Research Highlights

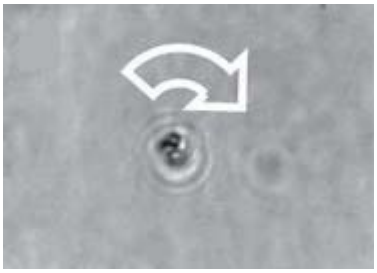
Nature Nanotechnology
Published online: 1 October 2009 | doi:10.1038/nnano.2009.318

Subject Category: **Molecular machines and motors**

Optical tweezers: Two in one

Adarsh Sandhu

The same laser can be used to both drive and detect the rotation of a nanoscale object.



Non-contact techniques for monitoring and controlling the rotation of nanostructures are crucial in various areas of nanotechnology such as nanoscale pumps in 'lab-on-a-chip' devices. Now Philip Jones of University College London and colleagues in Messina and Cambridge have demonstrated that optical tweezers — which exploit the force exerted by light on microscopic objects — can be used to monitor and control the rotational motion of nanorotors made of bundles of single-walled carbon nanotubes and aggregates of gold nanorods[1].

Depending on the size and optical properties of the nanorotors, they do one of two things when they are exposed to a laser beam with a wavelength of 830 nm: they start to rotate or they align with either the laser propagation axis or the dominant polarization direction. The rotation can be caused either by polarization torque or by the radiation pressure on the nanorotor being unbalanced.

By analysing the light after it has interacted with the nanorotors, it is also possible to measure their rotation frequency. This ability to control and monitor the rotation with the same laser will facilitate the use of this approach in various applications.

Reference

1. Jones, P. H. *et al*. Rotation detection in light-driven nanorotors. *ACS Nano* doi:10.1021/nn900818n (2009). | **Article**

Nature Nanotechnology ISSN 1748-3387 EISSN 1748-3395