

Smart materials with remote-controllable, functional molecules

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

Fortsetzungsanträge)

Bewilligung: 01.12.2015

Laufzeit: 3 Jahre

Projekt-Website: <http://www.ifg.kit.edu/english/404.php>

Smart materials will be fabricated by employing confined self-assembly of functional, photoactive molecules. The novel molecular architecture to be developed here for the fabrication of nanomachines with micrometer dimensions will be based on a particular type of crystalline, nanoporous materials, Metal-Organic Frameworks (MOFs). These "Designer Solids" contain pores large enough to allow for photoinduced changes of size and shape of the chromophores. The directed response of the nanomachines will be predicted, analyzed, and finally optimized using accurate theoretical methods. The assembly of the MOFs from metal-containing nodes and organic linkers, will not be carried out using conventional solvothermal synthesis, but via a novel, liquid-phase (quasi-) epitaxy process. The platform for the fabrication of nanomachines to be developed will be used to realize at least three milestones: photon-driven molecular pumps, conveyor belts for nano- and micrometer-sized particles (and droplets), and a millimeter-sized vehicle which can be driven by illumination with light pulses of different colors.

Projektbeteiligte

Priv.-Doz. Dr. Lars Heinke

Karlsruher Institut für Technologie
(KIT)

Institut für Funktionelle Grenzflächen (IFG)
Eggenstein-Leopoldshafen

Prof. Dr. Christof Wöll

Karlsruher Institut für Technologie
(KIT)

Physikalische Chemie
Institut für Funktionelle Grenzflächen
Geb. 330
Karlsruhe

Prof. Dr. Stefan Bräse

Karlsruher Institut für Technologie

(KIT)

Fakultät für Chemie und Biowissenschaften

Institut für Organische Chemie

Karlsruhe

Prof. Dr. Thomas Heine

Technische Universität Dresden

Fakultät für Chemie und Lebensmittelchemie

Theoretische Chemie

Dresden