

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Influence of the chemical structure on the slip boundary condition of liquids MISCHA KLOS, SEBASTIAN BACKES¹, Saarland University, Experimental Physics, D-66123 Saarbrücken, JUAN MANUEL CASTILLO SANCHEZ, MARTIN HORSCH, HANS HASSE, TU Kaiserslautern, Laboratory of Engineering Thermodynamics, D-67663 Kaiserslautern, KARIN JACOBS, Saarland University, Experimental Physics, D-66123 Saarbrücken — On small scales, especially in microfluidic devices, the role of the solid/liquid interface gets more important for the flow dynamics. Our experiments probe slippage via the dewetting of thin polymer films on hydrophobic substrates [1]. As hydrophobic coatings we use amorphous polymers (AF1600, AF2400) and different types of highly ordered self-assembled silane monolayers on top of silicon substrates. On silane surfaces, polystyrene (PS) of low molecular weight exhibit slip lengths up to micrometers [2]. On AF1600, no significant slip is observed. Scattering studies reveal an ordering of the PS side chains at the solid/liquid interface depending on the structure of the substrate [3]. Recent simulations were able to characterize these SAMs [4]. However, the situation changes if PMMA or polyvinylpyridine (PVP) are used: Dewetting experiments show that slip is less pronounced in PVP and in PMMA films. Obviously, the structure of the side groups plays a significant role. X-ray reflectometry supplements this hypothesis and give further insight to the slippage mechanism at the solid/liquid interface. [1] O. Bäümchen, et.al., J Phys Condens Matter 24 (2012) [2] R. Fetzer, et.al, Europhys Lett 75 (2006) [3] P. Gutfreund, et.al., Phys Rev E 87 (2013) [4] J.M. Castillo Sanchez, et. al. submitted

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Date submitted: 14 Nov 2014

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