VolkswagenStiftung

Nanocarbons in Aqueous Environment: Spectroscopy Applied to Electro- and Photochemical Processes in Liquid

Initiative: Freigeist-Fellowships

Bewilligung: 01.07.2015

Laufzeit: 5 Jahre

Projekt-Website: http://www.helmholtz-berlin.de/forschung/oe/em/materialentwicklung/research/

research-projects/carbon-nanomaterials-in-liquid-environment_en.html

Nanocarbons are extremely small objects constituted of carbon atoms, which might lead to major breakthroughs in energy, environmental science or medicine. However, since many of their applications take place in water, we need to better understand how they interact with aqueous environment. In particular, the origin and the nature of chemical reactions taking place at the surface of nanocarbons in water, either induced by electronic or light stimuli, have to be unraveled. This project is dedicated to the characterization of the electronic and molecular structures of nanocarbons (mainly nanodiamonds and graphene oxides) in aqueous environment using a combination of spectroscopy methods. Using excitation energies ranging from x-rays to infrared, electrons and molecular vibrations can be probed. The nanocarbons will be characterized directly in liquid environment using microjet or flow cell systems. The impact of visible light excitation and pH change, for example, on the nanocarbon electronic and chemical properties will be examined. From these experiments, a global picture of electro- and photochemical reactions occurring at the surface of nanocarbons in aqueous environment will be drawn, which will facilitate the design of next generation carbon-based materials.

Projektbeteiligte

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Open Access-Publikationen

Unusual Water Hydrogen Bond Network around Hydrogenated Nanodiamonds
X-Ray Absorption Spectroscopy of TiO2 Nanoparticles in Water Using a Holey Membrane-Based Flow Cell
Engineering oxygen-containing and amino groups into two-dimensional atomically-thin porous polymeric carbon nitrogen for enhanced photocatalytic hydrogen production
Combining nanostructuration with boron doping to alter sub band gap acceptor states in diamond materials

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Es werden die Institutionen genannt, an denen das Vorhaben durchgeführt wurde, und nicht die aktuelle Adresse.