Van der Waals Interactions in Wetting, Adhesion, Adsorption and Friction Experiments

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Van der Waals (vdW) forces are commonly regarded as being weak and of short range and are thus often neglected. However, our experiments give clear evidence that vdW forces significantly contribute to a range of phenomena at interfaces, like thin film stability, protein adsorption, bacterial and gecko adhesion as well as single asperity friction [1-6] and that vdW forces can be of long range. The key for an apt description of vdW and further relevant forces present in these diverse system is a precise knowledge about the interacting objects, for instance their chemical composition from the surface up to roughly 100 nm into the bulk. The effective interface potentials used to describe and understand the different experimental situations can additionally serve as useful descriptions for future simulations of similar systems, which will gain in precision and predictive power when taking vdW interactions into account.

References

[1] P. Loskill et al., Adv. Coll. Interf. Sci. 107 (2012) 179182
[2] H. Hähl et al., Langmuir 28 (2012) 7747
[3] P. Loskill et al., Langmuir 28 (2012) 7242
[4] P. Loskill, J. R. Soc. Interface 10 (2013) 20120587
[5] M. Lessel et al., Phys. Rev. Lett. 111 (2013) 035502
[6] J. McGraw and K. Jacobs, "Controlling wetting properties of polymers"; in "Encyclopedia of Polymeric Nanomaterials", edited. by S. Kobayashi and K. Müllen (2015) ISBN 978-3-642-29647-5; Springer Heidelberg