Synthesis & characterization of DNA-hybrids nano-architectures & nano-materials

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Stage pouvant se poursuivre en thèse : Oui

Résumé :

DNA based nanostructures are getting an increasing interest due to the unique properties of DNA self-assembling. With the aim of designing new smart nano-materials we wish to combine the tunable properties of DNA origamis with the 3D assembling control of nanomaterials (organic molecules, metal, nanoparticles,...). To that end, a series of nanoobjects with be precisely spatially organized to obtain original and adjustable structural and functional properties.

Sujet détaillé :

Over the past few years, significant results have been published on the DNA sequence design and self-assembling to form 2D/3D structures (cubes, tetrahedrons, planar plateforms, etc.) whose dimensions -in the nanoscale range- are accurately tuned with the sequence. We wish to take benefit of such DNA based structures to adjust the organization of nano-objects in define and adjustable shapes. In this project, we propose to fabricate 2D and 3D DNA Hybrids materials by 1) synthesis original nanometric bricks by combining DNA and organic molecules / metals or nano-objets (e.g. porphyrine, nanoparticles, carbon nanotubes...) and 2) assembling the later DNA-hybrid bricks into the 2D/3D nano-assemblies and nanodevices. This project aims to study the photonic, magnetic and electronic properties of particular DNA based nanomaterials.

The project is thus focused on the design and preparation of DNA-decorated hybrid nano-architectures generated by self-assembling processes. It will be carried out using the expertise acquired by our laboratory on both the DNA origami synthesis & characterization and the manipulation & functionalization of nano-objects.

Compétences requises :

A background in organic chemistry, bioconjugation chemistry, handling of biomolecules as well as some experience on nanometric object characterization (AFM, electronic microscopy?) would be appreciated.