Studying the Mechanics of DNA Rearrangements with Optical Tweezers

Thursday, July 11th, 2024 | 08:00 AM PDT | 11:00 AM EDT | 5:00 PM CEST

We warmly invite you to join us and our special guest speaker Dr. Maxim Molodtsov from The Francis Crick Institute, UK, for this webinar on Studying the Mechanics of DNA Rearrangements with Optical Tweezers.

The Nobel Prize winning Optical Tweezers (OT) technique enables the non-invasive, nanometer-precise manipulation of individual cells, molecules and nanoparticles, and the simultaneous application and quantification of the piconewton forces acting on them. OT can be used to study the smallest biological entities, from sub-cellular structures to DNA and proteins, providing unprecedented insights into life's fundamental building blocks.

Bruker's force-sensing optical tweezers systems can be seamlessly combined with advanced optical techniques, e.g. confocal, STED, TIRF, and DIC, enabling a host of novel research possibilities.

In his talk, Dr. Maxim Molodtsov will speak about his work investigating the forces involved in the molecular mechanisms underlying the three-dimensional organization and physical rearrangements of DNA during the cell cycle, crucial factors in gene regulation, repair, recombination, and cell division.

Don't miss the demonstration on the NanoTracker 2 Optical Tweezers, live from our labs in Berlin, where we will perform a DNA stretching experiment and measure the forces involved in the folding and unfolding of DNA.

Program - Thursday, July 11th, 2024

17:00 AM CEST | 8:00 AM PDT | 11:00 EDT

17:00 **Welcome & Introduction**
Oilibhe Pabsch, Scientific Affairs Manager, Bruker BioAFM

17:05 **Molecular Mechanics of DNA Rearrangements During the Cell Cycle**
Dr. Maxim Molodtsov, The Francis Crick Institute, UK

17:35 **Live Demo on NanoTracker 2 Force-Sensing Optical Tweezers and Optical Trapping Platform**
Dr. Randhir Kumar, Application Scientist, Bruker BioAFM

17:50 **Q&A session**

18:00 **Closing**

Studying the Mechanics of DNA Rearrangements with Optical Tweezers

Thursday, July 11th, 2024 | 08:00 AM PDT | 11:00 AM EDT | 5:00 PM CEST

Abstract and Biography

Molecular Mechanics of DNA Rearrangements During the Cell Cycle

Dr. Maxim Molodtsov, The Francis Crick Institute, UK

The three-dimensional organization and physical rearrangements of DNA are essential for correct gene regulation, repair, recombination, and cell division. The molecular mechanisms underlying the mechanics of these processes, however, remain poorly understood. My group uses a combination of single-molecule microscopy, force-spectroscopy, and computational modelling to investigate how individual molecules integrate their mechanical forces to rearrange DNA. In this talk, I will discuss our work on determining how conformational changes in the SMC protein complex cohesin, which is involved in the organization of DNA in interphase, generates mechanical forces, and how individual cohesins holding sister chromatids in mitosis resist the mechanical forces of the mitotic spindle.

Dr. Maxim Molodtsov

The Francis Crick Institute, UK

As a graduate student at the Molecular Cellular and Developmental Biology Department of the University of Colorado Boulder, USA, Maxim studied the forces generated by cytoskeleton microtubules. In a postdoctoral position at the Institute of Molecular Pathology in Vienna, Austria, he continued his work on the cytoskeleton, and also initiated projects aimed at understanding the three-dimensional organization of DNA. Since 2019, Maxim has been a group leader at The Francis Crick Institute, a biomedical research center in London, UK. He also lectures at the Department of Physics and Astronomy, University College London (UCL).

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