BioMEMS – Translational research

Mechanical properties of DNA through epigenetic

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Host Professor: **Pr. H. Fujita**

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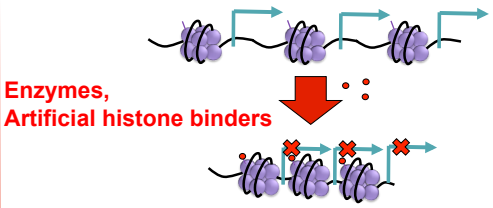
Context



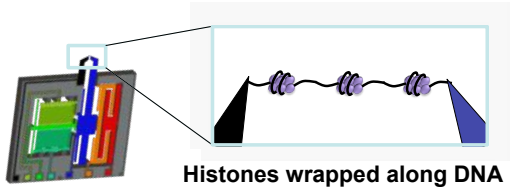
Histone modifications regulate genetic activity

Overall goal: Understand how histone can change the mechanical effects on DNA and its consequences on genetic activity (epigenetic).

Challenges:
Use a new MEMS-based device for the mechanical and physical observations of the DNA/histone complex at the macromolecular scale.

Objectives

- Demonstrate that Silicon Nano Tweezers (SNTs) can be used to study the mechanical effect of the histone along the DNA ;
- Characterize the mechanical and physical changes induced by the modifications of histone on DNA either with enzymes or artificial histone binders.



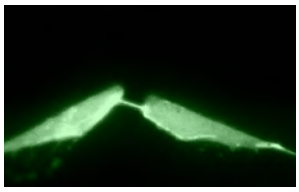
Silicon Nano Tweezers (SNTs)

Histones wrapped along DNA and trapped on tweezers tips

SNTs for detecting mechanical effect of histone modifications on DNA

Preliminary results

- Characterized the mechanical effects of different histone types along the DNA by Silicon Nano Tweezers and determined an apparent constant of association ;
- Observed the attachment of fluorescent histones along the DNA ;
- Determined the specific mechanical effect induced by an artificial histone binder.



Fluorescent histones are present along DNA and tweezers tips

Perspectives

- Model the compaction of the complex DNA / histone ;
- Extend these mechanical measurements to a larger number of biochemical reactions occurring on DNA.

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