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Water's Role in the Relaxation of Polyelectrolyte Complexes and Multilayers JODIE LUTKENHAUS, YANPU ZHANG, DARIYA REID, Texas AM University, HANNE ANTILA, EROL YILDIRIM, RAN ZHANG, MARIA SAMMALKORPI, Aalto University — In the last decade, evidence for an intriguing glass-transition-like phase transition has emerged in hydrated polyelectrolyte complex precipitates and polyelectrolyte multilayers. Although the transition is weak, it stimulates large-scale macroscopic phenomena such as multilayer shrinking, swelling, and rearrangement. To date, there is not a clear consensus on what causes this transition, although a growing body of evidence indicates that salt and water are key parameters. Recent simulations of hydrated polyelectrolyte complexes show that water molecules form a stabilizing hydrogen-bonded network and that this network is disrupted by dehydration of the polyanion at the thermal transition, leading to segmental relaxation of polymer chains. If true, this would explain the transition's dependence on water and extrinsic compensation as well as its glass transition-like character. This talk will focus upon water's role in the transition, in which a strong dependence on hydration is observed. Quartz crystal microbalance with dissipation (QCM-D) and modulated differential scanning calorimetry (MDSC) are used to track the transition in polyelectrolytes complexes as a function of hydration.

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