Self-Assembled Monolayer Coatings

Organic molecules can self-assemble on various surfaces to form a highly-ordered, crystalline-like monolayer, in which the hydrocarbon chains are oriented almost perpendicular to the surface as shown in figure 1.

Typically, such self-assembled mono layers (SAMs) are formed by dipping the substrate in a solution of the desired molecules and washing off the excess molecules. Alternatively, the molecules can be deposited onto the substrate from the gas phase. Self-assembled mono layers can be used for controlling some specific property of the surface; for example reducing materials adhesion or controlling the contact barrier in electronic circuits. In this project, you will be working on fabricating and characterizing such SAMs.

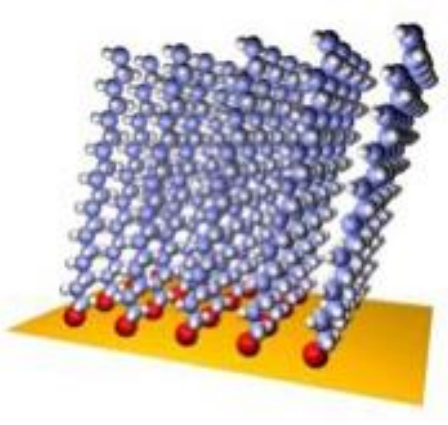

Figure 1 *Schematic illustration of a self-assembled monolayer (SAM).*

In particular, you will learn about several important tools for surface characterization such as AFM, which can be used to examine the topography of a surface with very high resolution. The working principle of an AFM is shown in figure 2 together with an AFM image of a surface where organic molecules have started to form a monolayer.

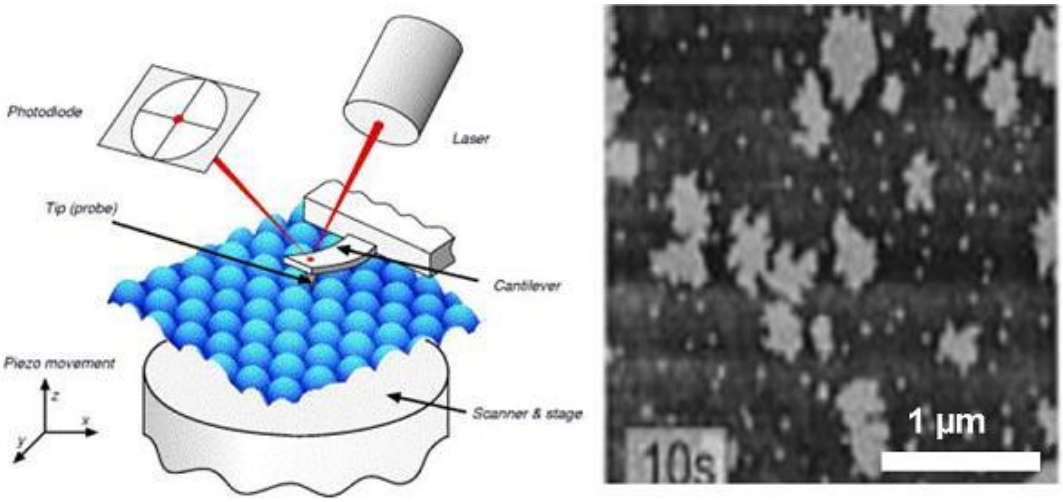

Figure 2 *Schematic illustration of an atomic force microscope, in which a sharp tip on a microcantilever is scanned across a surface to measure the surface topography. The right image (measured with AFM) shows a surface where the self-assembly process has begun but not yet finished. The white areas are islands consist of upright molecules, which will form a complete monolayer when more molecules are added.*

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