

# **Growth and Dissolution of Surface Structures by Electrochemical Control of Self-Assembly of Insoluble Molecular Monolayers**

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Electrochemical control of molecular self-assembly offers a number of interesting perspectives ranging from molecular electronics to nanostructure formation. The potential induced self-assembly monolayers of alkanes was investigated on both reconstructed and unreconstructed Au(111) surfaces under electrochemical control with STM (scanning tunneling microscopy). Hexadecane molecules appeared as 2.2 nm long rods, arranged in parallel rows, in high resolution STM images, suggesting an extended molecular conformation. Reversible order-disorder phase transitions can be induced by moving the electrode potential positive or negative of the stable potential region ( $0.15V_{SCE}$  to  $0.55V_{SCE}$ ) near the potential of zero charge. The growth of the ordered two dimensional phase, as well as the reorientation dynamics of molecules in the monolayer, are observed. In situ STM enabled the influence of the molecular overlayers on surface processes to be monitored in real time following potential driven perturbations. Our results also indicate that self-assembled monolayers modify the growth and dissolution dynamics, as well as the morphology, of nanoscale islands. Furthermore, these self assembled monolayers can serve as templates for selective deposition of other nanoscale structures.