



# Single molecule biophysics

Victoria Birkedal

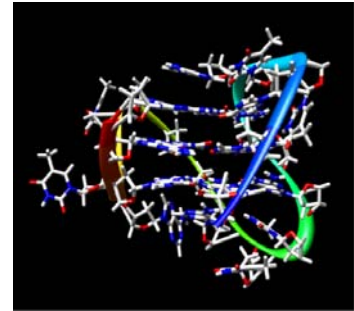
vicb@inano.au.dk 1521-121



---

## Baggrund:

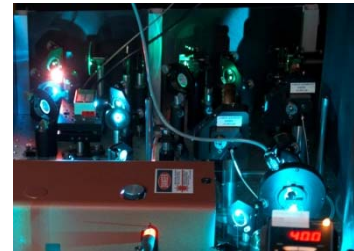
It is now possible to see and manipulate single molecules with light. We use this to elucidate structural changes of DNA, RNA and proteins. This information is essential for understanding function at the molecular level. We are both interested in studying conformational dynamics of biomolecules – such as DNA/RNA structures related to telomeres and man designed DNA nanostructures - and in developing the necessary experimental tools for these studies.



---

## Teknikker/Metoder:

We use fluorescence and fluorescence resonance energy transfer (FRET) spectroscopy and microscopy. We are able to measure the average behavior of many molecules in bulk studies but also to see individual biomolecules and investigate their properties in detail. Our toolbox is complemented by UV-vis absorption, UV-vis melting, circular dichroism spectroscopy and gel electrophoresis.



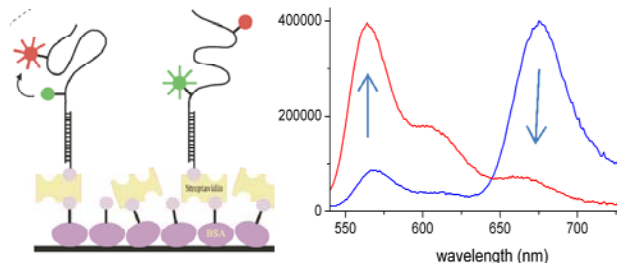
---

## Mulige projekter:

Conformation diversity of telomere DNA and interaction with proteins and small ligands.

DNA nanostructures and fluorescence resonance energy transfer.

Mounting a fluorescence microscope with single molecule sensitivity.



---

## Eksempler på tidligere bachelorprojekter:

FRET studier af telomeric G-quadruplex DNA

---

## Relevant litteratur:

- A. C. Krüger, M. K. Raarup, M. Muhligh Nielsen, M. Kristensen, F. Besenbacher, J. Kjems, V. Birkedal, **2010**, "Interaction of hnRNP A1 with telomere DNA G-quadruplex structures studied at the single molecule level ", *Euro. Biophys. J.*, *Epub ahead of print*.
- E. S. Andersen, Mingdong Dong, M. M. Nielsen, K. Jahn, R. Subramani, W. Mamdouh, M. M. Golas, B. Sander, H. Stark, C. L. P. Oliveira, J. S. Pedersen, V. Birkedal, F. Besenbacher, K. V. Gothelf, and J. Kjems, **2009**, "Self-assembly of a nano-scale DNA box with a controllable lid". *Nature* 459, pp. 73-75