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Effect of Adjacent Rubbery Layers on the Physical Aging Rate of Polymer Glasses PHILLIP RAUSCHER, CONNIE ROTH, Department of Physics, Emory University, Atlanta, GA 30329 — Recent advances in block copolymer synthesis have led to new routes for forming nanostructured polymer blends putting glassy and rubbery phases in intimate contact. The long-term stability of these systems is crucial for their performance and functionality. In order to investigate the effect of glassy-rubbery interfaces between neighboring polymer domains on the local stability and physical aging of the confined glassy layers, we have modified our streamlined ellipsometry method to be able to determine the physical aging rate of thin glassy layers adjacent to rubbery layers. We present results demonstrating how ellipsometry can be used to measure the physical aging rate of glassy polystyrene (PS) layers atop rubbery poly(n-butyl methacrylate) (PnBMA) layers. With decreasing PS layer thickness, down to 55 nm, we observe a slight increase in the aging rate. This is in strong contrast to single layer PS films, which show a decrease in aging rate with decreasing thickness due to the local Tg reduction at the free surface. The slight increase in aging rate of the glassy PS layers atop rubbery PnBMA cannot be explained by any shift in local Tg suggesting that this faster aging rate caused by the presence of the rubbery-glassy interface must be due to some separate mechanism.

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