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Viscoelasticity of Ultra Thin Films Probed via Temperature-Controlled Quartz Crystal Microbalance With Dissipation[1] JODIE LUTKENHAUS, JOE PUHR, AJAY VIDYASAGAR, Texas A&M Unversity, LUTKENHAUS LABORATORY TEAM — Temperature-controlled quartz crystal microbalance with dissipation (QCM-D) is a powerful technique for probing glass transitions in ultra thin films via changes in viscoelasticity. QCM-D has the added benefit of monitoring such changes as a function of overtone, which allows for one to probe transitions at different locations vertically throughout the film. Here, we present a general approach towards discerning glass transitions in layer-by-layer (LbL) assemblies, which are formed via the alternate adsorption of oppositely charged polyelectrolytes. LbL assemblies consisting of strong polyelectrolytes or of weak polyelectrolytes are presented. A glass transition was only observed in the presence of water, which extensively plasticized the film and facilitates the breaking and reformation of ion pairs. Early results of glass transitions in homopolymers such as polystyrene are also presented. A strong dependence of glass transition temperature on overtone number was observed, suggesting a range of changes in viscoelasticity with respect to temperature and distance from the substrate.

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