# STRATEGIES FOR CONTROLLED ASSEMBLY AT THE NANOSCALE

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The bottom–up approach is emerging as a viable alternative for low cost manufacturing of nanostructured materials [1, 2]. It is based on the concept of self–assembly of suitable nanostructures on a substrate. We propose various strategies to control the assembly of nanostructures (both organic and inorganic) at the nanoscale. Our approaches include surface patterning through a nanostencil [3, 4] (i.e. a miniature shadow mask with nanoscale features); deposition on naturally patterned substrates, which take advantage of long–range reconstructions [5–7]; and control of non-covalent bonds by co-adsorption at the liquid-solid interface. The general idea is to create nanoscale features on a substrate, which will act as *surface cues* that guide the deposited material into ordered structures. We jokingly call this approach 'Playing Tetris at the Nanoscale' [9]. Finally, new experimental tools are presented to gain atomic scale insight into the surface processes that govern nucleation, growth and assembly [10]. The controlled assembly of building blocks at the nanoscale will be effective for a variety of applications, ranging from nanoelectronics to chemical and biosensors.

**References:**

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**Figures:**

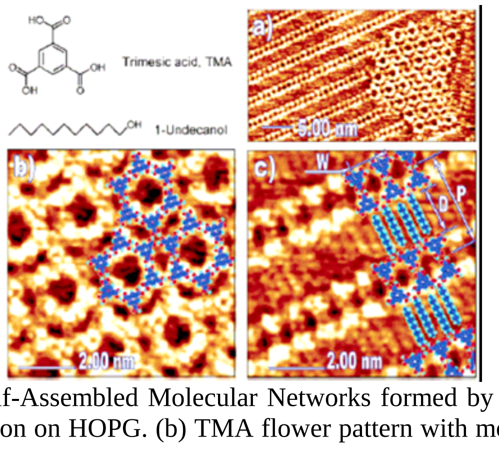


Figure 1. (a) STM image of Self-Assembled Molecular Networks formed by deposition of 1-undecanol and TMA from heptanoic acid solution on HOPG. (b) TMA flower pattern with molecular model. (c) TMA linear pattern with molecular model.

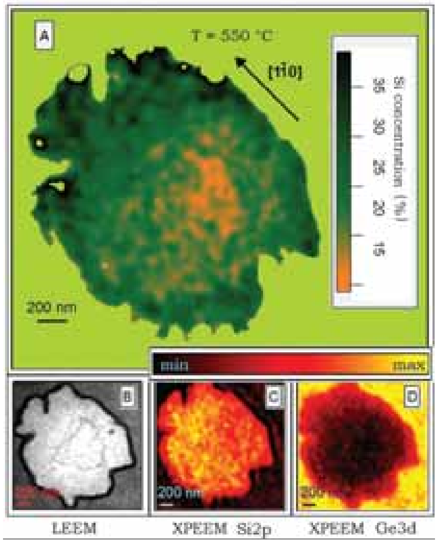


Figure 2. Absolute surface silicon content for a typical Ge(Si) ripened island grown at 550 °C. Sequence (A–D) is as in Figure 1. The Si concentration increases from 15% at the center of the island up to some 40% at the borders. The Si-depleted area tentatively corresponds to the partially eroded region visible in panel (B). This might explain a possible pathway towards the formation of atoll-like morphologies through the removal of the highly strained Ge-richer portions of the island's surface.