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**Molecular Engineering of Single Molecular Switches and Molecular Assemblies**

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We use molecular design, tailored syntheses, intermolecular interactions and selective chemistry to direct molecules into desired positions to create nanostructures, to connect functional molecules to the outside world, and to serve as test structures for measurements of single or bundled molecules. Interactions within and between molecules can be measured, understood and exploited at unprecedented scales. We look at how these interactions influence the chemistry, dynamics, structure, electronic function and other properties. Such interactions can be used to advantage to form precise molecular assemblies, nanostructures, and patterns. These nanostructures can be taken all the way down to atomic-scale precision or can be used at larger scales. We select and tailor molecules to choose the intermolecular interaction strength and the structures formed within the film. We selectively test hypothesized mechanisms for electronic switching by varying molecular design, chemical environment, and measurement conditions to enable or to disable functions and control of these molecules with predictive and testable means.