Tech Highlight

Enhanced nanopatterning technique based on 'capillary effects'

A technique, developed by IMRE scientists, to gain ultra-high precision control over the order and predictability of nanoparticles could open up a new avenue for manipulating sub-10 nm nanoparticles (within pre-defined nanostructures). This could lead to the fabrication of optoelectronic devices with enhanced functionalities such as increased speed and low power consumption. It could also be potentially applied to technologies that require very high patterning resolution such as nanoelectronics, optoelectronics and photonics.

Headed by Dr. Mohamed Asbahi, the IMRE research team used an approach based on 'capillary effects'. Irregular nanotriangles with internal sections as small as a blood vessel, were used to make the nanocavities. With the addition of a solvent, they were able to gain more control to manipulate the position of the nanoparticles within the nanocavities by altering the angle of the nanotriangles' corners. The experimental results showed a more controllable positioning of the particles even within the corners of the smallest angle.

The team is optimistic that with further research, this improved method for controlling the spatial arrangement of nanoparticles, could advance the process of nanopatterning with precisions exceeding other conventional lithographic techniques.

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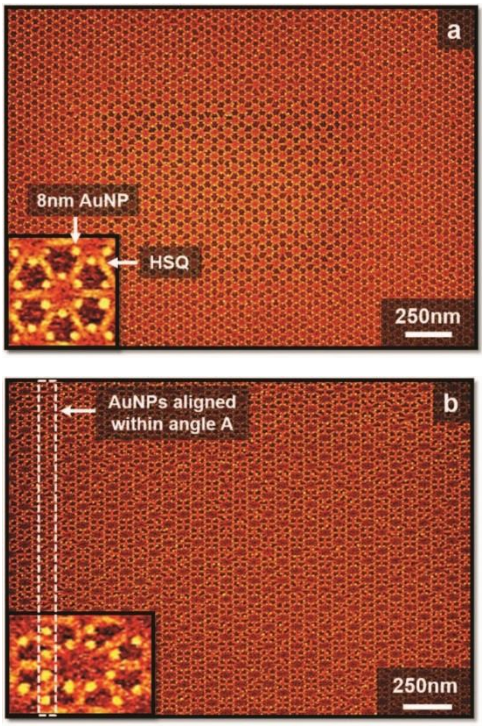
The results of this research were published in *Nanoscale*, entitled "Second order directed positioning of nanoparticles induced by the main terminal meniscus shape in irregular template cavities".



Scanning electron micrography (SEM) images showing arrays of 8 nm gold nanoparticles (AuNPs) as self-assembled within hydrogen silsesquioxane templates based on the (a) equilateral and, (b) right-angled triangular cavities. The insets show the structure at a higher magnification. The dashed box in (b) highlights that the position of the deposited AuNPs is mostly aligned within the smallest angle of the triangles.

Reference: Nanoscale, 2017, 9, 9886