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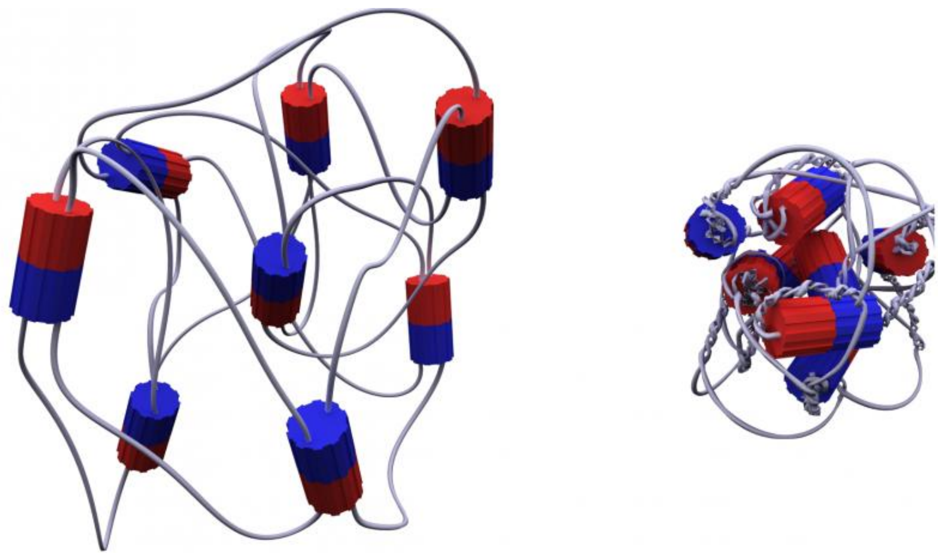

Shrinking gel is world's first material powered by nanomotors

A gel which can be shrunk by light-powered molecular motors has become the first ever material to change its shape because of microscopic nanomachines.

19 January 2015 - By BEN DEIGHTON

For the first time, the revolutionary gel gives researchers a way to use the motion of molecular machines in the real world.

'To bridge motions between the nanometric scale and the macroscopic scale, that's really the fundamental question behind the research,' said lead researcher Professor Nicolas Giuseppone, from the University of Strasbourg in France, whose work was part-funded by the European Research Council. 'It's a question that nanotech researchers have been asking themselves for a number of years.'

A gel is normally made of a network of molecular chains connected through nodes. Prof. Giuseppone and his team from the Institut Charles Sadron at France's national research centre CNRS used rotary molecular motors as the nodes.

Eight orders of magnitude

That means the molecular motors continuously wind up the filaments, amplifying their movement by eight orders of magnitude, and resulting in the gel shrinking by several centimetres.

'We are demonstrating a way to put them together and on that basis we can create materials which can produce movement at our scale,' Prof. Giuseppone said.

The study, published in the journal Nature Nanotechnology, will enable the development of a new type of material. 'We will have materials that are no longer static, but in a non-equilibrium dynamic,' explained Prof.

Giuseppone. ‘We could make artificial muscles.’

As the molecular motors are powered by light, the gel could also allow researchers to develop technology to store solar energy. That’s important because at the moment there is no easy way to keep power from solar panels.

However, Prof. Giuseppone cautions that it’ll take five to 10 years before this technology is ready for use in commercial products.

‘The next step is to make movements that are more controlled, for the moment we have a universal contraction but what we want is a directional contraction with controlled speed and power,’ said Prof. Giuseppone. ‘The other thing we are going to do is to try to reuse the energy that is stored inside the material.’

This video explains how the technique works. Video © Gad Fuks/Nicolas Giuseppone/Mathieu Lejeune

More info

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