# Molecular Adsorption at Biological Interfaces

**Ellen H.G. Backus[1], Sudipta Das[2], and Mischa Bonn[2]**

*[1]University of Vienna, Department of Physical Chemistry, Währinger Straße 42, 1090 Vienna, Austria*
*[2]Department of Molecular Spectroscopy, Max Planck Institute for Polymer Research, Ackermannweg 10, 55128 Mainz, Germany*

Physical and chemical processes occurring at aqueous interfaces play a prominent role in a variety of fields ranging from the chemistry of atmospheric aerosols and heterogeneous catalysis to biophysics and biochemistry. In many of these processes, ions play a prominent role. By using the surface-sensitive spectroscopic method sum-frequency generation (SFG), the surface propensity of environmentally relevant ions has been determined. With the SFG method basically the vibrational spectrum of just the interfacial layer will be obtained.
As autoionization products of water, both the hydrated proton and hydronium are naturally present in bulk water and at the surface. As such, we studied the surface affinity of these ions. By determining the onset concentration of surface adsorption at the water-air surface of hydrated protons and hydroxide ions, we can determine the relative surface-activity. To this order, we perform SFG experiments on the O-H stretch vibration. We will discuss how spectral changes in the response from hydrogen bonded molecules can be related to the surface adsorption of the hydrated ions. Moreover, changes in the spectral signature of the so-called free OH molecule sticking out in the air are used to determine the adsorption free energy of the proton [1, 2].
By comparing NaCl and HCl solutions at the water-air interface and covered with a monolayer of negatively charged surfactants, we could demonstrate as well that the surface propensity of ions is a function of both the nature of the ion and the nature of the surface [3].

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[3] S. Das, M. Bonn, E.H.G. Backus, J. Chem. Phys. **150**, 044706 (2019).