reduction in resolution). Nevertheless, the gain in resolution over a conventional DHM operating at the same wavelength should be clear.

A third point for consideration is ease of use: the optical arrangement requires the sample to be positioned between two oil-immersion objectives, which makes it difficult to present samples to the microscope. This is a limiting feature of any super-resolution microscope that employs such a double-objective configuration. Lastly, the computational complexity and calibration of the technique are considerably more involved than that of conventional systems.

That being said, the limitations of the system demonstrated by Cotte *et al.* are not unusual for a super-resolution technique. Furthermore, the complexities of the system are neither serious nor insurmountable, and will likely be overcome just as issues with other earlier super-resolution systems were overcome in their individual journeys to becoming commonplace research tools. ❐

Gary Brooker is in the Department of Biomedical Engineering and Montgomery County Campus Microscopy Center at the Johns Hopkins University 9605 Medical Center Drive Suite 240 Rockville, Maryland 20850, USA.
e-mail: gbrooker@jhu.edu

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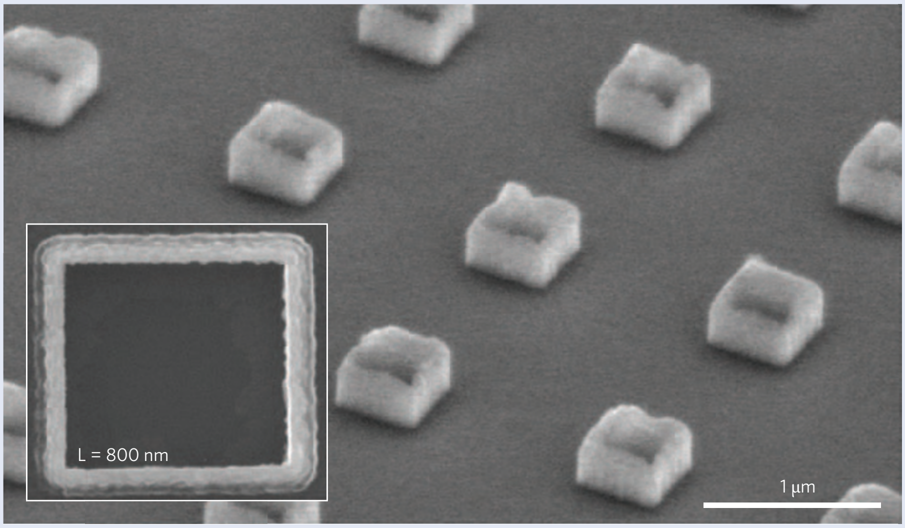
MINIATURE SOURCES

Light boxes

Azusa Hattori and colleagues from Osaka University and Osaka Dental University in Japan have developed a technique for fabricating luminescent nanoscale boxes (*Appl. Phys. Express* **5,** 125203; 2012). Their approach combines inclined pulsed laser deposition with a three-dimensional template prepared by nanoimprint lithography. The wall thickness of the boxes can be controlled over the range of 20–100 nm by varying the laser alignment. Additionally, the researchers hope that the boxes, with their luminescence peak at around 380 nm, may prove useful candidates for nanoscale device applications such as a luminescent light sources.



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First, the researchers used reactive ion etching on a silicon substrate to obtain a pattern of cubic resist structures. Then they deposited ZnO onto the resist template pattern by inclined pulsed laser deposition using an ArF excimer laser (wavelength of 193 nm) with a ZnO ceramic target. Rotating the substrate in 90° steps ensured even ZnO deposition across the different surfaces of the cube. The researchers then used ion milling to etch the ZnO top surface of the cubes and remove unwanted ZnO from the silicon substrate. Finally, they employed acetone dipping to remove the remaining resist material inside the cubes, thus forming the boxes.

Hattori explained to *Nature Photonics* that there is a balance between the size of the nanostructures and their shape and position in terms of functional nanodevice fabrication.

"Many nanofabrication approaches have been proposed previously but they are often applicable only to limited materials and have poor controllability," Hattori told *Nature Photonics*. "Our three-dimensional nanotemplate pulsed laser deposition technique enables the construction of extremely small high-quality nanostructures of any type of material (metal, insulator or semiconductor) with well-defined shapes and locations. This approach allows for the production of extremely small ZnO nanostructures at arbitrary positions while controlling their size with nanometre resolution."

In the future, the researchers would like to fabricate large arrays of structures of various shapes, including nanowires, nanopipes, triangular and polygonal nanoboxes, and core–shell nanostructures, for use in applications such as magnetically tunable photonic crystals, metamaterials, biosensors and light sources with angular momentum. Hattori explained that they have fabricated a ferromagnetic $(Fe,Zn)_3O_4$ semiconductor and a strongly correlated $(La,Pr,Ca)MnO_3$ nanobox/nanowire structure, which are good candidates for applications in magnetically tunable photonic crystals.

DAVID PILE