THE ROLE OF SELF-ASSEMBLING POLYPEPTIDES STUDIED BY HIGH RESOLUTION AFM

DONG Mingdong

Aarhus University, Interdisciplinary nanoscience Center (iNANO), Aarhus, Denmark, EU

Abstract

Polypeptides are functional biomolecules that play a key role in life science, where they can act as hormones and signaling molecules. They can self-assemble into a variety of nanostructures, including two dimensional lamellae, one dimensional nanofibrils and nanotubes, and zero dimensional nanospheres. The driving force behind these advanced nanomaterials involves weak non-covalent interactions that include hydrogen bonding, and hydrophobic and electrostatic interactions. Exploring self-assembling process of polypeptides may lead to the construction of more advanced polypeptide nanostructures for future applications. Atomic force microscopy is a powerful method to study the structural and physical properties of biomolecules. AFM-based force spectroscopy method allows measuring the interactions within individual molecules. Recently progress has been made in the measurement and characterization of dynamic nanomechanical properties using specially designed torsional harmonic cantilever sensor integrated into a conventional AFM. AFM-based sensor allows running the torsional mode to enhance harmonic signals in liquid environments. The novel AFM system has the ability to recover the tip–sample force waveforms which provide high-speed force–distance curves and allow specific material properties to be measured with high spatial resolution. This talk will review the recently developed experimental technique and its applications in quantitative imaging of peptide stiffness. The quantitative nanomechanical mapping and high resolution AFM imaging provide the feasible methods to study on the fine assembled structures and corresponding properties of polypeptide during self-assembly process.

Author did not supply full text of the paper/poster