

From Molecules to Dynamic Molecular Systems

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Summary. Among the major challenges ahead in the design of complex artificial molecular systems is the control over dynamic functions and responsive far-from-equilibrium behaviour. Chemical systems ultimately require control over structure, organization and function of multi-component dynamic molecular assemblies at different hierarchical levels. A major goal is the control over translational and rotary motion.

In this presentation focus is on the dynamics of functional molecular systems as well as triggering and assembly processes. We design switches and motors in which molecular motion is coupled to specific functions. Responsive behaviour will be illustrated in self-assembly and photopharmacology. The design, synthesis and functioning of rotary molecular motors will be presented with a prospect toward future dynamic molecular systems. In particular the use of rotary motors as multistage switches, acceleration of rotary motors, transmission and control of catalytic function is described. Finally, assembly of motors on surfaces and autonomous motion is illustrated.

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