

Supramolecular Assembly of Pyrene-DNA Conjugates into Columnar Vesicles

J. Thiede¹, I. Iacovache², S. Rothenbühler¹, S. M. Langenegger¹, B. Zuber², R. Häner^{1*}

¹Department of Chemistry, Biochemistry, and Pharmaceutical Sciences, University of Bern, Freiestrasse 3, 3012 Bern, Switzerland, ²Institute of Anatomy, University of Bern, Baltzerstrasse 2, 3012 Bern, Switzerland

The arrangement of structural subunits plays a crucial role in the shape of both natural and artificial supramolecular assemblies. In DNA nanotechnology, the well-defined DNA framework is utilized to achieve the spatial organization of functional groups.^[1] In previous work DNA was modified with phenanthrene sticky ends forming vesicular supramolecular assemblies with light-harvesting properties^[2] and *E*-tetraphenylethylenes modifications forming aggregation-induced emission active assemblies.^[3-4] In this work, we modified two complementary DNA strands with 1,6-dialkynyl-pyrenes at the 3'-end (Figure 1a). Cryo-EM were performed after self-assembly revealing columnar vesicles (Figure 1b). In addition, the self-assembly was analyzed and discussed with fluorescence spectroscopy, UV-vis spectroscopy, and AFM.

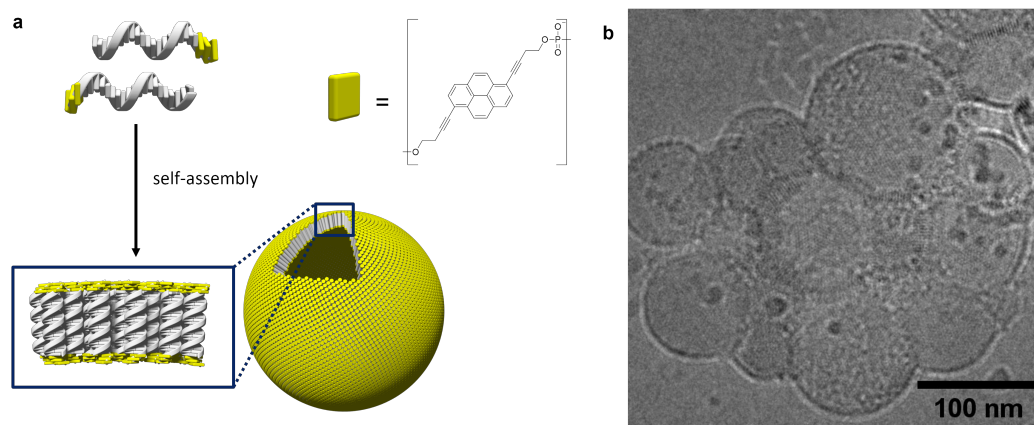


Figure 1 (a) Schematic representation of the self-assembled vesicles formed from 1,6-dialkynyl-pyrene-modified single strands and chemical structure of the pyrene-modification. (b) Cryo-EM image of vesicular assemblies.

[1] Mykhailo Vybornyi, Yuliia Vyborna, Robert Häner, *Chem. Soc. Rev.*, **2019**, 48, 4347-4360.

[2] Caroline D. Bösch, Jovana Jevric, Nutcha Bürki, Markus Probst, Simon M. Langenegger, Robert Häner, *Bioconjugate Chem.*, **2018**, 29, 1505-1509.

[3] Simon Rothenbühler, Ioan Iacovache, Simon M. Langenegger, Benoît Zuber, Robert Häner, *Nanoscale*, **2020**, 41, 21118-21123.

[4] Simon Rothenbühler, Ioan Iacovache, Simon M. Langenegger, Benoît Zuber, Robert Häner, *Bioconjugate Chem.* **2023**, 34, 70-77.