Bacterial Driven Micromotors

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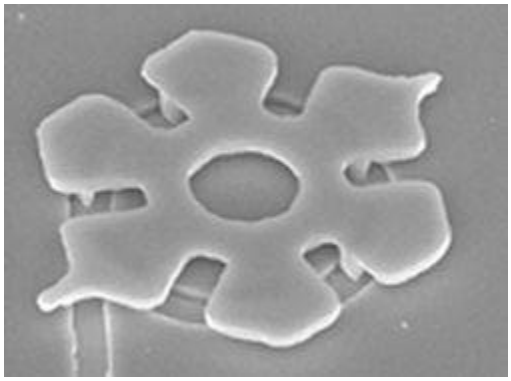
James Brien

Simple motors have been around for many hundreds of years. Despite the years of existence, the basic principles that govern motors have not drastically changed. They have been created on very large scales, but not until recently, on very small scales.

The size of these micromotors is on the order of 20-60 _m and uses bacteria (Mycoplasma mobile) around 1 _m. The concept is simple enough: hitch the bacteria to a yolk-like rotor and harness the energy generated as they move. It is similar to energy derived from cattle for milling purposes.



Although the technology behind this type of motor is new, the mechanisms are fairly well understood, which means adoption of this type of motor for application has fewer obstacles to clear.

The motor itself works by first cutting a square hole and grooves that lead into four circular tracts. Rotors like the one pictured above are placed above the circular tracts. These rotors have tabs that extend down into the tracts, and come in contact with the bacteria, Mycoplasma mobile.

A protein binding mechanism binds the bacterium to the tab, and because the bacteria move in a fixed direction, their movement is used to drive the motor.

Even though the scale is quite small, the bacteria move at around 5 _m per second, which can move the rotor at speeds up to 2.6 rpm.

The idea of using bacteria to do simple work has been around for quite some time, with the development of bacteria capable of consuming waste and emitting H_2O and CO_2 as the only byproducts. They have also been used to explore electricity generation in Fuel Cells by the U.S. Air Force.

Bacteria as a source for power, especially power within the human body, is cheap and effective. Because bacteria replicate quickly and the body is an ideal environment, energy supply is abundant.

These facts can be used to further implement technologies designed to enable permanent implantation of devices inside the human body by serving as a convenient and indefinite power supply.

Sources:

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