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University of Ljubljana
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VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI

Prof. Dr. Rita de Sousa Dias

Biophysics and Medical Technology, Norwegian University of Science and Technology (NTNU), Norway

z naslovom:

Polyelectrolytes in Biology: DNA condensation

v sredo, 6. maja 2015 ob 15:00 uri
v predavalnici 1 v 1. nadstropju Fakultete
za kemijo in kemijsko tehnologijo, Večna pot 113

Vljudno vabljeni!

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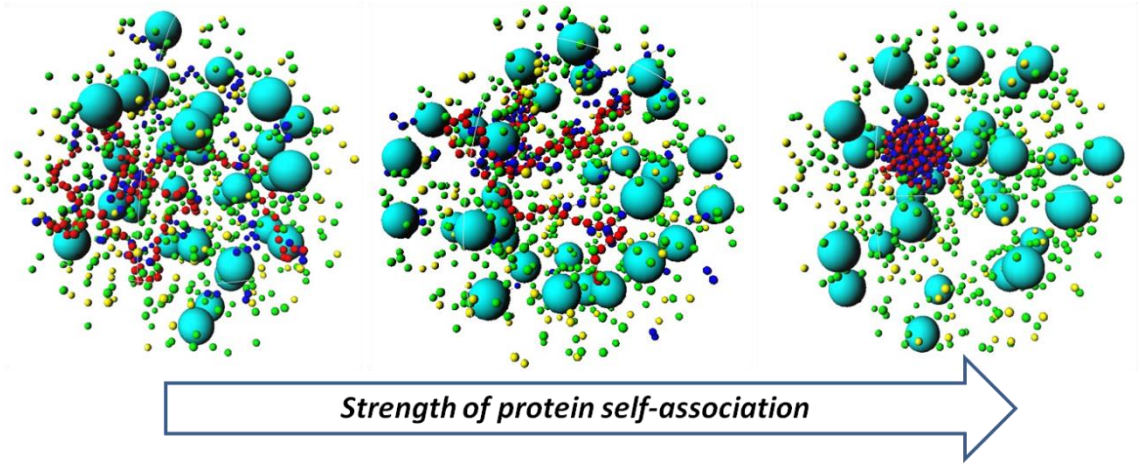
Abstract

The folding of DNA has attracted a considerable interest ever since DNA was found to be the storage of genetic information. Chromosomal DNAs are often many orders of magnitude larger than their biological packages (cells or viruses) and, in eukaryotic cells, packing is achieved by the wrapping of DNA around small, basic proteins, called histones.
Bacterial cells are very different from eukaryotic cells; they present no nuclear membrane that confines the DNA and there is no compelling evidence for the existence of histone-like proteins that condense and organize the genome. Instead, there is a range of DNA-binding proteins that modulate DNA via bending or bridging. One such type of proteins, H-NS, is a dimer that can self-associate into oligomers and induce bridging between different tracts of DNA [1].
The fact that the cytoplasm has a very large concentration of macromolecules (RNA and proteins) is believed to favor DNA condensation due to molecular crowding effects [2]. In this respect, it has been shown that cell lysis is accompanied by DNA decompaction [3].

This lecture will start with a general introduction on DNA condensation, which emphasizes the role of electrostatic interactions in this process.
Afterwards, I will present some results of an on-going project that aims to probe the effect of crowding and protein self-assembly on DNA condensation using simple model systems, studied using fluorescence techniques and Monte Carlo simulations.



Representative snapshots of model bacterial cells showing the effect of protein (dark blue sphere) self-association on DNA (red spheres) condensation and DNA-protein complex stability upon competition with charged crowding (light blue spheres) molecules. The green and yellow spheres represent the counterions of DNA, proteins and crowding agents.

[1] Dame, R. T.; Luijsterburg, M. S.; Krin, E.; Bertin, B. N.; Wagner, R.; Wuite, G. J. L., *J. Bacteriol.* **2005**, 187, 1845-1848.
[2] Woldringh, C. L.; Nanninga, N. J., *Struct. Biol.* **2006**, 156, 273-283.
[3] Murphy, L. D.; Zimmerman, S. B., *J. Struct. Biol.* **2001**, 133, 75-86.