

# **“Nanoscale assembly and machinery”**

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Significant progress has been made in creating synthetic molecules capable of internal conformational changes in response to external stimuli in the solution phase. However, their single molecule properties in technologically relevant environments, such as at interfaces and in nanoscale assemblies remain poorly understood. I will describe our recent efforts in probing and controlling molecular machines down to the single molecule level. Three types of molecular motions will be presented: rotary motion by double-decker rare-earth complexes, linear motion by rotaxanes, and light-driven switching motion by azobenzene derivatives. Critical to single molecule observations and control are purposeful molecular design and nanoscale assembly that determine the orientation, spacing and steric interactions of these single molecule machines.