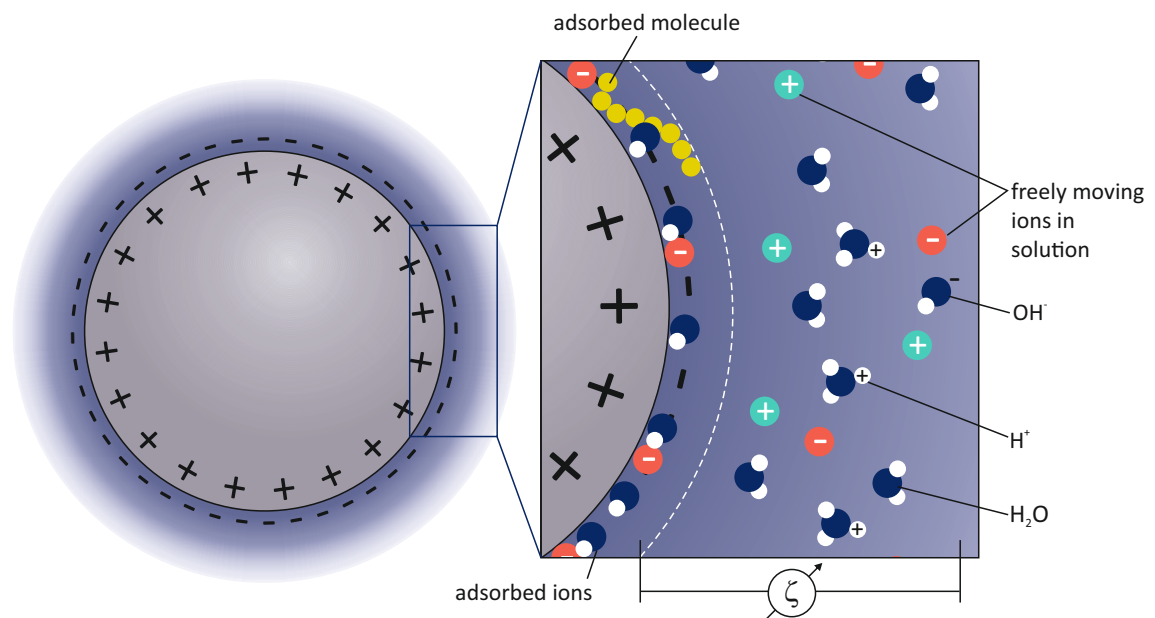


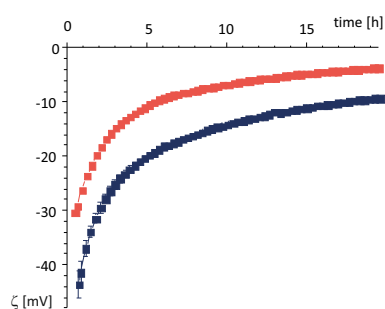
Applied Electrokinetics

The macroscopic properties of surfaces, their interactions and reactivity are determined by their polarity and acid-base properties, i.e. the charge of their dissociable surface groups. In our keylab "Applied Electrokinetics" we study charge formation and compensation processes of dispersed solids, particles, fibers, thin films and extended solid surfaces on multiple scales in contact with aqueous solutions. The measurement of the electrokinetic or zeta potential gives information on surface functionalities, dissociation and adsorption processes, and chemical reactions at the solid-liquid interface. Combined with the results of complementary analytical methods such as surface spectroscopy and wetting measurements, the zeta potential measurement is an important basis for the understanding of surface properties, adhesion and interaction mechanisms, and the physical and chemical surface modification.

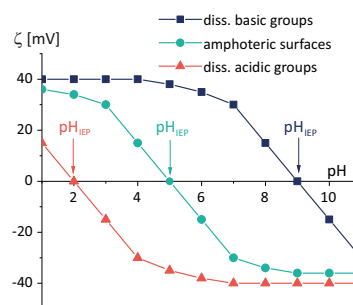


Principle

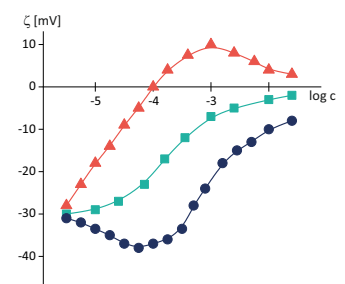
Determination of the zeta potential (electrical potential at the shear plane between native and strongly adsorbed charges at solid surfaces and the freely moving ions in the solution) in dependence on time, pH value, and the concentration of electrolytes or other adsorbing substances.



