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Polymer brushes dynamics by evanescent wave dynamic light scattering BENOIT LOPPINET, VASSILIKI MICHAILIDOU, GEORGE FYTAS, IESL-FORTH, JUERGEN RUEHE, IMTEK Freiburg Germany — Dynamics of swollen brush is experimentally measured by dynamic light scattering in the total internal reflection geometry. Dense thick polymer polystyrene brushes with varying grafting densities are obtained through grafting from synthesis. When highly swollen in good solvent, concentration fluctuations are found to decay through a fast diffusive mechanism, attributed to the expected cooperative diffusion, akin to semi-dilute polymer solutions. Its hydrodynamic size is found to be comparable to the estimated distance between grafting chains. De-swelling of the brush by lowering solvent quality (using cyclohexane at different temperatures) leads to qualitative different dynamics. An extra slower relaxation with a broad distribution of relaxation times is observed, which strongly depends on solvent quality, with an extensive slow down of its characteristic time and an increase of scattered intensity upon cooling. This complex dynamics is discussed in relation to the dynamics in entangled semi-dilute solution in theta solvent. Finally, the brownian dynamics of colloidal particles (radius from 17nm to 100nm) in contact with the brushes are reported. The particles are found to marginally penetrate the brush, but to nonetheless exhibit dynamics reflecting their interactions with the outer part of the brush.

Benoit Loppinet
IESL-FORTH

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