Nanopicture of the Day

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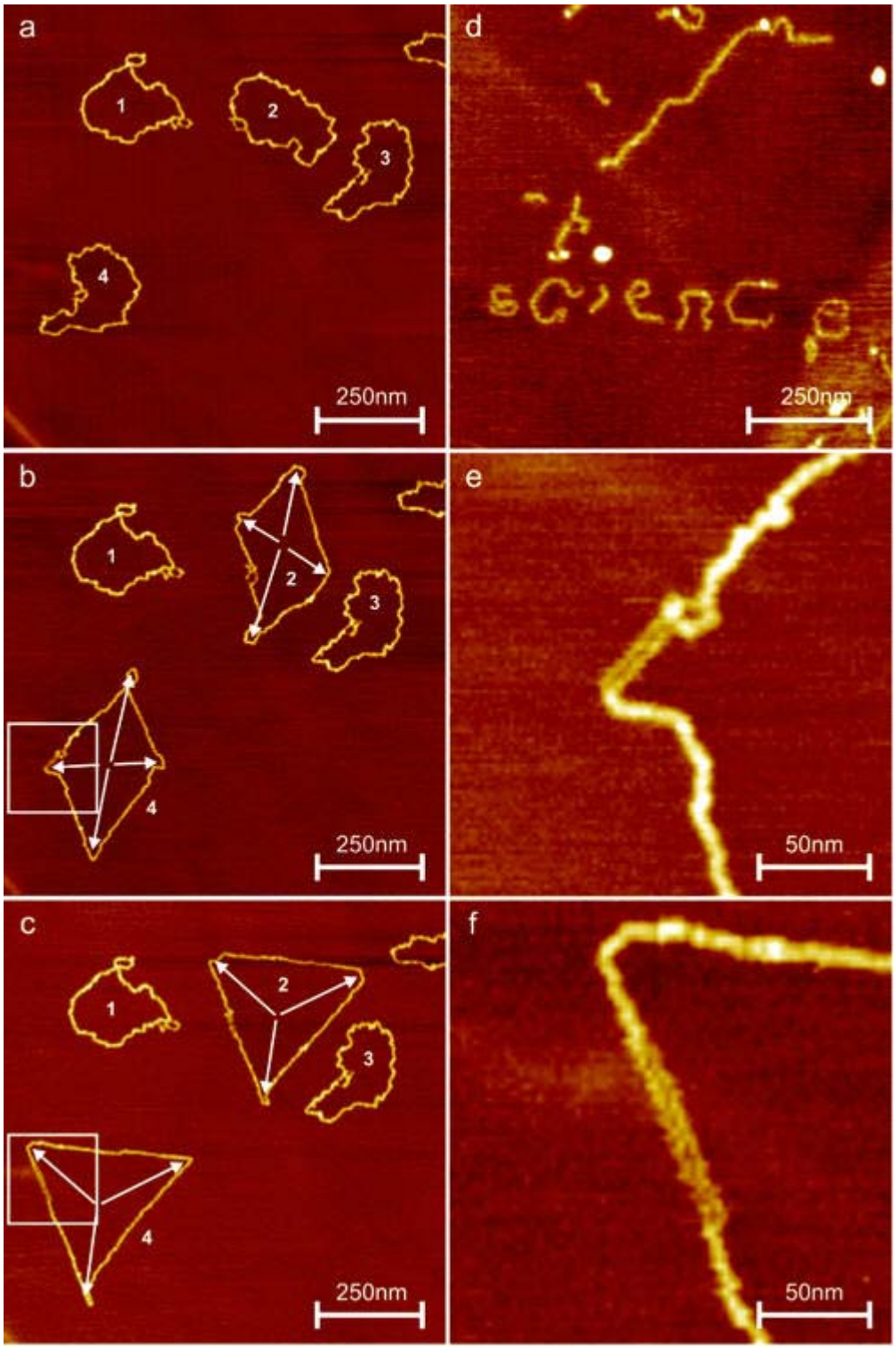
April 18, 2004



Stretched Genes

Source: Jürgen Rabe

References:

"Manipulation and Overstretching of Genes on Solid Substrates" Nikolai Severin, Jörg Barner, Alexey A. Kalachev, and Jürgen P. Rabe. *Nano Letters,* **4** (4), 577 -579, 2004.

Description:

A "molecular chip", i.e., a chip on which single macromolecules are freely arranged, is a key for the fabrication of nanoscopic molecular devices, e.g., DNA molecular array chips. Researchers have developed a new method for the manipulation of already deposited single macromolecules, which allows them to freely position single polyelectrolytes such as DNA on a substrate, to bend and stretch them, to remove stretching defects, and to overstretch double stranded DNA into two parallel single strands.

Above are Scanning Force Microscopy (SFM) images of dsDNA adsorbed on a graphite surface modified with $CH_3(CH_2)_{11}NH_2$ molecules. Manipulation was performed by bringing the tip in contact with the surface and moving it in the desired direction, using homemade manipulation hardware and software: (a) ds-plasmid DNA molecules as deposited; (b) after stretching two of them (no. 2 and 4) along the white arrows; (c) after manipulation of the same molecules into triangles; (d) seven letter word written with polydisperse sample of linear dsDNA; (e) zoom of the square marked in (b), revealing two separated single DNA strands; (f) zoom of the square marked in (c), revealing the same section as in (e) but now with two fully extended single DNA strands.

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