

~~~~ Polymer Physics Seminar ~~~~

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**301 Steidle Bldg.**

**Layer-by-Layer Coatings for Low-Fouling Reverse Osmosis Membranes**

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Biofouling is a problematic issue in ship operation, membrane desalination, medical applications and many other fields, which increases the operational cost and lowers the overall efficiency.<sup>1, 2</sup> In membrane mediated desalination process, many traditional membrane materials are hydrophobic and prone to biofouling. Polyethylene oxide (PEO) derivatives were often chosen to be incorporated into surface coating to improve antifouling properties for its great hydrophilicity.<sup>3</sup> However, PEO is dissolvable in water and other solvents, which limits its application significantly.

Layer-by-layer assembly is a preferred surface modification technique because it is easy to process, low on cost and has a variety of polymers and functionalities that can be incorporated. Recently it has been found that PEO-polyurethane LBL assembly displayed stability in water, salt water and sodium hydroxide solutions.<sup>4</sup> Thus it drew our interest to test the antifouling properties of the PEO-polyurethane LBL assembly and investigate its potential as an antifouling coating. The protein adsorption properties of the PEO-polyurethane LBL assemblies were characterized and their ability to withstand salt solution as well as sodium dodecyl sulfate (SDS) cleaning was also tested.

Electrostatic double layer forces were shown to affect initial cell and particle deposition. Since the charge polarity of the LBL assembly surface can be easily manipulated, it provides an ideal platform to investigate the influence of surface charge on protein adsorption. In this study, proteins with different isoelectric points were tested on differently charged surfaces. The results were compared and discussed.

- (1) Jarusutthirak, C.; Amy, G. Environmental science & technology. 2006, 40, 969-74.
- (2) Chambers, L. Stokes, K. Walsh, F.; Wood, R. Surface and Coatings Technology. 2006, 201, 3642-3652.
- (3) Asatekin, A. Kang, S. Elimelech, M.; Mayes, A. M. Journal of Membrane Science. 2007, 298, 136-146.
- (4) Jang, W.-S. Saito, T. Hickner, M. a; Lutkenhaus, J. L. Macromolecular rapid communications.2010, 31, 745-51.