DS 21: Symposium: Real Time Growth Studies II

Time: Thursday 11:15–12:45 Location: H32

Invited Talk DS 21.1 Thu 11:15 H32

Growth morphology evolution in real time and real space — •Joachim Krug — Institut für Theoretische Physik, Universität zu Köln, Zülpicher Strasse 77, 50937 Köln, Germany

Understanding morphology evolution during thin film growth requires the combination of real time probes, which provide information about the layer coverage distribution and derived quantities such as the surface roughness, and real space imaging which gives insight into the lateral (regular or irregular) structure. The talk will summarize the state of the art that has been achieved in the study of simple model systems, such as homoepitaxial metal films. Starting from the statistical growth limit, where interlayer transport is completely suppressed, we will sketch the quantitative theory of mound formation based on the analysis of nucleation of new layers. We will discuss the relevance of this mechanism for organic thin film growth, and argue that information on the possible suppression of interlayer transport in these systems can be obtained from the shapes of growth spirals. Stochastic roughening mechanisms giving rise to self-affine morphologies will then be briefly reviewed, and the phenomenon of rapid roughening in organic films, where roughness builds up faster than in the statistical growth limit, will be discussed in the context of available theories.

Invited Talk DS 21.2 Thu 12:00 H32

Growing metals on silicon surfaces - STM study in-vivo — •Ivan Ošťádal, Pavel Sobotík, Pavel Kocán, and Jan Pudl — Faculty of Mathematics and Physics, Department of Electronics and Vacuum Physics, Charles University in Prague, V Holešovičkách 2, 180 00 Praha 8, Czech Republic

Scanning tunneling microscopy (STM) was used for direct imaging early stages of heteroepitaxial growth of Ag and In on silicon surfaces during deposition by vacuum evaporation. An experimental arrangement used for such STM in-vivo measurements is presented and discussed. Image sequences showed the behavior of single metal adatoms after arriving on the Si(111)7×7 surface and formation of metal clusters at room and higher temperatures. The data revealed a kind of long range interaction among metal adsorbate [1]. STM cannot image individual, highly mobile, metal adatoms on the the Si(100)2×1 surface at room temperature but dynamics of metal chains growth and decay can be recorded with a single atom resolution. The chains composed of metal adatom dimers form surface structures with morphology given by a type of metal. In-vivo measurements indicate substantial role of surface C-type defects at metal adatom nucleation [2]. The STM data are discussed with respect of models used for kinetic Monte Carlo simulations of the growth.

[1] I. Ošťádal, P. Kocán, P. Sobotík, J. Pudl, Phys. Rev. Lett. 95 (2005) 146101

[2] P. Kocán, I. Ošťádal, P. Sobotík, Surf. Sci. 600 (2006) 3928; P. Kocán, P. Sobotík, and I. Ošťádal, Phys. Rev. B 74 (2006) 037401