

PROTEINS AND SURFACES: A CHARGED RELATIONSHIP

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The interaction of proteins with solid surfaces is one of the central problems of modern biotechnology: On the one hand, adsorption on proteins must be prevented in many circumstances in order to prevent bacterial growth or biofouling, on the other hand, immobilization of enzymes on suitable solid supports is of considerable technical importance. Up to now, there is only a limited understanding of the driving forces for protein adsorption. Very often the so-called hydrophobic forces are held solely responsible for protein adsorption. However, Coulomb interactions are operative as well and may become decisive at low ionic strength. In my lecture I'll present our recent work on this problem. The role of Coulombic forces will be discussed in detail. In particular, calorimetry has been used to demonstrate the central importance of entropic forces for protein adsorption with densely grafted polyelectrolytes [1]. Recently, we have extended this work to the interaction of proteins with charged gels in collaboration with J. Dzubiella [2]. All results obtained so far demonstrate that the interaction of proteins with surfaces can be understood in a semi-quantitative fashion by now.

1. K. Henzler, B. Haupt, K. Lauterbach, A. Wittmann, O. Borisov, M. Ballauff, Adsorption of beta-Lactoglobulin on Spherical Polyelectrolyte Brushes: Direct Proof of Counterion Release by Isothermal Titration Calorimetry, *J Am Chem Soc*, **2010**, *132*, 3159-3163.
2. N. Welsch, A. L. Becker, J. Dzubiella, M. Ballauff, Core-shell microgels as „smart“ carriers for enzymes, *Soft Matter*, 2012, advance article