

Towards molecular engines: cooperative coupling of molecular motors in engineered environments

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch

Fortsetzungsanträge)

Ausschreibung: Mittelaufteilung

Bewilligung: 18.02.2009

Laufzeit: 3 Jahre

Motivated by the absence of an engine capable of converting chemical energy into mechanical energy without creating heat first, the goal of this project is to hierarchically assemble biomolecular motors into large-scale, functional arrays capable of creating a macroscopic force output. The envisioned molecular engine will consist of a multilayer structure, in which each layer consists of a surface coated with kinesin motor proteins and a surface coated with microtubules. The two surfaces glide with respect to each other as the kinesin motors utilize the chemical energy provided by the hydrolysis of ATP to propel themselves along the microtubules. The team of experimental scientists, theoretical scientists and engineers will develop the scientific understanding and engineering know-how to (1) efficiently couple molecular motors to linear, polar filaments, (2) assemble planar, unipolar arrays of filaments and conformal surfaces, (3) stack motor/filament layers into multilayer structures with enhanced force or velocity of movement, and (4) demonstrate cyclic energy conversion in a Newcomen-type engine.

Projektbeteiligte

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