Hydration layer mapping on mineral surfaces

A. Kühnle¹ H. Söngen¹ S. Seibert¹ R. Bechstein¹
¹Bielefeld University

Solid-liquid interfaces are omnipresent both in nature and technology. In geo-
chemistry, many processes are governed by the structure and reactivity of the
involved interfaces [1]. Likewise, understanding biomineralization for biomimetic
materials design will require elucidating the fundamental steps in nucleation
and growth at the interface [2]. Recent advances in dynamic atomic force mi-
croscopy (AFM) have opened up the possibility to resolve the solvation structure
at solid-liquid interfaces [3]. In this talk, we will present improvements in AFM
instrumentation that allow for three-dimensional solvation layer mapping [4].
Using this technique, interfacial cations can be identified [5] and defect sites
can be resolved by their hydration structure [6]. These insights will be impor-
tant for gaining a molecular-level understanding of the structure and reactivity
of solid-liquid interfaces.

   Bechstein, Stelanie Klassen, John Tracey, Adam S. Foster, and Angelika Kühnle, Langmuir 33,
   125 (2017).