Institut Européen de Chimie et Biologie

I E C B

3D-DNA nanotechnology-based tools for Biophysics and Structural Biology.

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I will present a new technology called 3D-DNA-Origami nanotechnology, which enables building custom-shaped nanometer-scale objects with molecular weights in the mega-dalton regime. In this method, a long scaffold single-stranded DNA can be folded with the help of hundreds of short DNA strands into well-defined three-dimensional shapes, much as a single sheet of paper is folded to create a variety of designs in the traditional Japanese art. This technology gives us the ability to approximate a level of complexity that rivals that of the molecular machinery found in cells. 3D DNA origami structures can also be used as molecular pegboards with a resolution of nanometer, and they have been widely used in the assembly of hetero-elements such as proteins, peptides, virus and nano-particles. As a result, this field is being used to develop customized molecular tools for a variety of purposes, including structural biology, biotechnology, drug delivery and materials science. I will focus on two topics: i) Structural DNA nanotechnology tools for Structural Biology investigations: NMR and Cryo-EM applications. ii) 3D-DNA nanotechnology-based tools for molecular biophysics: Single-molecule and Nano-sensor applications.