

Supramolecular Self-Assemblies on a Silicon Surface

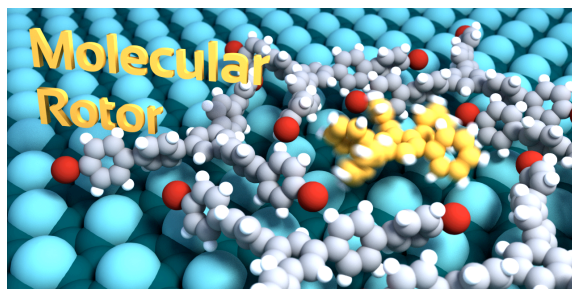
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The formation and control of nano-objects adsorbed onto a surface are one of the most promising challenges in nanotechnology. In this context, molecular components have been successfully reported on noble metal surfaces. Nevertheless, the use of semiconducting interfaces remains important for the development of many devices, such as molecular electronics and materials for energy conversion. From an economic point of view, silicon-based surfaces are the best option, because their costs are much lower than the ones for metallic monocrystalline surfaces. Strong molecule–substrate interactions could be rarely avoided so far; they can disrupt the growth of the supramolecular edifice but can also be helpful for nanostructuring by covalent grafting.

Here, I describe the basic rules for the adsorption of a single molecule on a silicon-based surface without covalent bond between molecule and the surface. Then, the growth of supramolecular networks will be investigated. Finally, by using this new strategy, a thermally-activated rotation of pentaphenylbenzene molecules within nanopores formed in a self-assembled supramolecular network on a silicon-based surface will be achieved. We think that this study opens new avenues for studying the controlled dynamics of molecular machines fabricated on semiconducting surfaces.



Molecular rotator adsorbed in open supramolecular framework on a silicon-based surface