AFM in Conjunction with FluidFM® Technique and Applications

Tuesday, October 12, 2021 | 13:00 BST | 14:00 CEST

Join us for this virtual workshop which will be held in conjunction with Cytosurge AG, Switzerland. Discover the fascinating capabilities of combining Bruker's BioAFM techniques with the Cytosurge FluidFM technology. The virtual workshop will include talks and a practical demonstration live from our lab in Berlin.

Atomic Force Microscopy (AFM) is an advanced multi-parametric imaging technique that enables the 3D imaging of the topography of biological samples in the nm-range, the characterisation of their nanomechanical properties, and the visualization of interactions and structural changes occurring at the molecular level.

The FluidFM (Fluidic Force Microscopy) technology features microchanneled, force-sensing cantilevers with microfluidic pressure control. They enable the handling of femtoliter volumes, precise pressure control (0.1mBar), and can be used as nano-syringes to extract cell material or inject fluids into singles cells or tissues.

The seamless combination of FluidFM with Bruker's BioAFMs opens the door to a host of novel experiment designs and applications. It enables a broader range of force control, use of microfluidics for single cell manipulation applications, and accurate positioning combined with perfect optical integration for observation and control.

Applications include:

- Single cell injection or extraction
- Single cell adhesion measurements with forces >50nN
- Enhanced nanomanipulation capabilities
- Trigger-Tracking experiments: Precise localized injection into cells (FluidFM) and tracking of interactive forces, changes in topography, or nanomechanical properties (AFM)
- Access to single cell gene editing, injection of targeted drugs or gene vectors for AFM users

Our special guest speaker Dr Cécile Formosa-Dague, CNRS, Toulouse, France, will speak on her work developing novel harvesting methods for microalgae, a promising resource for biofuel production, using the AFM and FluidFM Technologies.

Dr Mirko Vanetti, Cytosurge AG, will speak on the growing field of applications for the FluidFM technology, and outline examples of how the technology can support CRISPR, neurobiology and virus research.

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14:00 Introduction
Carmen Pettersson, Marcom Manager EMEA, Bruker BioAFM

14:05 Developing New and Efficient Methods for Harvesting Microalgae using AFM and FluidFM
Dr Cécile Formosa-Dague, CNRS, Toulouse Biotechnology Institute (TBI), INSA de Toulouse, France

14:35 FluidFM Application Highlights
Dr Mirko Vanetti, Cytosurge AG

14:45 NanoWizard AFM Family in Conjunction with FluidFM
Dr Torsten Mueller, Senior Developer Life Sciences, Bruker BioAFM

14:55 Live Demonstration BioAFM-FluidFM
Dr André Koernig, Applications Scientist, Bruker BioAFM

15:10 Q&A and Closing

Talk abstract

Developing New and Efficient Methods for Harvesting Microalgae using the AFM and FluidFM Technologies
Dr Cécile Formosa-Dague, CNRS, Toulouse Biotechnology Institute (TBI), INSA de Toulouse, France

Microalgae are a promising resource for biofuel production despite their industrial use being limited by the lack of effective harvesting techniques. Dr Formosa-Dague's work focuses on the development of efficient and sustainable ways to harvest microalgae using flocculation/flotation technique. In the first flocculation step, cells are aggregated into large flocs that can be easily captured by rising microbubbles. Microbubbles carry the flocs to the surface of the suspension, where they can be easily separated from water. AFM force spectroscopy techniques are used in this context to understand the molecular mechanisms underlying microalgae flocculation. In addition, recent developments using the FluidFM technology allow us to proceed further and probe the direct interactions between the microbubbles and cells. Understanding the interactions between cells or between the cells and bubbles paves the way for the development of cost-effective harvesting processes that will help make microalgae-based biofuel production economically viable on the industrial scale.

Dr. Cécile Formosa-Dague did her PhD between 2012 and 2015 at the Laboratory for Analysis and Architecture of the Systems (LAAS-CNRS) in Toulouse, where she worked on important issues related to multidrug-resistant microorganisms using AFM. After that, she joined the Y. Dufrêne team at the Catholic University of Louvain (UCL) in Belgium, where she pushed further the technological concepts developed during her PhD to study biofilm formation in bacteria. In 2017, after having won a Marie Curie grant, she moved to the TBI (Toulouse Biotechnology Institute) where she worked on developing interdisciplinary approaches to studying microalgae and their interactions with their environment using AFM techniques. Finally, in 2019, she obtained a permanent position at the Centre National de la Recherche Scientifique (CNRS) where she continues to develop these research activities on microalgae, at the TBI, and to work on new techniques based on the FluidFM technology.

Please don't hesitate to contact us at productinfo.emea@bruker.com if you have any questions.