Institut Européen de Chimie et Biologie

I E C B

# *Substituted Nucleotides: versatile building blocks in DNA bio-nanotechnology.*


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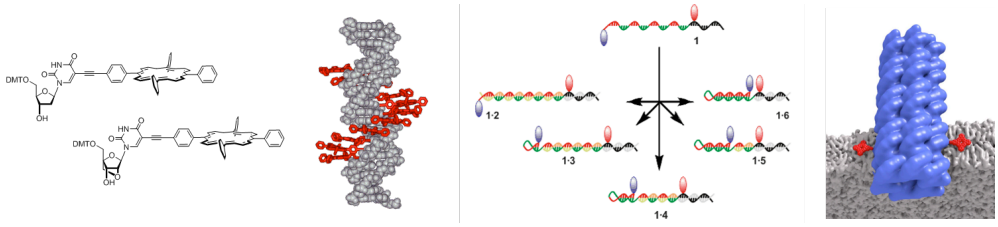
DNA has become very attractive as scaffold for functional molecules on the nanometre scale.[1] The sequence specific insertion of modified nucleotides using automated DNA synthesis allows for the creation of new designer molecules with a wide range of potential applications. We have established a general synthetic route to porphyrin-nucleosides and their subsequent site specific incorporation into oligonucleotides to create multiporphyrin arrays. Up to eleven consecutive porphyrins could be incorporated into DNA giving access to a multiporphyrin array of approximately 10 nm in length, which corresponds to the highest amount of DNA modification with a large hydrophobic metal complex to date.[2] The spectroscopic data and structure calculations indicate the formation of a stable helical array in the single strand porphyrin-DNA. The π-stack of the porphyrins leads to strong electronic interaction between the chromophores. A zipper array with induced stability and energy transfer properties has recently been realised, providing access to the first reversible photonic wire based on a DNA scaffold.[3]

Here our latest results in terms of novel modified DNA structures, including their characterization using CD and EPR spectroscopy, will be presented. Applications of modified DNA will be described, such as genosensors,[4] switches[5] and DNA origami nanopores;[6] ongoing projects in G-quadruplex stabilisation and DNA origami enzyme assemblies will be shown as well.

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