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Molecular dynamics at nanometric length-scales

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Broadband Dielectric Spectroscopy, Spectroscopic vis-Ellipsometry, X-Ray Reflectometry, Alternating and Differential Scanning Calorimetry are combined to study glassy dynamics and the glass transition in nanometric thin (≥ 5 nm) layers of polystyrene (PS) having widely varying molecular weights and Polymethylmethacrylate (PMMA) deposited on different substrates. For the dielectric measurements two sample geometries are employed, the common technique using evaporated electrodes and a recently developed approach taking advantage of nanostructures as spacers. *All* applied methods deliver the concurring result that deviations from glassy dynamics and from the glass transition of the bulk never exceed margins of ± 3 K *independent* of the layer thickness, the molecular weight of the polymer under study and the underlying substrate. Our findings are discussed in the context of the highly controversial literature and prove that an appropriate sample preparation is of paramount importance in order to avoid artefacts.

- [1] Erber et al., *Macromolecules* **43**, 7729 (2010).
- [2] Mapesa et al., *Europ. Phys. J. - Special Topics* **189**, 173-180 (2010).
- [3] Treß et al., *Macromolecules* (2010). DOI:10.1021/ma 102031k.