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Synthesis of diblock copolymer brush layers to control the adaptation time to water

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Synthesis of diblock copolymer brush layers to control the adaptation time to water
Benjamin Leibauer1, Andres de los Santos Pereira2, Sajjad Shumaly1, Ognen Pop-Georgievski2, Hans-Jürgen Butt1, Rüdiger Berger1
1 Departement Physics at Interfaces –Max Planck Institute for Polymer Research
2 Institute of Macromolecular Chemistry CAS, Prague
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The Young's model describes the wetting behavior of an ideal surface. Recently, Butt et al. presented an adaptation model, which connects adaptation processes of the surface to dynamic contact angles [1]. In order to test the adaptation model, we used a tilted plate setup, which allows measuring velocity dependent contact angles. The applicability of the adaptation model was experimentally verified by Li et al. using surfaces made of statistical copolymers [2,3]. The adaptation model was used to measure the release kinetics of a pH-responsive polymer [4]. In a next step, we synthesize polymer surfaces with the aim to control the adaptation time scale upon wetting and dewetting systematically. We used the surface-initiated atom transfer radical polymerization ATRP to selectively synthesize diblock copolymer brushes. We prepared poly(2-hydroxyethyl methacrylate) (PHEMA) as a hydrophilic block from the surface and we grafted polystyrene (PS)) or Poly(1-hexyl methacrylate) (PEtHexMA) as hydrophobic block on top of the PHEMA block [5]. By regulating the architecture and thickness of the polymer brush we tune the wetting properties. In addition, we control the adaptation time of polymer brush surfaces by changing the drop-sample temperature.
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Hauptautoren: LEIBAUER, Benjamin; Dr. DE LOS SANTOS PEREIRA, Andres (Institute of Macromolecular Chemistry CAS, Prague); Dr. BERGER, Rüdiger (MPIP); Herr SHUMALY, Sajjad; Dr. POP-GEORGIEVSKI, Ognen (Institute of Macromolecular Chemistry CAS, Prague); Prof. BUTT, Hans-Jürgen (MPIP)

Vortragende(r): LEIBAUER, Benjamin

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