Poster Presentation

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Formation dynamics of CoSi2 thin nanoplates arrays studied by GISAXS in situ

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During the last decades an increasing demand for the development of new methods of preparation of nano-composite materials suited for technological applications has been observed [1]. The interest on these nanomaterials is related to the fact that many of their properties can be varied in a continuous way by changing size, shape and/or spatial ordering. Silicides of transition metals such as CoSi2 are of great interest because of the possibilities that they open to applications as a contact material for microelectronic devices [2]. A simple method for obtaining buried arrays of CoSi2 plates coherently embedded in a Si host lattice was described in a previous study [3]. Grazing-incidence small-angle X-ray "GISAXS" and transmission electron microscopy "TEM" results indicated that the nanoplates exhibit a hexagonal lateral shape and a remarkable uniform thickness. The lattice of each CoSi2 nanoplates was shown to be coherent with the host Si lattice, and parallel to one of the four planes belonging to the Si(111) crystallographic planes family. In this work we present a diffusion dynamics study of Co into Si single crystal lattice using in situ GISAXS setup designed ad-hoc. The Co atoms were initially embedded in a SiO2 thin film deposited on Si(001) substrates subjected to a isothermal treatment during 1 hour at several temperatures between 650-850 oC, The diffused Co react with Si atoms and form CoSi2 nanoplates. GISAXS intensity was modeled assuming that the total scattering intensity is the sum of the intensity produced by a set of spatially uncorrelated and spherical Co nanoparticles – embedded in the SiO2 layer - plus the intensity coming from the hexagonal nanoplates parallel to the different planes of the Si(111) family.

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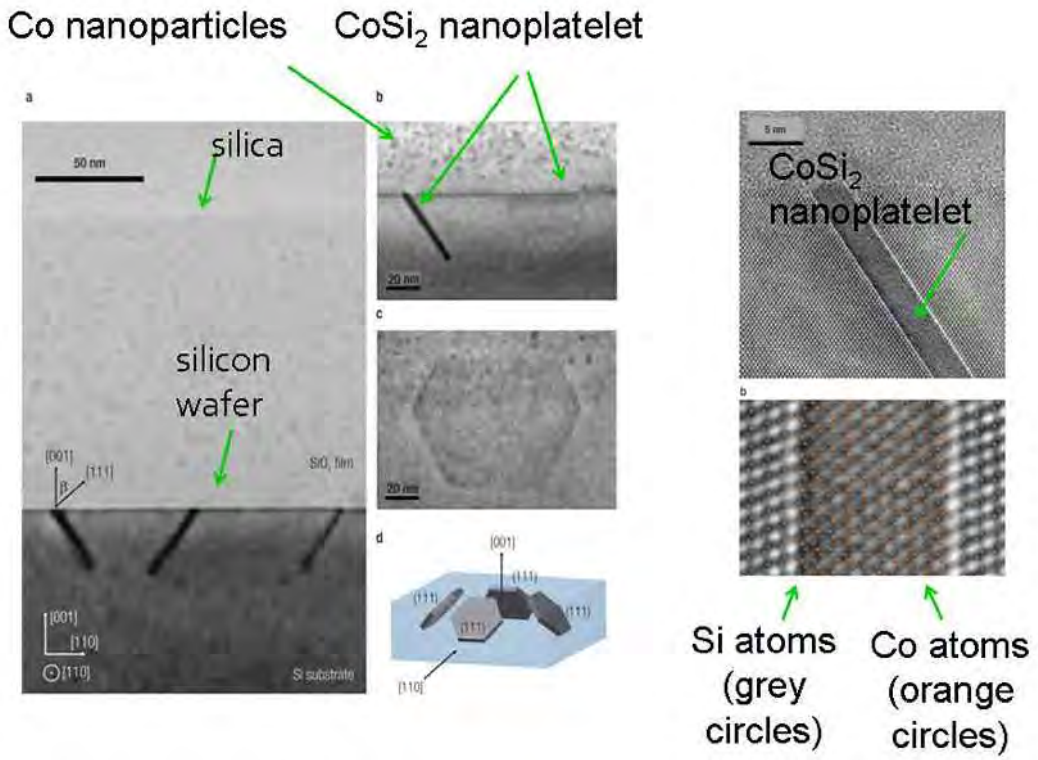

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