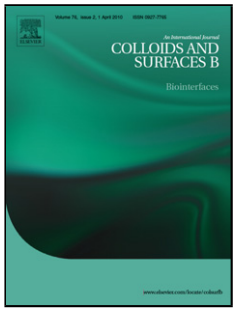

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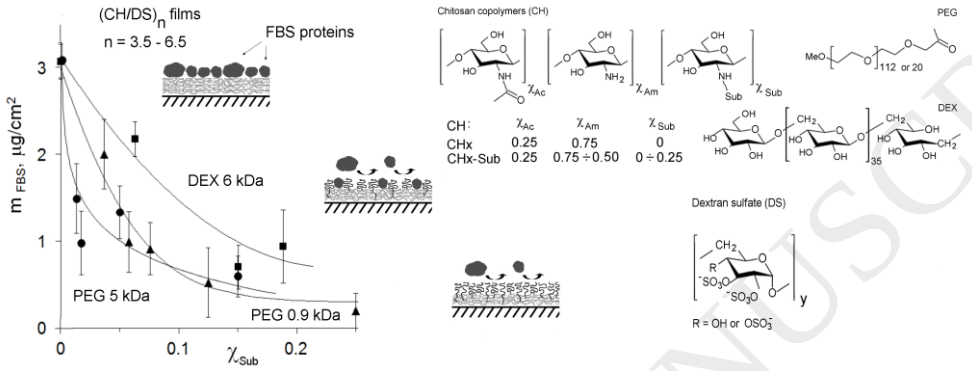
Layer-by-Layer Films of Polysaccharides Modified with Polyethylene Glycol and Dextran

Tatsiana G. Shutava*, Kanstantsin S. Livanovich and Anastasiya A. Sharamet

Institute of Chemistry of New Materials, National Academy of Sciences of Belarus, Minsk, Belarus

**Corresponding author:* Tatsiana Shutava, PhD, Leading Researcher, Institute of Chemistry of New Materials, National Academy of Sciences of Belarus, F.Skaryny St. 36, Minsk, 220141 Belarus, Fax: (375)17-237-68-28; tshutova@yahoo.com, shutova@ichnm.basnet.by

Graphical abstrcat



Highlights

- PEG or dextran-grafted chitosans replace parent polymer in layer-by-layer films
- Copolymer–based films show high resistance to protein adsorption
- Antifouling properties of copolymer films are controlled by side chains overlapping
- PEG and dextran side chains are equally effective in preventing protein adsorption

Abstract: Layer-by-layer (LbL) films with enhanced resistance to protein adsorption were obtained on the basis of N-grafted copolymers of chitosan with polyethylene glycol (PEG) or dextran (DEX). The copolymers with the backbone molecular weight of 18 and 450 kDa, side chains of PEG of 5.0 and 0.9 kDa, DEX of 6.0 kDa and the degree of amine groups substitution χ_{Sub} as high as ~0.25 were alternated with dextran sulfate (DS) to assemble up to 10 bilayer films. The film material contains 85±5% of water with virtually no effect of the copolymer structure. By utilizing the graft copolymers and applying suitable number of copolymer/DS bilayers to the surface, the mass of adsorbed fetal bovine serum proteins was decreased by 70-85 % as compared to that on unmodified chitosan/DS film. In terms of overlapping side chains on the LbL surface the copolymers of PEG and DEX are equally effective in tailoring protein-resistant materials.