Multistranded protein fibrils and unfolded proteins in contact with polysaccharides and substrates

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The adsorption and immobilization of proteins on solid surfaces is among the most important problems in biochemical research given that many biologically processes occur at interfaces. In combined experimental and theoretical efforts the adsorption of proteins on metal surfaces [1] and spherical polyelectrolyte brushes [2] has been studied. On metal surfaces two- and three-dimensionally folded proteins as well as unfolded proteins can be found depending on the interaction between the proteins and the substrate. Electrospray ion beam deposition allows for a conformational selective adsorption of proteins. This opens the possibility for functional protein structures at surfaces.
An interesting case of protein aggregation is the conversion of specific proteins from their native form into very stable fibrils. Some of those fibrils are related to human diseases, while others are of use for food processing. The fibrillation of β-lactoglobulin due to thermal treatment and the dynamics of β-lactoglobulin amyloid fibrils have been studied [3]. Moreover, the complexation of β-lactoglobulin fibrils and oppositely charged polysaccharides has been investigated [4]. The polysaccharides act as interlocking components to form fibril networks.

[1] A close look at proteins: submolecular resolution of two- and three-dimensionally folded cytochrome c at surfaces, Nano Lett. 12, 2452 (2012).
[2] Interaction strength between proteins and polyelectrolyte brushes: a small angle x-ray scattering study, Phys. Chem. Chem. Phys. 13, 17599 (2011).
[3] Gelation, phase behavior, and dynamics of β-lactoglobulin amyloid fibrils at varying concentrations and ionic strengths, Biomacromolecules 13, 3241 (2012).
[4] Complexation of β-lactoglobulin fibrils and sulfated polysaccharides, Biomacromolecules 12, 3056 (2011).