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Calorimetry of Thin Films – From Single Layer Glass Transitions to Inter-layer Diffusion in Double Layers CHRISTOPH SCHICK, Institute of Physics, University of Rostock, Germany, DONGSHAN ZHOU, State Key Laboratory of Coordination Chemistry, Nanjing University, China, HEIKO HUTH, MATHIAS AHRENBERG, Institute of Physics, University of Rostock — Nanocalorimetry allows studying the glass transition in nanometer thin films. One of the striking results of fast scanning (FSC) as well as alternating current (AC) calorimetry is the commonly observed constant Tg in thin films down to a few nm. Blends of polystyrene and poly(phenylene oxide) (PS/PPO) confined in thin films (down to 6 nm) were investigated by AC nanocalorimetry. For this blend, we see even for the thinnest films (6 nm, corresponding to about half of PPO's radius of gyration Rg) only one unchanged glass transition. The good miscibility between PS and PPO remains even in ultrathin films. Finally, we show that our chip calorimeter is sensitive enough to study the inter-layer diffusion in ultrathin films. The PS chains in a 150 nm PS/PPO double layer that is prepared by spin coating PPO and PS thin films in tandem gradually diffuse into the PPO layer when heated above the Tg of PS, forming a PSxPPO100-x blend. However, on top of the PSxPPO100-x blend, there exists a stable pure PS like layer (ca. 30nm in our case) that does not diffuse into the blend beneath even staying at its liquid state over 10 hours.

Christoph Schick
Institute of Physics, University of Rostock, Germany

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