

Abstract Submitted
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Effects of mixing ratio, salt concentration and temporal trend on the formation of polyelectrolyte complex YANPU ZHANG, Department of Chemical Engineering Texas A&M University, EROL YILDIRIM, HANNE ANTILA, MARIA SAMMALKORPI, Department of Chemistry Aalto University, JODIE LUTKENHAUS, Department of Chemical Engineering Texas A&M University, TEXAS A&M UNIVERSITY COLLABORATION, AALTO UNIVERSITY COLLABORATION — Polyelectrolytes complexes (PEC) form by mixing polycation/polyanion solutions together. Promising applications of PECs range from industrial flocculants, coatings, and membranes to advanced materials for solar cells, injectable hydrogels, and chemical sensors. One challenge for PEC processing and application is that their physical properties are often time-dependent. In this work, we report on the influence of polycation/polyanion mixing ratio, salt concentration, and time on the formation of PECs made from poly(diallyldimethylammonium chloride) (PDAC) and poly(styrene sulfonate sodium salt) (PSS). Physical such as turbidity, hydrodynamic size, and zeta potential are investigated as a function of time. We find various critical values that can be used to predict whether a PEC will remain stable in suspension or whether it will gradually aggregate and precipitate. We discuss these findings in relation to the stepwise aggregation model that depicts primary PEC particles gradually form larger aggregates. Finally, we perform detailed molecular dynamics simulations to examine the structure and effective charge distribution of the PECs with their temporal stability at varying mixing ratios and salt concentrations to support the experimental findings.

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