Abstract Submitted
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Ion Dispositions in Polyelectrolyte Multilayer Films[1] DAVID HOAGLAND, Polymer Sci. & Eng. Dept., Univ. of Massachusetts Amherst, ZHAOHUI SU, XINGJIE ZAN, TIAN WANG, Changchun Institute of Applied Chemistry — Polyelectrolyte multilayers (PEMs) fabricated from sodium chloride-containing solutions of poly(diallyldimethylammonium chloride) (PDDA) and poly(styrene sulfonate) (PSS) were examined by various techniques to determine the dispositions of polyelectrolytes and counterions across the PEM thickness. The key technique was dry film QCM, which quantified incremental mass depositions during PEM assembly. Counterion dispositions depended strongly on salt concentration, and three salt regimes were identified: zero to near zero salt ([NaCl] less than 0.1M), low salt ([NaCl] between 0.1M and 0.75M), and high salt ([NaCl] greater than 0.5M]). The first two are associated with linear PEM growth while the latter is associated with exponential PEM growth. At zero salt, no counterions are present in the PEM bulk (middle), while at low salt, an excess of PDDA charge across the bulk coincides with an excess of counteranions. Differently, at high salt, deposited PSS permeates the PEM bulk, conveying an excess of countercations. At all salt concentrations, the PEM surface charge alternates according to the capping polyelectrolyte's identity. Accumulations of small ions in the bulk can be ascribed to as yet poorly understood property asymmetries between the two deposited polyelectrolytes.

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