ge thin-film system. The intensities of surface in-plane reflections from the GeSi thin film and the Ge substrate are measured using synchrotron radiation near the resonance energies of a three-wave resonance grazing incident diffraction. The broad intensity profiles of the surface in-plane reflections from the thin film provide a general background to reveal the intensity variation due to multi-wave coherent interaction. The perfect match of the in-plane momentum transfer at the interface between the thin film and the substrate is found responsible for the interference of the x-ray wavefields involved. Thus direct phase determination of surface in-plane reflections of the thin films is achieved.

[1] Chang, S.-L., et al (1998) Phys. Rev. Lett. **80**,301-304.