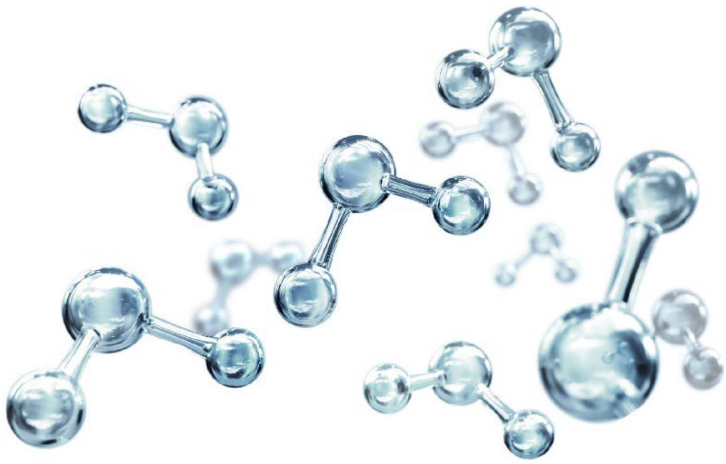
Seminar

Centre for Molecular Water Science

7th of July 2022
12:00 h

Zoom Virtual Meeting:
https://tuhh.zoom.us/j/82631283465
Meeting-ID: 826 3128 3465
Password: 978444



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Water droplets: Electron scattering, hydrated electrons and mass transfer across the air-liquid interface

Low-energy electron scattering in liquid water plays a crucial role in a variety of physical, chemical, and biological processes, including radiation chemistry and biology. The quantitative description of electron scattering, however, has been hampered by the lack of scattering cross sections for liquid water. Our recent studies have resolved this issue: By combining photoemission imaging of water droplets with detailed electron scattering simulations, we have retrieved accurate low-energy electron scattering cross sections for water. The advantage of droplets lies in the additional information on scattering that is provided through optical confinement effects.

We exploit these scattering cross sections to compare genuine (intrinsic) properties (electron binding energy and photoemission anisotropy) of the hydrated electron and its formation dynamics after below and above band gap laser excitation in large water clusters and liquid water. The genuine properties and the formation dynamics in clusters agree well with those in the liquid, suggesting similar properties of the solvated electron in liquid water and large water clusters.

Mass transfer of water between the gas and droplet phase of an aerosol is ubiquitous in our environment. It determines the kinetics of cloud activation by atmospheric organic aerosols. Usually, mass transfer is quantified by the mass accommodation coefficient, which indicates the probability of a gas molecule to stick to the surface upon collision. However, mass accommodation coefficients are difficult to determine experimentally. We show that photoacoustic measurements on single optically-trapped aerosol droplets provide a new route for the determination of accurate accommodation coefficients of water on aqueous surfaces.