TECHNISCHE UNIVERSITÄT WIEN
Vienna | Austria

European Research Council
Established by the European Commission

PhD Positions Available Immediately in ERC Funded Research Project:

Water at Oxide Surfaces: A Fundamental Approach "WatFun"

Project Description:
The water/oxide interface, and the molecular processes that happen there, regulate everything from environmental chemistry and the sequestration of CO_2 to the cohesion of man-made structures. The properties of individual surface sites govern reactivity, so probing chemistry at this level is necessary to better understand natural processes, and to ultimately improve technologies where this interface plays a central role.

In this project, we take a radically new approach to investigate the water/oxide interface at the most fundamental, the atomic, scale: we have found a way to integrate bulk liquid water into ultrahigh vacuum (UHV) setups, where an arsenal of highly-developed techniques is available to investigate surfaces. This provides the opportunity to accurately determine fundamental quantities that were hitherto inaccessible, and to obtain clear-cut experimental results for interpreting and predicting molecular-scale processes.

In this project, we take grasp this opportunity to develop novel measurement concepts, and apply them to minerals. Following a broad work plan we will:

- measure the surface tension of neat water and the surface free energies of solids with unprecedented purity;
- devise a method to determine, site-by-site, the intrinsic proton affinity, the fundamental property that determines the point of zero charge of oxides in solutions, and their Brønsted acidity in gas-phase reactions;
- investigate, at the atomic scale, how liquid water affects surface structure, and how oxides become hydroxylated, dissolve, and 'age';
- discover how ice nucleates on the mineral aerosol surfaces that are crucial in cloud formation;
- study how dissolved CO_2 reacts with natural minerals, which affects the global carbon cycle;
- address the hydrated oxides that form the basis of cements in concrete.

Taken together, we provide a fresh view on environmentally-relevant chemistry, and show how our approach can make an impact in a much wider range of areas.

Masters Degree in Physics or Chemistry required.
Applications by email to:

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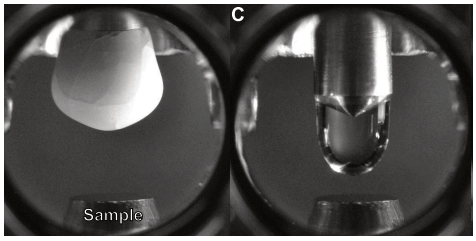

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