Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Polyelectrolyte Uptake by PEMs at High Salt**[1] DAVID HOAGLAND, Dept. of Polymer Sci. and Eng., Univ. of Massachusetts Amherst, ZHAOHUI SU, BO PENG, XINGJIE ZAN, State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of Applied Chemistry — Upon a jump in salt concentration, a polyelectrolyte multilayer (PEM) constructed by the layer-by-layer process will swell, and in consequence, uptake from solution a large additional mass of the capping polyelectrolyte. Here, swelling and uptake are monitored in time by the quartz crystal microbalance with dissipation (QCM-D) method as a function of elevated salt concentration (0.75M<[NaCl]<2.5 M) during the uptake of poly(styrene sulfonate) (PSS, MW∼70,000 g/mol) by poly(diallyldimethylammonium chloride)/PSS PEMs made at [NaCl]=0.5M. For [NaCl] less than ∼1 M, PSS adds only at/near the PEM surface, while for higher [NaCl], PSS fully permeates the PEM, contributing a PSS mass approaching, even exceeding, that already present; higher salt concentration leads to faster and greater PSS uptake. Above [NaCl]=1.0 M, uptake is diffusive, characterized by surprisingly large and sharply [NaCl]-dependent diffusion coefficients ($\sim 10^{-14} - 10^{-12}$ cm$^2$/s). This uptake process opens a general opportunity for facile bulk and surface modifications of PEMs.

[1] D.H. acknowledges support of the NSF-sponsored Univ. of Massachusetts MRSEC and Z.S. acknowledges support of the National Natural Science Foundation of China (50921062)

David Hoagland
Dept. of Polymer Sci. and Eng.,
Univ. of Massachusetts Amherst

Date submitted: 17 Nov 2011 Electronic form version 1.4