

# DNA strands create tiniest Smileys

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Harvard University scientists on Wednesday said they had created Smileys, Chinese characters and card-game symbols at scales of billionths of a metre using strands of DNA.

The feat marks the next step in "[DNA origami](#)" in which the molecule that provides the [genetic code](#) for life is used as a building block at the nanoscale, with potential outlets in engineering and medicine.

DNA is like a twisted ladder with double "rungs" of chemicals which interlock.

By unzipping the ladder and cutting it lengthwise, researchers can create a stretch with a set of single rungs that can partner up with a matching strand.

This is the characteristic harnessed by a team led by Peng Yin of Harvard's Wyss Institute for Biologically Inspired Engineering.

Reporting in the British journal *Nature*, the team showed off short lengths of DNA, each 42 "rungs" long, that interlocked with complementary stretches of the molecule.

Like Lego tiles, the strands could be programmed to assemble themselves into specific shapes.

To demonstrate the method, the team made a molecular picture featuring 107 designs, from emoticons, [Chinese characters](#), numbers and letters

from the Latin alphabet.

The canvas is a rectangle measuring 64 nanometres by 103 nanometres, with 310 pixels.

Scientists have been interested in [nanoscale](#) shapes for more than 20 years, and have progressively moved from two dimensional to three dimensional successes.

The idea is not just for intellectual amusement.

DNA can be used as a framework at the molecular scale, with potential outlets in high technology and medicine.

For instance, work in the lab includes building a DNA "board" for transistors of carbon nano-tubes and devising a clamshell-shaped structure designed to pop open and deliver a minute payload of medicine to zap a cancer cell nearby.

The new research helps this by fast-tracking the assembly technique -- in 2D, for now -- and reducing costs.

A set of 1,706 tiles costing roughly \$7,000 can make an "astronomical" number of shapes, a commentary published by Nature said. Each shape in the Harvard's picture took only an hour or so to accomplish, using a robot to select and mix the strands.

In the late 1980s, it took nearly two years to design and build a seven-nanometre cube, using a long strand of DNA that had to be twisted into the desired shape.

**More information:** *Nature*, May 30, 2012. pp 623-626

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