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: https://www.helmholtz-berlin.de/forschung/oe/em/materialentwicklung/research/freigeist---

nanocarbon-group/index_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

The Impact of Cation Intercalation on the Electronic Structure of Ti3C2Tx MXenes in Sulfuric Acid
Enhancement of Ti3C2 MXene Pseudocapacitance after Urea Intercalation Studied by Soft X-ray Absorption Spectroscopy
Role of Dopants on the Local Electronic Structure of Polymeric Carbon Nitride Photocatalysts
Vibrational signature of hydrated protons confined in MXene interlayers