time-dependent measurement: swelling, chemical reactions



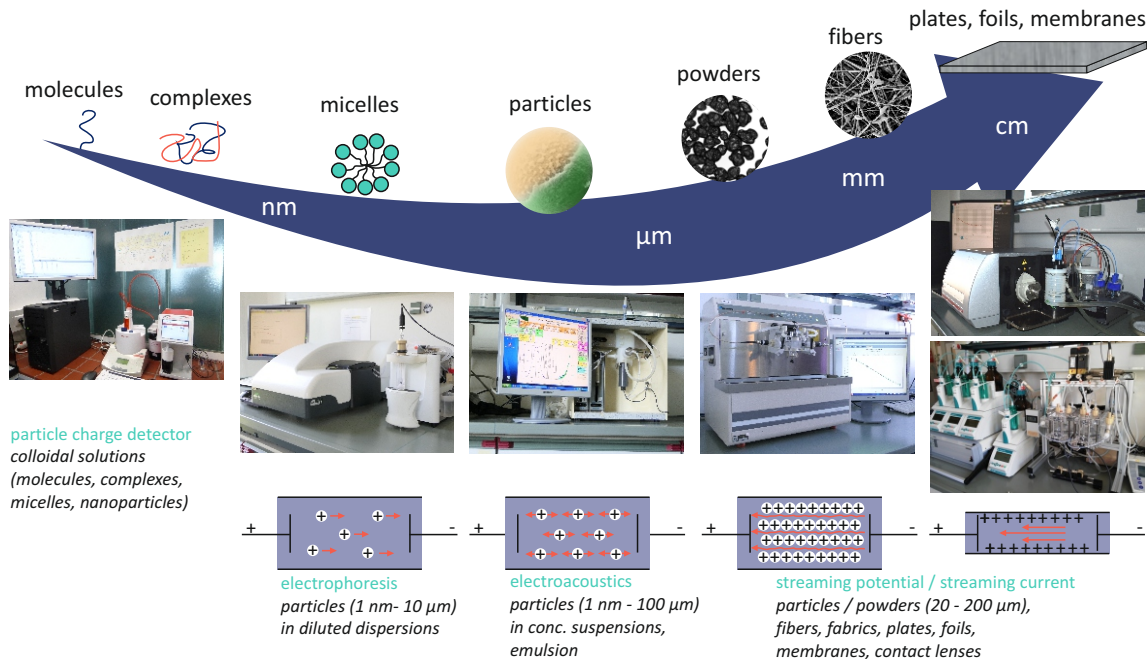
pH-dependent measurement: acid/base behavior, dissociation, adsorption



concentration-dependent measurement: adsorption, charge reversal

Equipment

For the characterization of solids of different size and geometry, commercial devices basing on different electrokinetic techniques, partly with particle measurement, are available.



Applications

Electrokinetic measurements are applied in various fields including biotechnology, semiconductor materials and devices, micro- and nanodevice fabrication and processing, electronic and optical functional materials, energy, water purification technology, adhesives, functional coatings, lightweight construction, etc., to investigate properties and effects such as

- charge and stability of colloidal substances
- dissociation, adsorption, flocculation
- adhesion of particles and (bio-)molecules
- surface functionalization, modification, reactivity
- electrostatic effects, e.g. in filtration processes
- bonding strength of coatings and adhesive joints
- filler-matrix interactions in composites

Selected publications

- Bellmann, C. ; Caspari, A. ; Moitz, C. ; Babick, F. Dynamische und elektroforetische Lichtstreuung. Anton Paar GmbH, Graz 2018
- Grundke, K. Characterization of polymer surfaces by wetting and electrokinetic measurements. in: Stamm, M. (Ed.) Polymer Surfaces and Interfaces, Springer, Berlin Heidelberg 2008, 103-138
- Bellmann, C. ; Synytska, A. ; Caspari, A. ; Drechsler, A. ; Grundke, K. Electrokinetic investigation of surfactant adsorption. Journal of Colloid and Interface Science 309 (2007) 225-230
- Bellmann, C. ; Klinger, C. ; Opfermann, A. ; Böhme, F. ; Adler, H.-J. Evaluation of surface modification by electrokinetic measurements, Progress in Organic Coatings 44 (2002) 93-98
- Jacobasch, H.-J. ; Simon, F. ; Werner, C. ; Bellmann, C. Elektrokinetische Meßmethoden: Grundlagen und Anwendungen. Technisches Messen 63 (1996) 439-446
- Jacobasch, H.-J. Characterization of solid surfaces by electrokinetic measurements. Progress in Organic Coatings 17 (1989) 115-133

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Cooperations

