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Ionic Effect on the Conformations of Weak Polyelectrolyte Brushes: from Monovalent, Multivalent to Macro ions CHEN QU, ZHONGLI ZHENG, Y. ELAINE ZHU, Univ of Notre Dame — The conformation structure and resulting interfacial properties of surface tethered weak polyelectrolyte brushes exhibit strong dependence on solution conditions, such as pH and ionic strength, due to the tunable ionization along the polymer backbone. In this work, we investigate the influence of counterions on wetting and swelling characteristics of positively charged poly(2-vinyl pyridine) (P2VP) brushes grafted to a solid surface. The critical transition pH, at which stretched P2VP brush chain collapse with a resulting increase in P2VP surface hydrophobicity, is determined in aqueous solutions by AFM, QCM, and contact angle goniometer. The critical transition pH is observed to shift to higher pH values by adding monovalent counterions of increased concentration. In contrast, an opposite trend toward lower pH range is observed by adding divalent counterions; similar behavior is also observed with added nanocluster macroions. However, it appears that reentrant counterion condensation is only observed with P2VP brushes added with divalent ions, but not with monovalent ions or macroions. Distinct scaling behaviors of P2VP brush thickness with three different types of counterions are also obtained.

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