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Abstract book

Incoherent structures in lithium submonolayer films on tungsten and molybdenum (112) faces

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In two-dimensional submonolayer metal-on-metal adsorbed films, different structures can form even at low coverages. This is possible because of values of electronegativities of adatoms and adsorbent will be significantly different [1]. Initially, a structure of the films is consistent with a periodic potential of the surface. As the coverage degree θ increases, such a consistency begins to be lost. Reasons are a lateral interaction of adatoms and their size. A vivid example of such films is lithium adsorbed on anisotropic grooved (112) faces of tungsten and molybdenum [2]. Maximum coverage, at which the structures remain consistent with the substrate, is half of the monolayer with a structure p(1×2). Applying a mathematical model of surface diffusion created by us in a homogeneous film, we found that a formation of a coherent structure p(1 × 2) leads to a very sharp decrease of a diffusion coefficient if there are no defects in such a film. The film becomes incoherent in the range of coverages $0.5 < \theta < 1$. Rectangular at $\theta = 0.5$ elementary cell becomes oblique-angled one due to a displacement of rows of adatoms. This is accompanied by loss of a distant order, i.e. a hexatic phase is formed. In real systems, a similar phenomenon was observed by authors [3] in a range of coverages $0.66 < \theta < 0.85$ by measuring the intensity of LEED profiles. In contrast to modern research, a transformation of the structure in the two-dimensional crystalline phase was studied.

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