

14:00

Nanofabrication par combinaison :  
nanostructuration et autoassemblage  
*Combinational nanofabrication: nanopatterning  
and self-assembly*

**Clivia Sotomayor**, Catalan Institute  
of Nanotechnology (ICN-CIN2), Barcelone, Espagne



Mardi 7 octobre

In the context of information and communication technologies self-assembly and nanopatterning technologies meet to facilitate novel functions on Silicon platforms under the umbrella of heterogeneous integration.

It is commonly assumed that self-assembly of mesoscopic, nanoscopic and molecular entities is by definition cost-effective compared to other nanofabrication methods. However, as with any technology, quantitative methods are required to extract ordering parameters. Here we present a way to obtain crystal ordering in the plane and in the bulk by applying acoustic fields during vertical drawing crystallisation of colloidal mesoscopic and nanoparticles. This spatially coherence resonance-like behaviour in the self-assembly of three-dimensional fcc colloidal crystals results in an improvement of a factor of 10 of the in-plane crystallinity. The process is akin to stochastic resonances. The quantitative analysis is a generic approach to quantify crystal using discrete Fourier Transform analysis of the scanning electron micrograph or AFM images. This approach can be extended to quantify ordering of other self-organised structures, such as micells or self-organised quantum dots. Our study covered also the 3-dimensional ordering of these structures by transmission spectroscopy. We thus have tested a quantitative approach to self-assembly characterisation thereby bringing it closer to metrics and standards, which are a prerequisite for uptake in future applications, such as those in biotechnology.

**Clivia M. Sotomayor Torres** obtained her BSc. (Hons.) Physics in 1979 (Southampton University, UK) and her Dr. Phil. in Physics in 1984 (Manchester University, UK). She has held academic appointments at the Universities of St. Andrews and Glasgow (UK), a chair at Wuppertal University (Germany) and a research professorship at Univesity College Cork (Ireland). Clivia has received three prestigious awards from the Royal Society of Edinburgh, the Nuffield Foundation, and a ZONTA Amelia Earhart Fellowship (USA) in 1993, 1990 and 1982, respectively. Her research interests include the science and engineering of optical nanostructures, nanoimprint lithography, light propagation and emission in periodic and quasi-periodic media, inorganic nanotubes and more recently confined phonons in silicon-on-insulator thin films and membranes. Since May 2007 she is an ICREA Research Professor at the Catalan Institute of Nanotechnology (ICN-CIN2) in Spain, where she has built a group to investigate phonons in low dimensional systems, develop nanofabrication methods for 3D structuring and carry out research in dispersion engineering.

She has authored over 350 scientific papers and edited six books, including *Alternative Lithography: unleashing the power of Nanotechnology* published by Kluwer-Academic-Plenum in 2003.

Since 1989 she has participated in several EU projects as partner and coordinator. Her team currently participates in STABILIGHT, NANOPACK, NAPANIL and NANOICT. She coordinates the IST Network of Excellence "Nanophotonics to realise molecular-scale technologies" PHOREMOST.