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Effect of Thickness on the Thermal Properties of Hydrogen Bonded Layer by Layer Assemblies CHOONGHYUN SUNG, AJAY VIDYASAGAR, KATELIN HEARN, JODIE LUTKENHAUS, Texas A&M University — Layer by layer (LbL) assemblies have attracted a lot of attention for their functional versatility and ease of fabrication. However characterizing thermal properties, especially for ultra thin LbL assemblies, has remained a challenging topic. We have investigated the role of the film thickness on the glass transition temperature (T_g) for poly(ethylene oxide)/poly(acrylic acid) (PEO/PAA) and (PEO)/poly(methacrylic acid) (PEO/PMAA) hydrogen bonded LbL assemblies in both bulk as well as in confined thin films using modulated differential scanning calorimetry (MDSC) and temperature-controlled ellipsometry. PEO/PAA LbL assemblies exhibit a well-defined T_g, both in bulk and thin films. For films less than 100 nm thick, the T_g increased slightly as film thickness decreased. On the other hand, PEO/PMAA LbL assemblies displayed clear glass transitions only after thermal treatment, which produces anhydride crosslinks. Also, the thickness dependence on T_g was less pronounced for PEO/PMAA LbL films. It was also seen that the thermal expansion coefficient (α) increased for film thickness below 200nm. We speculate that interactions between the film and substrate likely influence the thickness-dependent T_g

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