The Chinese University of Hong Kong

Department of Biomedical Engineering

Correlative biomaterial characterization by AFM and Fluorescence

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Date	:	**23 November 2021**
Time	:	**4:00 pm**
Zoom Link	:	https://cuhk.zoom.us/j/96789683568?pwd=SjUrUkZEQnRLdGhKbFdCRDVUUk9UUT09
Meeting ID	:	**967 8968 3568**
Passcode	:	**893022**

Abstract

The AFM is a versatile tool to investigate a large and still growing number of biomaterials, in particular in combination with fluorescence microscopy. First, I will present how changes in the collagen network of the articular surfaces from knee joints can be detected via high-resolution AFM imaging under native conditions. In a combination of AFM and fluorescence microscopy we can show that local changes in the organization of fluorescent stained cells, a marker for early osteoarthritis, lead to a significant local reduction of the elastic modulus, local thinning of the collagen fibers, and a roughening of the articular surface [1].

Second, we will present fundamental insights into the formation and breaking of (multivalent) bonds. Here, we disentangle physical and chemical bonds that form in mussel-inspired coatings. Both, the timescale of bond formation and their strength is determined. This helps to understand the interplay between adsorption (physisorption) and chemical reactions (chemisorption) in polymer coatings [2].

Finally, I will show first results on how a combination of AFM and single-molecule fluorescence may become a useful tool in determining the dynamic structure of proteins.

[1] Tschaikowsky et al., Acta Biomaterialica, 126 (2021), p. 315–325. [2] Lallemang et al., submitted

Biography

Thorsten Hugel studied physics in Freiburg (GER) and Bristol (GB). He obtained his PhD in 2003 from the Ludwig-Maximilians-Universität München (LMU) in the group of Hermann Gaub, researching into molecular machines using AFM and light absorption. From 2003-2005 he did a postdoc at the University of California Berkeley (USA) in the group of Carlos Bustamante, where he investigated the bacteriophage phi29 using single molecule fluorescence and magnetic tweezers. In 2005 he became a junior professor at the Department of Biophysics and at the Institute of Medical Engineering of the Technische Universität München (TUM). At these institutions he was promoted to Assistant Professor (2008) and Associate Professor (2011, tenure). In the same year he was awarded the Rudolf-Kaiser-Preis 2011.

In 2014 Thorsten Hugel was offered a professorship at the Institute of Physical Chemistry, Albert-Ludwigs-Universität Freiburg (http://www.singlemolecule.uni-freiburg.de). He is member of several collaborative research centers and holds a prestigious ERC consolidator grant. He uses single-molecule methods, in particular AFM and single-molecule FRET, to investigate the function and dynamic structure of biomaterials.

***** ALL ARE WELCOME *****

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