

# Hierarchical self-assembly of nucleotide-appended oligopyrenotides into defined supramolecular objects

*Y. Vyborna,*

*M. Vybornyi, R. Häner\**

*Department of Chemistry and Biochemistry, University of Bern Freiestrasse 3, CH-3012 Bern, Switzerland*

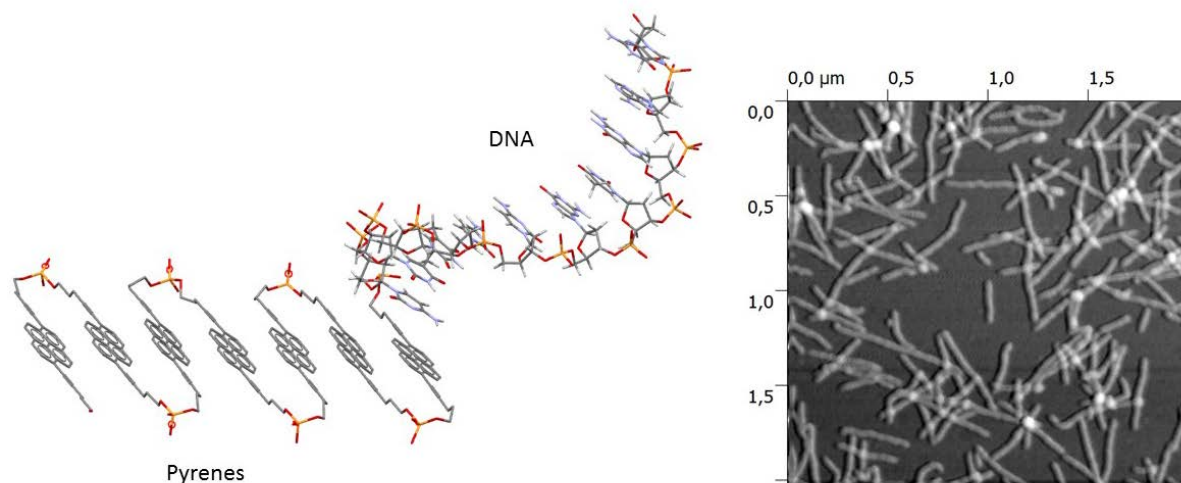
*[yuliia.vyborna@dcb.unibe.ch](mailto:yuliia.vyborna@dcb.unibe.ch)*

Supramolecular DNA assembly blends DNA building blocks with synthetic organic and inorganic molecules giving structural and functional advantages both to the initial self-assembly process and to the final construct.<sup>1</sup>

Synthetic molecules can bring a number of additional interactions into DNA nanotechnology. Incorporating extended aromatic molecules as connectors of DNA strands allows folding of these strands through  $\pi$ - $\pi$  stacking (DNA “foldamers”).<sup>2</sup>

In previous work it was shown that short oligopyrenotides (phosphodiester-linked pyrene oligomers) behave as staircase-like foldamers, which cooperatively self-assemble into two-dimensional supramolecular polymers in aqueous medium.<sup>3</sup>

Herein, we demonstrate that a 10-mer DNA-sequence modified with 7 pyrene units (see illustration) forms dimensionally-defined supramolecular polymers under thermodynamic conditions in water. We present the self-assembly behavior, morphological studies, and the spectroscopic properties of the investigated DNA-sequences (illustrative AFM picture shown below).



<sup>1</sup>F. A. Aldaye, A. L. Palmer, H. F. Sleiman, *Science* **2008**, *321*, 1795–1799.

<sup>2</sup>W. Wang, L.-S. Li, G. Helms, H.-H. Zhou, A. D. Li, *J. Am. Chem. Soc.* **2003**, *125*, 1120–1121.

<sup>3</sup>M. Vybornyi, A. V. Rudnev, S. M. Langenegger, T. Wandlowski, G. Calzaferri, R. Häner, *Angew. Chem. Int. Ed.* **2013**, *52*, 11488–11493.