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'Drag and drop' interface simplifies laser microscopy

17:53 06 March 2007
NewScientist.com news service
Tom Simonite

A device that radically simplifies the operation of "laser traps" could let non-experts manipulate microscopic objects more easily. It could provide new research opportunities for biologists and other scientists without expertise in optics, the system's designers claim.

Until now, experts have had to painstakingly adjust the position of individual mirrors to create laser beam "traps" that hold cells or small particles in place.

The new device, created by Danish researchers, provides a simple "drag and drop" interface that makes this process far simpler.

This video shows the system controlling microscopic spheres (2.5MB .mov format). Up to 80 objects can be manipulated at a time, using the device.

"We hope to open up the technology to a wider audience – biologists in particular," says Jesper Glückstad, of the Risø National Laboratory in Denmark. Glückstad notes that it takes considerable skill to position a sample and the mirrors needed to align the beams: "It has been a bottleneck until now – only a few people in my own group are able to do it within a reasonable time."

In the crosshair

The new device has a small motor fitted to each of its mirrors, which are controlled by a computer. A video display shows a crosshair pinpointing the focus of one of two laser beams. The user drags this across the screen to position each of the beams so that they are precisely aligned.

Once this set of laser crosshairs have been positioned correctly, up to 80 cells or particles can be manipulated in 3D simultaneously using another drag and drop interface. This involves tuning the power and other optical properties of each of the beam pairs.

Other, simpler laser tweezers can hold a cell in place under a microscope but such tweezers use only a single beam. The lens must be positioned about one millimetre from a sample.

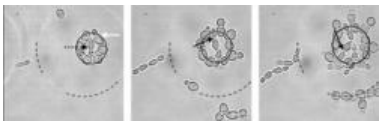
Larger workspace

This "is like sticking your nose right down to the surface", says Glückstad, "you get tunnel vision." By contrast, counter-balancing two beams extends the gap between lens and sample to one centimetre, providing a larger workspace, he adds.

David McGloin, who works on laser trapping at St Andrews University, UK, says most researchers currently build their own laser manipulation systems. "There is certainly the opportunity for greater penetration of the technology among biologists without that expertise," he told **New Scientist**.

Glückstad and colleagues plan to develop their drag and drop system commercially, but McGloin points out that there will still be alternatives to buying an expensive off-the-shelf system. "In a research sector like universities there is often the possibility to find collaborators that do have optics expertise," he notes.

Journal reference *Optics Express* (vol 15, p1923)



Enlarge image
The laser system is used to trap and move yeast cells (Image: Jesper Glückstad)

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