Slow physical aging of thin polymer films of varying chain architecture\textsuperscript{1} BRADLEY FRIEBERG, EMMANOUIL GLYNOS, PETER GREEN, University of Michigan — The physical aging rate of supported polystyrene (PS) films is influenced by film thickness, $H$, and by macromolecular architecture. For linear PS films, in the thickness range 300 nm to 50 nm, supported by silicon oxide substrates, the aging rate decreased by 15 percent. On the other hand, star-shaped PS, with functionality $f=8$ and with an average molecular weight per arm of $\text{M}_{\text{arm}}=25$ kg/mol, exhibited a 25 percent decrease throughout the same thickness range. When $\text{M}_{\text{arm}}$ was decreased to 10 kg/mol the depression in aging rate was 45 percent. We reconcile these changes in physical aging in terms of model that accounts for gradients in the local $T_g$ of the film in the vicinity of interfaces. These findings have important implications for the processing and function of thin polymer films for different applications.

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