Making dynamic DNA-based materials: DNA origamis and nanogels

Sergii Rudiuk

PASTEUR, Department of Chemistry, École Normale Supérieure, PSL University, Sorbonne Université, CNRS, France

Abstract:

Even though the main natural biological function of DNA is the storage and transmission of genetic information, its specific chemical structure enables a wide range of *in vitro* applications spanning from biotechnologies to material sciences. In this talk I will present some of these applications, and especially the use of DNA as a brick for creation of new nanobiomaterials: DNA nanogels [1] and DNA origamis [2]. I will also describe how to exploit the physico-chemical properties of DNA to create new approaches for actuation of these DNA-based nanomaterials by developing generic molecular tools able to affect and control two important DNA properties: compaction [3] and melting [4], and this without any covalent modification of DNA. As outcome of these original approaches, such achievements as photocontrol, isothermal formation and change of shape of DNA origamis will be in detail explained in this talk.

Selected references:

[1] Zhou, L., M. Morel, S. Rudiuk, D. Baigl, "*Intramolecularly Protein-Crosslinked DNA Gels: new biohybrid nanomaterials with controllable size and catalytic activity*", **Small 2017**, 13(28), 1700706.

[2] Lee Tin Wah, J., C. David, S. Rudiuk, D. Baigl, A. Estevez-Torres, "*Observing and controlling the folding pathway of DNA origami at the nanoscale*", **ACS Nano 2016**, 10(2), 1978.

[3] Venancio-Marques A., A. Bergen, C. Rossi-Gendron, Rudiuk S., D. Baigl, "*Photosensitive polyamines for high-performance photocontrol of DNA higher-order structure*", **ACS Nano 2014**, 8, 3654.

[4] Bergen, A., S. Rudiuk, M. Morel, T. Le Saux, H. Ihmels, D. Baigl, "*Photodependent melting of unmodified DNA using a photosensitive intercalator: a new and generic tool for photoreversible assembly of DNA nanostructures at constant temperature*", **Nano Lett. 2016**, 16 (1), 773.

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連絡先：
瀧ノ上正浩
takinoue@c.titech.ac.jp