

PROTEIN-REPELLING DEPOSITED LAYERS FROM COMPLEX COACERVATE MICELLES

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In order to suppress fouling of surfaces due to, e.g., protein adsorption and bacterial adhesion, surfaces are often covered with water-soluble, neutral polymers. Poly ethyleneoxide (PEO, PEG), end-attached to the surface has been used with particular success. The extended hydrophilic chains, often denoted as 'brushes', serve as a barrier for the particles that must be repelled from the surface. For robust and easy application, methods are needed by which one can prepare hydrophilic brushes easily and reliably on a variety of surfaces, preferably with some freedom to tune the brushes to specific needs. Both chemical and physical interactions have been used for this purpose, but many methods have limitations.

We discuss in this contribution a new method, namely anchoring the brush by means of a complex coacervate. This method relies on first preparing micelles by mixing two oppositely charged polymers, one of which carries one or more neutral hydrophilic blocks which are to form the brush.

When mixed in the right proportions, micelles appear by electrostatically driven association of the pair of charged polymers. These micelles have a core consisting of the two charged polymers in the form of an insoluble complex, surrounded by a 'corona' of the neutral hydrophilic blocks. We discuss the properties of these micelles, and the forces that drive their formation, and how the solution behaves as a function of polymer composition.

We also discuss the deposition of the micelles on a variety of surfaces: charged, neutral, hydrophobic and hydrophilic, demonstrating that their tendency to adsorb is almost independent of the nature of the surface. Finally, we show that the treated surfaces are protein repellent under a wide variety of conditions, which makes them promising candidates for biomedical applications.

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