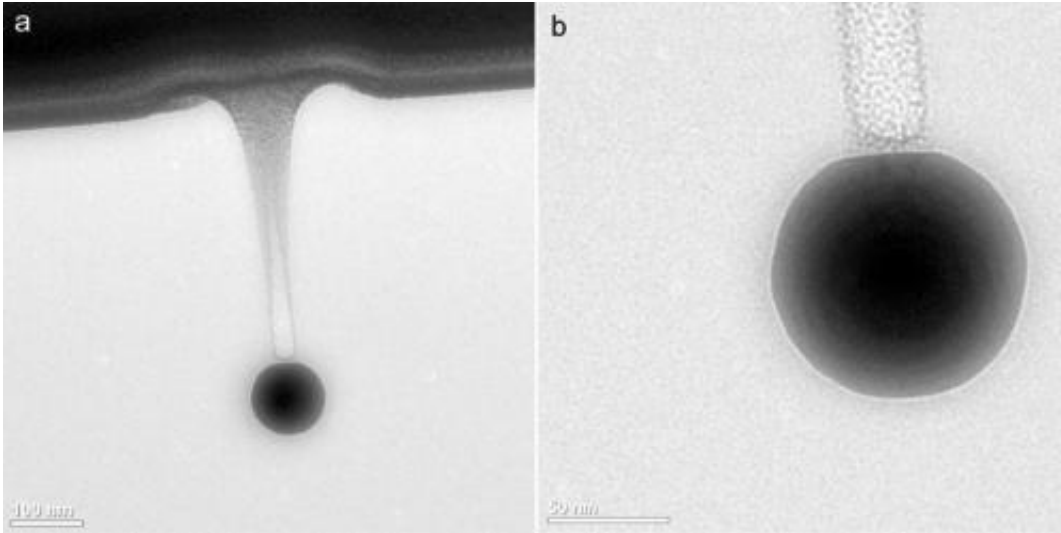


# Gold 'nano-drills'

January 22 2015

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Nanopore formed by gold nanoparticle

Spherical gold particles are able to 'drill' a nano-diameter tunnel in ceramic material when heated. This is an easy and attractive way to equip chips with nanopores for DNA analysis, for example.

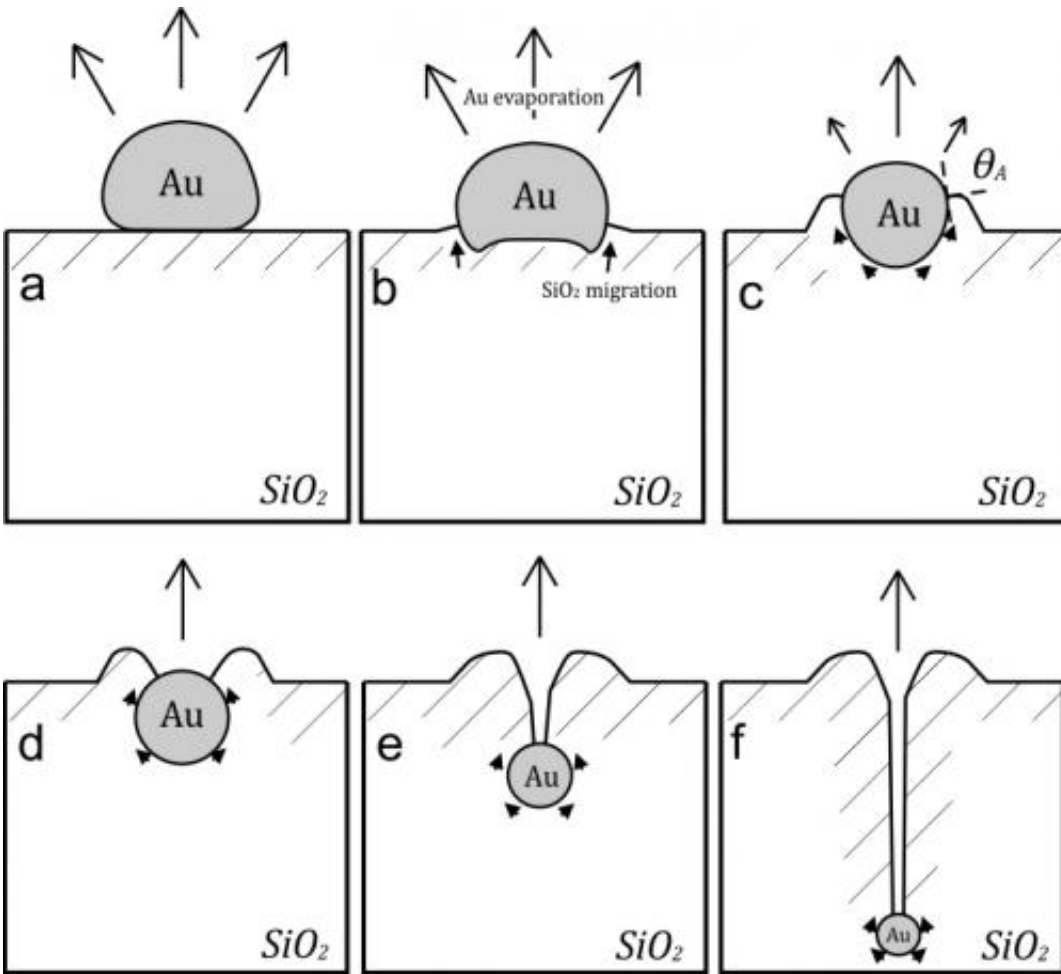
Nanotechnologists of the University of Twente published their results in *Nano Letters*.

Researcher Lennart de Vreede applied a large number of microscopic discs of gold on a surface of [silicon dioxide](#). When heated up for several hours, the gold is moving into the material, perpendicular to the surface, like nanometer-sized spheres. Nine hours of heating gives a tunnel of 800 nanometers in length, for example, and a diameter of 25 nanometer:

these results can normally only be achieved by using complex processes. The gold can even fully move through the material. All nanotunnels together then form a sieve. Leaving the tunnel closed at one end, leaves open the possibility of creating molds for nano structures.

Once heating to close to their [melting point](#), the gold discs – diameter one micron -, don't spread out over the surface, but they form spheres. They push away the silicondioxide, causing a circular 'ridge', a tiny dam. While moving into the silicondioxide, the ball gets smaller: it evaporates and there is a continuous movement of silicondioxide.

For example in DNA-sequencing applications, De Vreede sees applications for this new fabrication technology. In that case, a DNA-string is pulled through one of these nano-channels, after which the building blocks of DNA, the nucleotides, can be analysed subsequently. Furthermore, De Vreede expects the 'gold method' to be applicable to other ceramic materials as well. His recent experiments on silicon nitride indicate that.



Process of forming pores using gold nanoparticles

**More information:** Lennart J. de Vreede, Albert van den Berg, and Jan C. T. Eijkel, "Nanopore Fabrication by Heating Au Particles on Ceramic Substrates," *Nano Lett.*, 2015, 15 (1), pp 727–731, [DOI: 10.1021/nl5042676](https://doi.org/10.1021/nl5042676)

Provided by University of Twente

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