Home
World
Companies
Markets
Markets & funds data
Lex
Comment & analysis
Technology
Business life
Business education
Management
Media and marketing
Entrepreneurship
Law and professions
Science & technology
Investing in China
Your money
Arts & Weekend
In depth
FT Reports
Jobs & classified
Site services

Partner sites
Chinese.FT.com
FT Deutschland
Les Echos

'Nanomachines' represent huge stride in technology

By Clive Cookson,Science Editor
Published: September 8 2005 03:00 | Last updated: September 8 2005 03:00

Scientists have for the first time built molecular-scale "nanomachines" that can move objects a million times larger, the British Association science festival was told yesterday.

Chemists at Edinburgh University propelled droplets of liquid up a slope, using light to activate banks of molecular machines that coat a gold surface.

Although the experiment is proof of a principle with no immediate use, the technology has many potential applications. They include linking nanomachines to make artificial muscle fibres, producing "smart materials" that change physical properties in response to a stimulus, and - further in the future - controlling the movement of drugs around the body to points where they are needed.

The Edinburgh experiment imitates biology by harnessing Brownian motion - the random movement of molecules caused by collision with molecules around them. The key is to control Brownian motion so it moves molecules in a particular direction rather than randomly, said David Leigh, the research leader.

Each nanomachine on the gold surface has a shuttle component, which moves in reaction to light, either revealing or hiding a Teflon-like part of the molecule. This determines whether the surface attracts or repels liquid, changing the surface tension of the droplet on it.

The effect produces enough energy to move the droplet as much as a millimetre up a 12-degree incline.

Prof Leigh said: "That may not sound much, but in relation to the nanoscale molecular motors it is equivalent to raising an object to over twice the height of the world's tallest building with millimetre-sized pistons."

Another researcher who reported significant progress in putting nanoscience into action was Donald Fitzmaurice of University College Dublin, who is using DNA to guide the assembly of nano-scale electronic components.

"We use DNA for two reasons," said Prof Fitzmaurice. "It has excellent nanostructural properties and we can use the [genetic coding] information contained in DNA to make proteins."

The practical motivation for his work is to produce ultra-miniature components for integrated circuits for the time - expected about 10 years from now - it becomes impossible to make conventional silicon components any smaller.

Prof Fitzmaurice said: "This grand convergence of biotechnology and nanotechnology is going to blur the distinction between the animate and inanimate worlds, which could cause problems because the way we organise our society is based on a well-defined distinction between living and non-living. There could be ethical issues over the rights we assign to synthetic materials that are alive and at the same time not alive."

= requires subscription to FT.com