

Force Spectroscopy and Recognition Imaging: Quantifying Binding Strength and Affinity on the Single-Molecule Level

YOOJIN OH(yoo_jin.oh@jku.at)

Institute of Biophysics, Johannes Kepler University Linz

Abstract

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 K_d of DNA duplexes from recognition images, yielding $K_d = 2.4 \times 10^{-10}$ M. Using TREC we developed an affinity sensing assay, which can be directly assessed without any labelling or secondary binding for detection.

Keywords: *AFM, Affinity, Recognition, Label-free*

Biography

2018 - current, Elise-Richter Fellow, Institute of Biophysics, Johannes Kepler University Linz, Austria

2010 - 2017, Post-doc, Institute of Biophysics, Johannes Kepler University Linz, Austria

2009, Ewha Womans Univ. Ph.D. in Physics