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Unusual Molecular Weight Dependence to the Physical Aging of Thin Polystyrene Films MICHAEL THEES, CONNIE ROTH, Emory University — Physical aging and the glass transition are intimately related, with the physical aging rate providing a measure of the stability of the glassy state formed. Previously, we have investigated the physical aging rate in thin supported polystyrene (PS) films finding that the local aging rate is correlated with the local glass transition temperature [Pye et al., Macromolecules 43, 8296 (2010)]. These studies were able to provide a measure of the depth to which bulk glassy dynamics are perturbed by the free surface interface, a distance much further than similar measures of liquid-like dynamics. Here, we present physical aging measurements of thin PS films using ellipsometry. Surprisingly, we observe a distinctive molecular weight dependence to the physical aging behavior of thin (30 nm thick) films not present in bulk (1000 nm thick) films for very high molecular weights (Mw >3000 kg/mol). These results indicate that chain connectivity plays a subtle, but important role in how gradients of glassy dynamics are propagated between the free surface and substrate interfaces

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