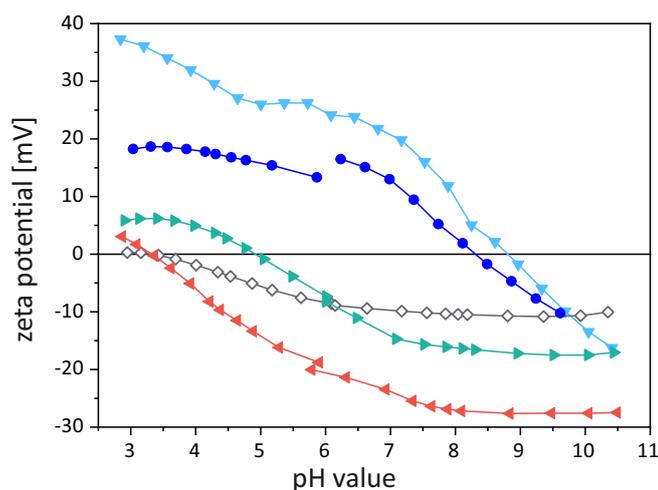
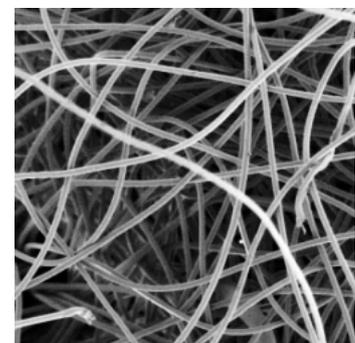
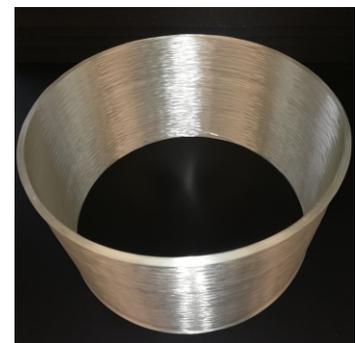


Applied Electrokinetics: Fibers and Textiles

For many applications of fibers, e.g., in special and technical textiles, filters or fiber-reinforced composites, their surface properties such as charge and wettability play an important role. They determine not only the properties of fabrics and nonwovens but also the particle retention in filters or the fiber-matrix interaction in composites. Targeted surface properties are often adjusted by finishings and coatings. By means of streaming potential measurements – in combination with complementary surface analysis methods as wetting measurements or spectroscopy – we can identify functional groups on fiber surfaces and verify functionalizations and coatings. Furthermore zeta potential measurements are an important basis for a controlled physical and chemical modification of fiber surfaces.

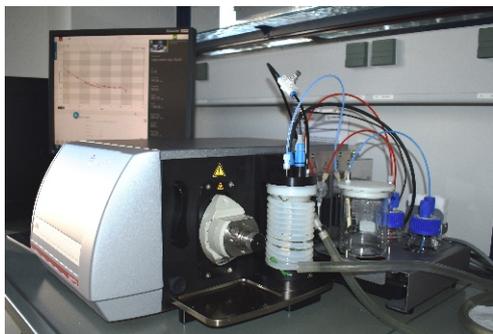
Applications

- characterization and finishing of natural fibers
- adsorption of sizing components and surfactants on glass and carbon fibers
- activation and functionalization of polymer and carbon fibers
- special textiles, functional nonwovens and fabrics
- soil-repellent finishing of natural and polymer fibers
- performance and electrostatic charging of functional textiles and filters
- control of properties and coatability of fiber-polymer composites, e.g. sheet-molding compounds (SMC)
- strain-hardening cement composites (SHCC) and textile-reinforced concrete
- smart textiles and actuators



Zeta potential of polyelectrolyte-modified polyvinyl alcohol fibers for fiber-reinforced concrete
blue: basic modification, red: acidic modification, cyan: amphoteric, gray: reference (unmodified)

Equipment



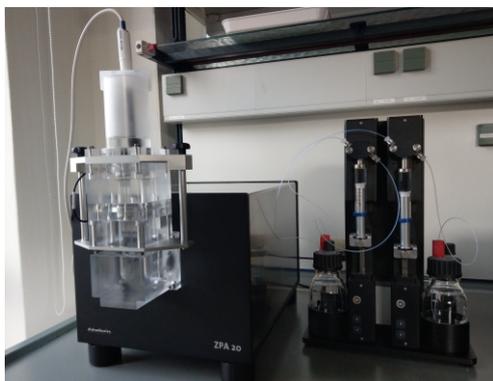
SurPASS™ 3 (A. Paar GmbH)

streaming potential measurements in aqueous solutions
cylindrical cell for fibers and textiles
pH titration, concentration dependence



EKM (ZetaScience)

streaming potential measurements in aqueous solutions
cylindrical cell for fibers and textiles
pH titration, concentration dependence



ZPA 20 (DataPhysics Instruments GmbH)

streaming potential measurements in aqueous solutions
cylindrical cell for fibers and textiles
pH titration, concentration dependence

Selected publications

- Drechsler, A. ; Frenzel, R. ; Caspari, A. ; Michel, S. ; Holzschuh, M. ; Synytska, A. ; Curosu, I. ; Liebscher, M. ; Mechtcherine, V. Surface modification of poly(vinyl alcohol) fibers to control the fiber-matrix interaction in composites. *Colloid and Polymer Science* 297 (2019) 1079-1093
- Kuhr, M. ; Synytska, A. ; Bellmann, C. ; Aibibu, D. ; Cherif, C. Methods for a permanent binding of functionalized micro-particle on polyester fabric for the improvement of the barrier effect. *Journal of Industrial Textiles* 46 (2016) 643-663
- Bellmann, C. ; Plonka, R. ; Caspari, A. ; Grundke, K. Investigation of competitive adsorption of fibre sizing components: possibilities of electrokinetics. *Composite Interfaces* 20 (2013) 279-286
- Bellmann, C. ; Caspari, A. ; Albrecht, V. ; Loan Doan, T.T. ; Mäder, E. ; Luxbacher, T. ; Kohl, R. Electrokinetic properties of natural fibres, *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 267 (2005) 19-23

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