Commentary

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Study Description on DNA Nanotechnology and its Applications

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Description

DNA (Deoxy-ribonucleic acid) being a life material is documented as a comprehensive information-house in the form of genetic-codes. Throughout the last decades, artificial deoxyribonucleic acid has been explored as an outstanding material to fabricate specifically shaped nano-architects of 1D, 2d and 3D math by simple self-assembly of various DNA strands. Current advances in DNA nanotechnology open up exciting perspectives for the design of personalized and patient-specific treatments. This progress is made possible on one hand by the extraordinarily high precision and specificity that are typical of DNA base pairing, and on the other hand by our growing ability to use these properties in DNA-based synthetic constructs. It has been researched as an interesting biomaterial for analytical, bio sensory and applications. This statement focuses on describing the final conception of polymer engineering as well as linear DNA nanotechnology, short circular DNA nanotechnology, DNA origami and thus hybrid protein-DNA nanotechnology / supra molecular approaches. The DNA nanotechnology industry detaches this molecule from its biological context and uses its information to assemble and link structural motifs. This field has had a stimulating impact on nanoscience and nanotechnology, and has been revolutionary in our ability to manage molecular self-assembly.

On the synthetic linear DNA nanotechnology Pioneering work was done by Nadrian C. Seeman in 1998 based on Watson–Crick/base-pairing model and Chargaff's rule. It was proficient to make specifically designed nano-architects with definite shape and Characteristics. Structural DNA nanotechnology uses the "bottom-up" self-organization of DNA to produce two-dimensional and three-dimensional objects of various sizes and complexity. DNA can be also used to build nanoscale machines, and a number of DNA-based nano mechanical devices have been already made. However, most of these nano motors are operated by cyclic changes of the chemical environment. In contrast, protein cellular motors are constantly extracting chemical energy from chemical bonds and converting that energy to create mechanical motion. It will be of great interest to develop a synthetic nano motor that will circulate freely with constant stimulation, just like natural protein motors do. Recently, we have introduced a novel DNA nano motor that has autonomous feature. DNA-modifying enzymes can also be used to create and manipulate DNA nanostructures. Although studies in this area have so far been limited, many design tools have been developed for using these enzymes to manipulate DNA in sequence-specific ways. Small nano factories and therefore very specific in their actions, based on different biological processes.

Conclusion

The study of the DNA-based nanostructure is an interesting field because of its unique structural, physicochemical and recognition capabilities. This commentary describes the use of DNA to make nanostructured materials and the use of such nanostructures for various biochemical and medical applications. Including the DNA nanostructures themselves, the DNA-based construction of metallic and semiconductor nanoparticles, nanowires and DNA functionalized nanotubes. DNA nanotechnology holds great promise for drug delivery and the preparation of biochips and biosensors. Some interesting and promising examples of the use of DNA-based nanostructures as biosensors and gene delivery systems are also presented. However, further work should focus on understanding the mechanism of interaction between nanomaterials and biomolecules, such as DNA, on the surface of multifunctional or homogeneous nano films and nano electrodes to explore the potential of novel properties to create a new generation of biosensors.