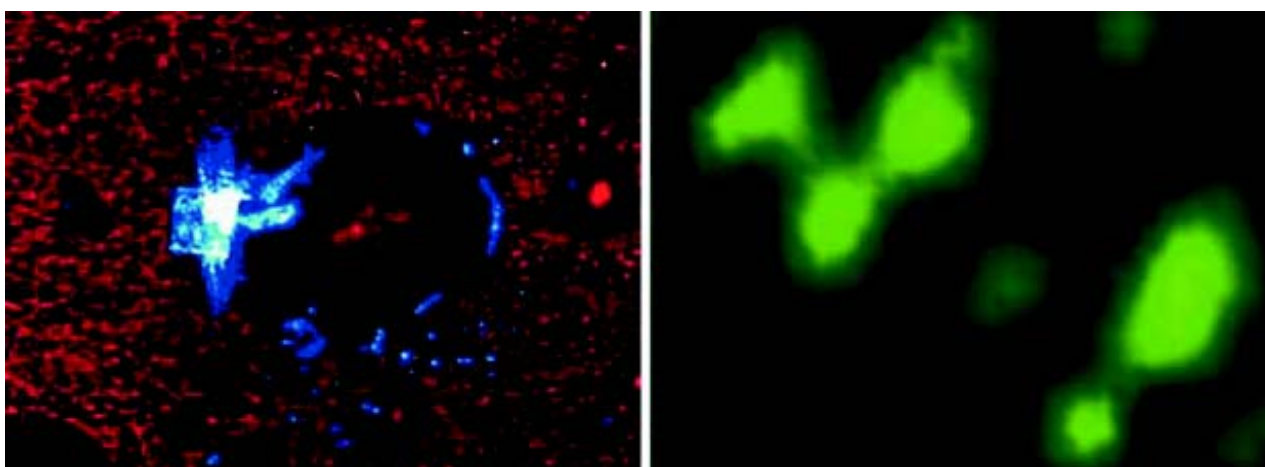


Special Reports

Plasmons Make Light Work for Microscopy¹

Compiled by Steve Reucroft[†] and John Swain[‡]

^{†‡}Dept. of Physics, Northeastern University, 110 Forsyth Street, Boston, MA 02115.



A “plasmon microscope” formed with a glycerin drop (left) creates an image of a $30 \times 30 \mu\text{m}^2$ array of “nanoholes” (blue square), in which the triplets of the 100 nm diameter holes can be resolved (right).

A clever new technique could allow biologists to study structures well below the wavelength of light without the need for complex devices such as electron microscopes. The idea in its first concrete implementation is simplicity itself. A sample is placed on a metal-coated glass surface and covered with a drop of glycerin. Laser light shines through the glass and produces surface plasmons (propagating optical modes) in the metal.

Broadly speaking, plasmons can be thought of as a kind of 2D light, with particles that are composites of electrons and photons. They have wavelengths of only about 70 nm, or about an order of magnitude less than visible light. In the new technique developed by Igor Smolyaninov and colleagues at the University of Maryland and Queen’s University of Belfast, the glycerin acts like a parabolic dish that can collect plasmons sprayed out from the sample at its focal point. It then forms

them into something like a “plasmon beam” that goes back down towards the metal surface. Some of the photon part bounces back up and can be seen with a regular light microscope. The performance is close to what an electron microscope might achieve, but involves no vacuum, high voltage or elaborate specimen preparation.

Further reading

Igor Smolyaninov *et al.*, *Phys. Rev. Lett.* **94**, 057401 (2005).

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