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Simultaneous determination of zeta-potential and spectroscopic properties of relevant ice nucleation substances

Ahmed Abdelmonem (1) and Johannes Lützenkirchen (2)

(1) Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology (KIT) - Germany, (2) Institute for Nuclear Waste Disposal, Karlsruhe Institute of Technology (KIT) - Germany

A home-made cell adapted to a commercial streaming potential device allows for simultaneous measurements of zeta-potential and spectroscopic properties of relevant ice nucleation substances. Such information is highly important to determine the ice nucleation properties of charged relevant atmospheric surfaces [1, 2]. Obtaining simultaneous results on one system yields a valuable insight into the complex mineral-water interfaces, which have been previously obtained by separated measurements. The new experimental set-up that permits the study of one specific sample with different approaches not only avoids sample handling but also allows for direct transferability of results. The cell currently is suitable for flat surfaces (i.e. single crystal surfaces (ideally of a defined cut), prisms, half-spheres and half-cylinders). We present results on various systems, including a hydrophilic alumina surface, a hydrophobic surface, and a dissolving mineral surface. The distinct differences in the outcome of the measurements indicate that the set-up also will allow using the nonlinear optical signal to define an equilibrium condition at the interface, which is currently assumed for the streaming potential measurements. An upgrade to a supercooled cell will be presented.

1. A. Abdelmonem, E.H.G. Backus, N. Hoffmann, M.A. Sánchez, J.D. Cyran, A. Kiselev, and M. Bonn, Surface-charge-induced orientation of interfacial water suppresses heterogeneous ice nucleation on α-alumina (0001). Atmos. Chem. Phys., 2017. 17(12): p. 7827-7837.
2. A. Abdelmonem, Direct molecular-level characterization of different heterogeneous freezing modes on mica – Part 1. Atmos. Chem. Phys., 2017. 17(17): p. 10733-10741.