



DEPARTMENT OF MECHANICAL ENGINEERING
AND
MEDICAL ENGINEERING PROGRAMME

SEMINAR

Title: Molecular engineering of cellulosome systems: from single-molecule mechanics to hydrogel reaction cascades

Speaker: Professor Michael Nash
Dept. of Chemistry, University of Basel
Dept. of Biosystems Science and Engineering (ETH Zurich)
Switzerland

Date: 18 May, 2017 (Thursday)

Time: 2:30 p.m.

Venue: Room 7-37, Haking Wong Building, HKU

Abstract:

Cellulosomes are large multi-component protein complexes comprising networks of non-catalytic protein scaffolds, catalytic enzymes and other ancillary domains. These intricate structures reside on the extracellular surface of anaerobic bacteria, and serve to convert cellulose into soluble sugars, an important industrial process for production of renewable fuels and chemicals. Cohesin-dockerin (Coh-Doc) complexes are the ligand-receptor pairs that hold the network components together. The extreme environments in which Coh-Doc pairs operate (e.g., elevated temperatures, extreme pH) has led to natural selection for robust interactions, both in terms of biochemical affinity and, as I will demonstrate in this talk, in terms of high mechanical strength. I will present our recent work demonstrating that Coh-Doc interactions are among the most mechanically robust interactions reported, and identify molecular mechanisms giving rise to this impressive stability. In the second part of the talk, I will present a newly developed enzymatic reaction cascade that allows us to screen cellulosome-complexes for thermostability and substrate specificity using

polymerization-based amplification. These two blocks highlight currently emerging trends in cellulosome research that will provide a basis for further technology development.

Biosketch:

Michael Nash received a Bachelor of Science in Biomedical Cybernetics, graduating with highest honors from the University of California - Los Angeles in the spring of 2006. He held research internships at the California Institute of Technology NASA Jet Propulsion Lab (Pasadena, CA, USA), the Pacific Northwest National Lab (Richland, WA, USA), and the Biomedical Engineering Department at the University of New South Wales (Sydney, Australia). He earned a dual PhD degree in Bioengineering and Nanotechnology from the University of Washington - Seattle in December 2010. Following Postdoctoral work in Applied Physics at Ludwig-Maximilians-Universität (LMU Munich) from 2011-2012, he was promoted to Independent Group Leader in May 2013. In September 2016, Michael began his current position as tenure-track Assistant Professor with joint appointments at the University of Basel, Department of Chemistry, and at ETH Zurich, Department of Biosystems Science & Engineering.

Michael's research has been recognized through numerous competitive fellowships and grants. In 2015 he was awarded 1 of 10 Young Investigator Grant worldwide from the Human Frontier Science Program, and in 2016 he was the winner of an ERC Starting Grant. Michael's research is in the broad area of nanobiomaterials and biophysics, specifically focusing on single-molecule protein mechanical properties, protein and polymer engineering, and the interface between synthetic and biological systems.

ALL INTERESTED ARE WELCOME.

For further information, please contact Dr. Y. Lin at 3917 7955.

Research areas: Advanced Materials and Biomedical Engineering