# Computer simulation of metal-on-metal growth

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The structures observed in growth experiments result from an interplay between a large number of different, competing processes occurring on the surface. These processes include diffusion of monomers and/or (small) clusters, the formation of islands, deposition of atoms, dissociation of atoms from islands, and interlayer diffusion. Computer simulations provide a powerful tool to study the influence of these processes on the growth properties. From a comparison between simulation results and experimental observations, important information can be deduced about microscopic parameters; information which is, in most cases, difficult to obtain directly from experiments.

In this talk a number of examples will be presented of how computer simulations may be used to interpret the results of (homo-epitaxial) growth experiments. The following topics will be discussed:

- Scaling of the island density and the characteristic island separation with temperature and deposition rate for growth in the sub-monolayer regime.

- Multilayer growth (up to five monolayers), and the influence of an additional energy barrier for interlayer diffusion on the morphology of the grown films.

- Multilayer growth at low temperatures, where single-adatom mobility is negligibly small. A model is proposed to explain the experimental observations of growth oscillations (indicating (quasi) layer-by-layer growth), and of a characteristic island separation of the order of ten interatomic distances.

- The influence of energetic particles bombarding the surface during growth. During sput-

ter deposition and ion-beam-assisted deposition energetic particles ((reflected) primary ions and sputtered particles) hit the growing surface. The influence of these energetic particles on the island density during growth, and on the surface morphology will be discussed.

- The role of surfactants to improve the quality of grown films. The systems Cu/Cu(100) and Cu/Cu(111), both with In as a surfactant are taken as examples to illustrate the possible roles of surfactants, and to show the influence of surfactants on growth properties.

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