



Wolfson Department of Chemical Engineering Special Seminar

Lecture Hall 6, Wolfson Department of Chemical Engineering,

Wednesday 21.12.2016 at 13:30

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Revealing Contact Formation Characteristics of Bacteria: A Single Cell AFM Study in Combination with Monte Carlo Simulations

Single cell AFM force spectroscopy has proven to be useful to quantify the acting forces if combined with a clever choice of substrates. On hydrophobic surfaces, the hydrophobic interaction plays the main role for the adhesion of bacteria [1] and the contact formation process is dominated by the longest cell wall macromolecules. In our AFM study, we revealed the initial contact formation by observing the snap-in process in detail [2]. Monte Carlo simulations with a simple model for a bacterium strikingly match the results, corroborating the interpretation that the contact formation of *S. aureus* relies on thermally fluctuating cell wall proteins that tether to a substratum and subsequently pull the bacterium to the surface. That way, e.g. *S. aureus* is able to attach to surfaces over distances far beyond the range of classical surface forces! Moreover, force/distance curves of single cell bacterial probes [3] reveal striking differences between bacterial adhesion to hydrophilic and hydrophobic surfaces and enable also to infer the contact area of bacterial adhesion.

[1] Thewes, N. et al., *Beilstein J. Nanotechnol.* **2014**, 5, 1501. [2] Thewes, N. et al., *Soft Matter* **2015**, 11, 8913. [3] Thewes, N. et al., *Eur. Phys. J. E* **2016**, 38, 140.