

Biomedical Computation Review

Stanford University
318 Campus Drive
Clark Center Room S231
Stanford, CA 94305-5444

seeing science

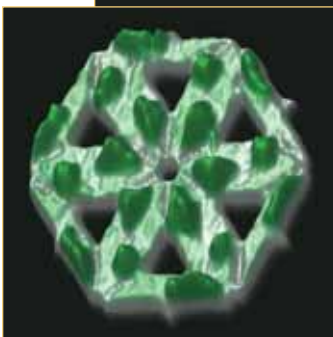
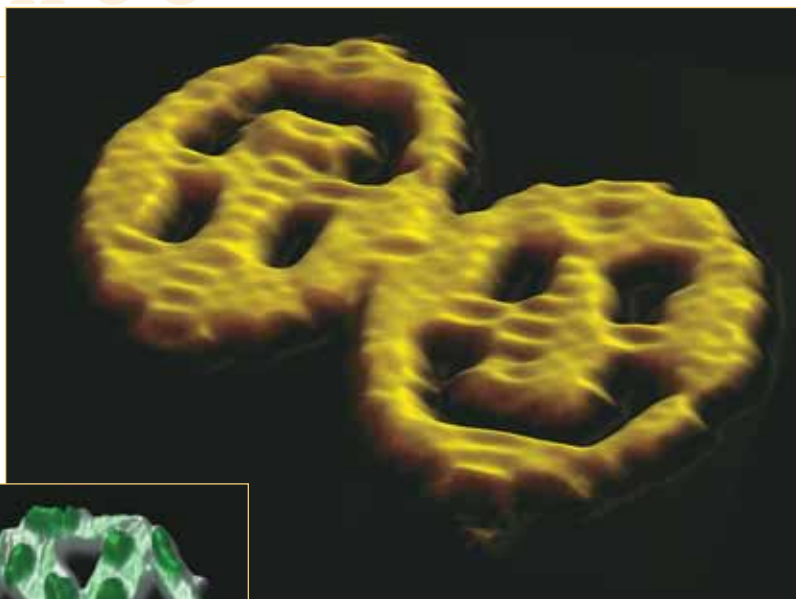
SeeingScience

BY KATHARINE MILLER, MANAGING EDITOR

Making DNA Smile

Designing nanostructures of DNA just got easier. **Paul Rothmund, PhD**, a senior research fellow at Caltech has found a way to coax a long strand of DNA into a pre-determined geometric shape by mixing it together with some well-designed “staples” (oligonucleotides). After designing the shape and the staples on a computer, Rothmund has produced smiling faces, a map of the western hemisphere, stars, and a wide range of geometric shapes with good to excellent yields: between 60 and 90 percent of the time, the intended shape

comes out perfectly. The work, which could have ramifications for the design of nanodevices, was published in the March 16, 2006 issue of *Nature*; more shapes can be seen at <http://www.dna.caltech.edu/~pwkr/>.



Each of these two smiling friends is actually a giant molecular DNA complex, 100 nanometers across and 5 megadaltons in mass. They are created by self-assembly, in a single reaction step, in which a 7000 base long single strand of DNA is folded by about 250 short DNA strands, each about the length of a PCR primer. Roughly 50 billion smileys are made in a single drop of water at once. The hexagon is about 250 nanometers across and is composed of 6 origami triangles linked together. Courtesy: Paul Rothmund and Nick Papadakis.