Structural DNA Nanotechnology (SDN) Gallery

DNA is an excellent system for studying self-assembly and fabricating complex nanoscale structures. This is due to DNA's extraordinary set of capabilities, including molecular recognition, large diversity of unique strand sequence space and its predictable (and programmable) secondary structure.

Here we feature a number of well-known DNA structures that have been modeled with NanoEngineer-1 Alpha 9. DNA Origami

Description:
This is a NanoEngineer-1 design of Paul Rothemund's DNA origami example used in a number of articles he's published. It was modeled completely from scratch using NanoEngineer-1 Alpha 9 . DNA origami represents an important milestone in the field of Structural DNA Nanotechnology (SDN) due to the affordability and simplicity of synthesizing structures in high yield. Dr. Rothemund's method is so easy that even a high school student has designed and fabricated the Nanorex logo out of DNA. The best way to understand how the DNA origami method works is to read Dr. Rothemund's original article published in Nature.

Author:
Paul W. Rothemund
Computer Science, Computation and Neural Systems, Caltech DNA Tetrahedron

Description:
In 2005 a paper was published by A.J. Turberfield (and colleagues) describing a family of DNA tetrahedra consisting of triangles of DNA helices covalently joined at the vertices to form a mechanically rigid 3D structure. This image of a reduced model of one structure, which is less than 10 nanometers on a side, was created using NanoEngineer-1 Alpha 9 and relaxed using a customized molecular-mechanics-like force field developed by Dr. K. Eric Drexler made specifically for DNA structures. The bowing of the DNA helices is pronounced in this rendering and is the result of electrostatic potential terms included in the force field.

Author:
Andrew J. Turberfield
Department of Physics, University of Oxford DNA Cube

Description:
This atomistic model of a DNA cube shows that it is formed from six different cyclic strands that are linked to each other twice on every edge, making this molecule a hexacatenane. Each edge of the cube is a piece of double helical DNA, containing two turns of the double helix. It was designed and synthesized by J. Chen and N.C. Seeman in 1991.

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