Photocatalytic processes for micromotion and analytic purposes - PHOTOLYTICS

Initiative: Freigeist-Fellowships

Bewilligung: 28.06.2016

Laufzeit: 5 Jahre

Projekt-Website: https://simmchenresearch.wordpress.com/

Transforming energy into movement seems quite easy, every car or airplane is able to achieve this in the world that is surrounding us. However, this is not the case at the small scale: Micro- and nanomotors have to swim in conditions dominated by viscosity and Brownian diffusion, and it is nearly impossible to add a fuel tank on a microobject. Therefore, micro-swimmers have to be able to convert energy from their surroundings into motion which in most cases requires toxic fuels. This proposal aims at using photocatalytic microswimmers in presence of water as non-toxic fuel and sunlight as a renewable energy source. The first step is the development of highly productive photocatalysts, joined by a study of the mechanism of photocatalytic water splitting. Those optimized materials will be employed as sunlight driven micro- and nanomotors, devices with high potential for various applications. The most promising approach is the degradation of organic pollutants to clean waste water, but also novel sensors will benefit from the renewable energy source propelling the devices. This bi-national proposal between TU Dresden and the CBPF in Rio de Janeiro connects the two attractive fields of photocatalysts and nanomotors towards new excellent synergies in research and it will help rising the general public awareness towards the possible implementation of a circular economy.

Projektbeteiligte

Dr. Juliane Simmchen
Technische Universität Dresden
Physikalische Chemie
Andreas-Schubert Bau
Dresden

Open Access-Publikationen

Inherently asymmetric photocatalytic microswimmers
microfluidics for microswimmers(PhD thesis)