NABIAM

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FORCE SPECTROSCOPY AND RECOGNITION IMAGING:

Quantifying Binding Strength and Affinity on the Single-Molecule Level

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Single-molecule and single-cell force spectroscopy are appropriate tools for retrieving accurate dynamic and statistical information about the nanomechanical behavior of molecular bonds involved in adhesion to biotic and abiotic surfaces. In biochemistry, the determination of the equilibrium dissociation constant is key for quantifying the interaction between biological molecules. Despite the wide range of approaches in increasing the measurement sensitivity for minute sample amounts, critical limitations with respect to labelling, fluorescence tags, and low detection signals combined with high noise are difficult to overcome. This intimately leads to requirements of new measurement tools that combine high sensitivity with nano-scale spatial resolution. In recent years, the topography and recognition (TREC) imaging technique, based on force spectroscopy in resonance, has been utilized for mapping bio-molecular recognition events to localize bio-molecules at the nano-scale. In the present work, we fabricated DNA arrays on glass or silicon substrates as platforms capable for sensing single molecular interactions. We employed TREC to characterize the DNA array and quantified the equilibrium dissociation constant Kd of DNA duplexes from recognition images, yielding Kd = 2.4×10^{-10} M. Using TREC we developed an affinity sensing assay, which can be directly assessed without any labelling or secondary binding for detection.

10th December 2020, 4:30 pm (CET)

Link for joining the event (MS Teams): https://bit.ly/nabiam_lectures_2020-12-10