

Abstract Submitted
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Polyelectrolyte Adsorption and Multilayer Formation: Effects of Fluctuation and pH QIANG WANG, YING JIANG, Colorado State University — Using a self-consistent field theory, we have studied the adsorption of flexible polyelectrolytes (PE) on oppositely charged, flat substrates. We examined the effects of PE charge distribution and degree of ionization, substrate charge density, short-range surface-polymer interactions, solvent quality, bulk polymer and salt concentrations, and PE chain length on the conditions under which strong charge inversion can be obtained. The fluctuation effects were studied using the one-loop expansion and revealed by comparing with the mean-field results. We have further modeled the layer-by-layer assembly process using oppositely charged PE. We study in detail the effects of substrate charge density, PE degree of ionization, and bulk salt concentration on the internal structure and charge compensation of the multilayer formed by either strongly dissociating PE or weakly dissociating PE (where the effects of solution pH were examined). A universal rule of charge compensation is found at the steady state, where two consecutively deposited layers carry no net charge. Our results agree with most experimental findings on PE layer-by-layer assembly.

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