INSTITUT NÉEL Grenoble

Topic for Master 1 internship – Academic year 2020-2021

Thermal scanning probe microscopy of DNA nanostructures

General Scope:
DNA origami are convenient tools to engineer self-assembled nanostructures of controlled geometries. We propose to use this unique feature to design and characterize DNA origami optimized for the measurement of the thermal transfer through molecular scaffolds. In order to have a spatial resolution we will use thermal scanning microscopy in air (pictured on the figures a and b) combined with other methods of atomic force microscopy. Our goal is to gain insight into heat transfers at the molecular level and to demonstrate that DNA origami can be used as standard for the characterization of Scanning Thermal Microscopy (SThM).

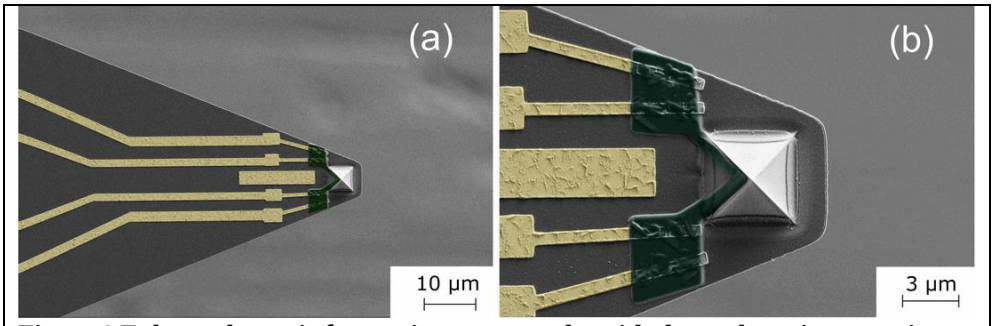

Figure 1 Enhanced atomic force microscopy probe with thermal sensing capacity.

Research topic and facilities available:
The Internee will design and self-assemble 3D nanostructures based on the cADNano software (figure 2) and characterize them using standard gel electrophoresis and atomic force microscopy. He/She will optimize the self-assembly process in order to achieve high throughput analysis of AFM data. He/She will get familiar with the AFM imaging, the clean room fabrication of the tips and thermal measurements at the nanoscale

Possible collaboration and networking:
This internship will be hosted in the TPS team and collaborations with the CEA, and CETHIL in Lyon are ongoing with this project.

Required skills:
The internship relies on the use of unique microfabricated tips and delicate instruments, thus, the Internee should be meticulous and well organized. In addition, He/She should be highly motivated and curious to work on interdisciplinary projects.

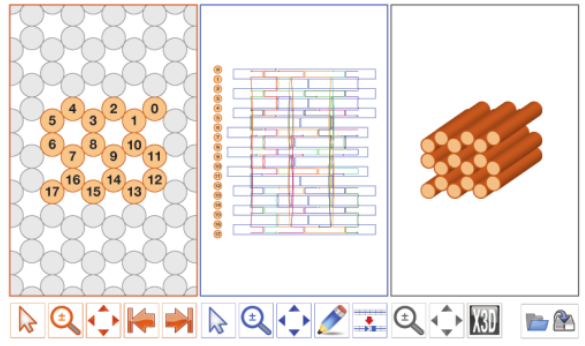

Figure 2: CAD interface to design DNA nanostructures

Starting date: Spring 2021

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