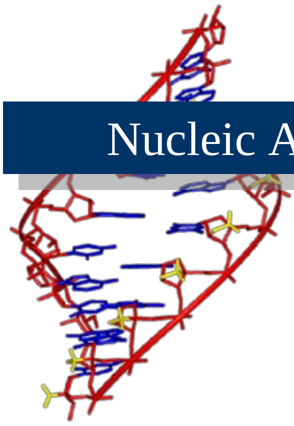

DEPARTMENT OF PHYSICS, CHEMISTRY AND PHARMACY

Nucleic Acid Center **Seminar** no. 76

Friday 2 December 2016
at 10:30 in the FKF Meeting-room

Dr. Eugen Stulz

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"Tailor-made DNA in bio-nanotechnology"

Web: http://www.southampton.ac.uk/chemistry/about/staff/est.page#

Abstract:

DNA has become very attractive as scaffold for functional molecules on the nanometre scale.[1] The sequence specific insertion of modified nucleotides using automated DNA synthesis allows for the creation of new designer molecules with a wide range of potential applications. We have established a general synthetic route to incorporate chromophores and metal complexes into oligodeoxynucleotides (ODNs) site-specifically via solid phase synthesis. We have thus attached the so far largest number of porphyrin based chromophores onto DNA, giving access to a multiporphyrin array of approximately 10 nm in length.[2] The π-stack of the porphyrins leads to strong electronic interaction between the chromophores but low duplex stability. A zipper arrangement has thus shown to increase stability substantially, and energy transfer provided access to the first reversible photonic wire based on a DNA scaffold.[3]
In this presentation, I will elaborate on the basic concepts to create novel materials based on both natural and modified DNA, with a focus on porphyrins as modifiers. The concepts will be exemplified with specific systems from our laboratory, which include highly sensitive genosensors,[4] DNA switches,[5] and DNA origami.[6]
Embedded will also be examples on spectroscopic methods to analyse the systems. The scope and limitations will also be highlighted.

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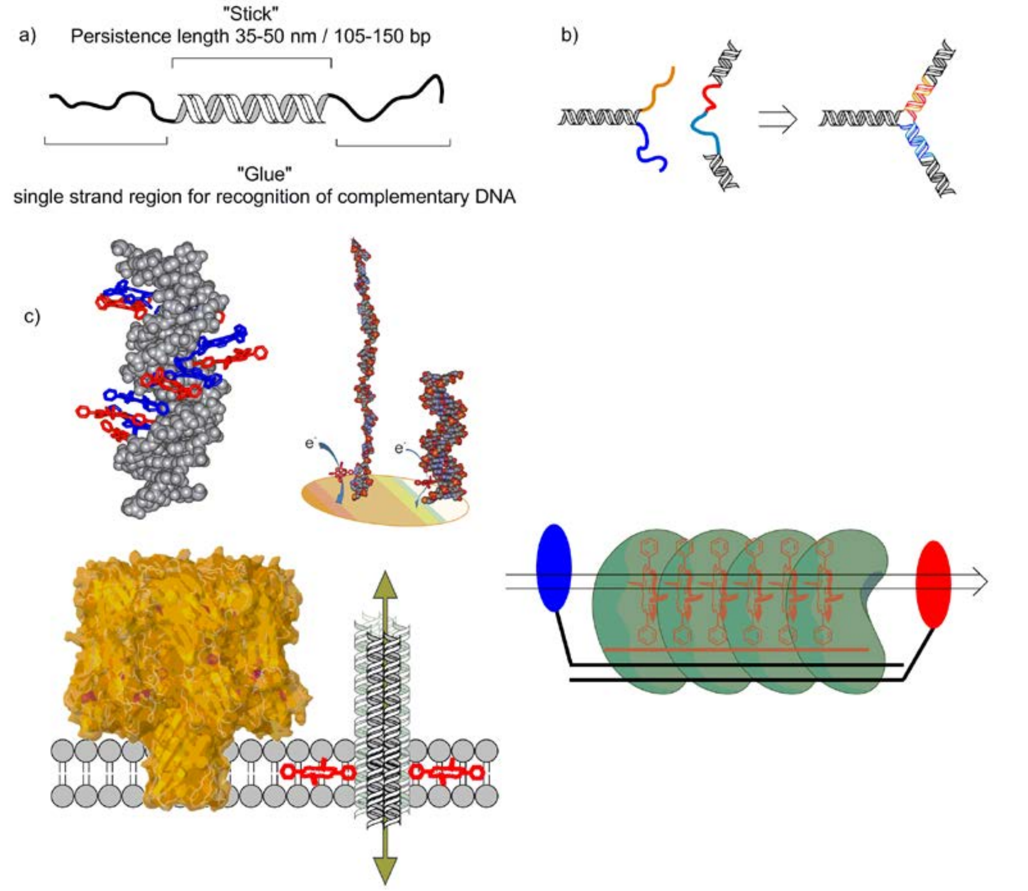

Fig. 1 representing some the topics to be discussed.

a) Schematic representation of DNA as stick and glue molecule.

b) Concept of constructing DNA assemblies by recognition of complementary strands.

c) Applications of modified DNA:

multi-porphyrin assemblies, electro-chemical geno-sensors, DNA origami nanopores mimicking trans-membrane proteins, and a bio-templated light pipe

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