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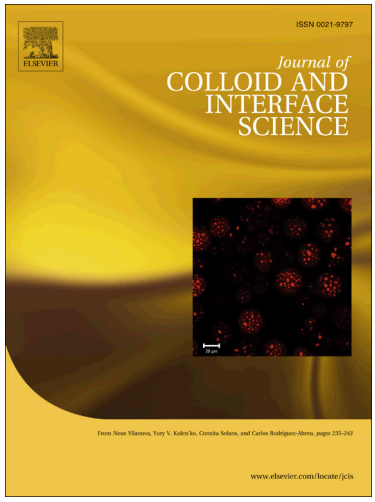

Regular Article

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Controlling adsorption of albumin with hyaluronan on silica surfaces and sulfonated latex particles

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ABSTRACT

Polysaccharides are known to modify binding of proteins at interfaces and this paper describes studies of these interactions and how they are modified by pH. Specifically, the adsorption of human serum albumin on to polystyrene latex and to silica is described, focusing on how this is affected by hyaluronan. Experiments were designed to test how such binding might be modified under relevant physiological conditions. Changes in adsorption of albumin alone and the co-adsorption of albumin and hyaluronan are driven by electrostatic interactions. Multilayer binding is found to be regulated by the pH of the solution and the molecular mass and concentration of hyaluronan. Highest adsorption was observed at pH below 4.8 and for low molecular mass hyaluronan (≤ 150 kDa) at concentrations above 2 mg ml^{-1}. On silica with grafted hyaluronan, albumin absorption is reversed by changes in solvent pH due to their strong electrostatic attraction. Albumin physisorbed on silica surfaces is also rinsed away with dilute hyaluronan solution at pH 4.8. The results demonstrate that the protein adsorption can be controlled both by changes of pH and by interaction with other biological macromolecules.

Keywords: Adsorption, Albumin, Hyaluronan, Polystyrene latex, Small-angle neutron scattering, Neutron reflectivity, Hydrophobic interaction; Electrostatic interaction