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Slip and interfacial structure of polymer melts and solutions in contact with end-tethered polymers PHILIPP GUTFREUND, AIRIDAS KOROLKOVAS, GEORG LIESCHE, ANDREW DENNISON, Institut Laue-Langevin, Grenoble, France, KATHARINA THEIS-BRÖHL, Hochschule Bremerhaven, Germany, MAX WOLFF, Uppsala University, Sweden, BULENT AKGUN, Bogazici University, Istanbul, Turkey, JEAN-LOUIS BARRAT, University Joseph Fourier Grenoble 1, France — We present a neutron reflectometry (NR) study on polystyrene (PS) sheared in contact with functionalized solid surfaces. These methods provide a non-invasive tool to elucidate the structure of the buried interface with sub-nm resolution. We combine the scattering experiments with in situ surface sensitive rheology to gather information about the microscopic origin of interfacial slip. We have performed in situ shear-NR on PS melts and solutions in contact with chemically grafted PS chains. Entangled polymers can exhibit macroscopic slippage and its origin is supposed to arise from stretching of surface adsorbed chains and subsequent disentanglement from the free flowing chains. The combination of surface sensitive rheometry in a plate-plate torsional shear set-up and NR is potentially a unique technique to address this question by using labeled polymer chains chemically attached to the surface or in the free liquid. We present first results on in situ shear NR on PS melts in contact with high density PS brushes as well as entangled PS solutions flowing over grafted PS chains of the same length of lower density. In both cases we observe a structural change of the grafted PS at a certain shear rate that may be linked tostretching and/or disentanglement of the interfacial chains.

Philipp Gutfreund
Institut Laue-Langevin

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