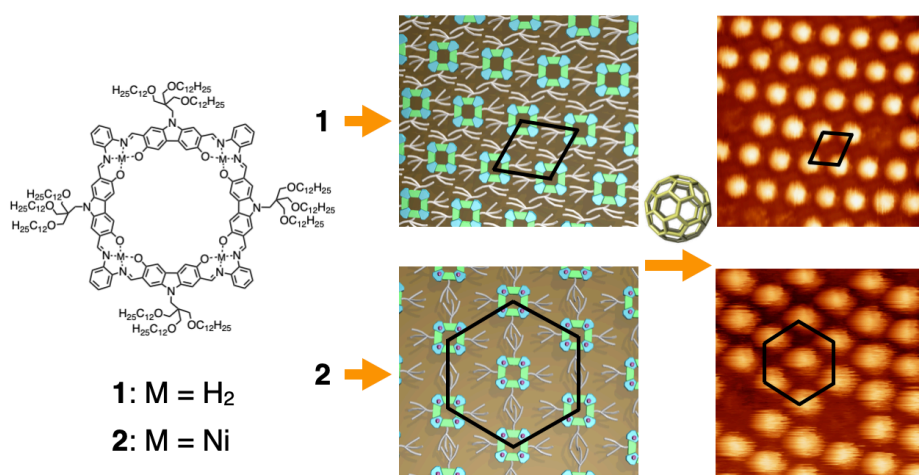


Generation of a Monomerically Dispersed C₆₀ Monolayer Templated by a Two-Dimensional Crystal of Macrocycles

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Keywords: Supramolecular Chemistry; Host–Guest Chemistry; Macrocycle; Nanospace; Scanning Tunneling Microscopy

An integrated array of monomerically dispersed fullerenes on an electrode surface hold tremendous promise for exploration of a new class of exotic organic devices such as monomolecular transistors and molecular memories. A periodic monolayer array of discrete C₆₀s was generated on an atomically flat Au(111) surface with the aid of a template adlayer. As the template, we employed 2D crystals on the surface composed of a shape-persistent macrocycle and its metal complex.¹ The macrocycle was made by 4:4 alternative condensation between carbazole and phenylenediamine precursors and has a 1 nm hollow. Therefore, the macrocycles formed periodic arrays of molecular pits on the surface to capture a fullerene in each pit. Scanning tunneling microscopy (STM) imaging under ultra-high vacuum (UHV) revealed that the square-shaped macrocycles, with 1.5 nm sides, were arranged with a periodicity of approximately 4 nm spacings on the Au(111) surface. The periodic pattern of C₆₀s on the surface was prepared by sublimation onto the surface. C₆₀s were accommodated in the pits and the complex was thermally stabilized up to about 200 °C by CH- π interaction with the inner edge of the pit and by interaction with the gold surface which was observed in a scanning tunneling spectroscopy measurement.²



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