RESEARCH HIGHLIGHTS

NANOBIOTECHNOLOGY

Tiny cell transistor

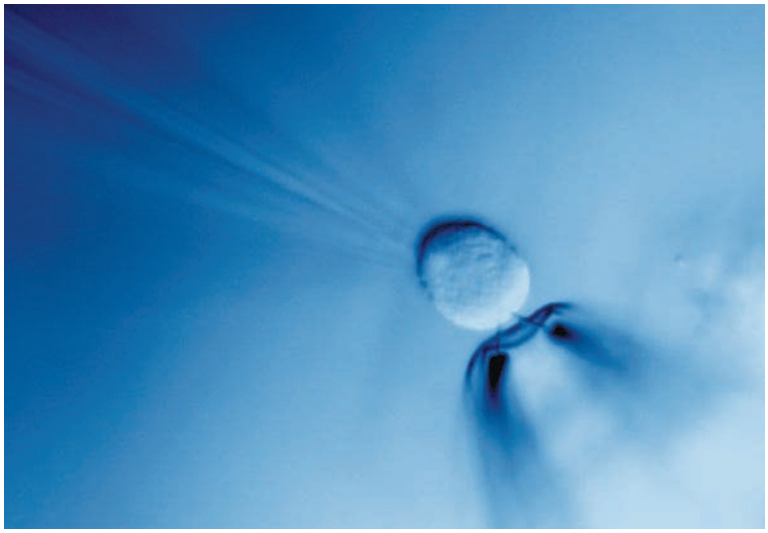
Science **329,** 830–834 (2010)

A nanometre-sized transistor disguised as part of a biological membrane has infiltrated a living cell (pictured) and measured its electrical activity.

Charles Lieber and his colleagues at Harvard University in Cambridge, Massachusetts, created their hairpin-shaped device out of a silicon nanowire with a tiny transistor on the elbow of the bent pin and an electrical contact on each of the pin's two arms. They coated the elbow's tip with phospholipids — the main constituent of cell membranes — tricking the membrane into accepting the tip and pulling it inwards. The authors made a device less than 50 nanometres wide — smaller than many virus particles.

The team poked the probe into a single cultured embryonic chicken heart cell and used it to record a series of voltage peaks corresponding to the beating of the cell.

For a longer story on this research, see go.nature.com/t4z6hK



SCIENCE/AAAS

AGEING

Proteins clump with age

PLoS Biol. **8,** e1000450 (2010)

Ageing worms accumulate protein clumps similar to those observed in humans with Alzheimer's and Huntington's disease.

Cynthia Kenyon and her colleagues at the University of California, San Francisco, searched for proteins made by the nematode *Caenorhabditis elegans* that would not dissolve in detergents — a sign that the proteins would aggregate into insoluble clumps. The researchers found 461 proteins that become more insoluble as the worms age. Several of the proteins were similar to those that are found clumped and tangled in the brains of patients with Alzheimer's disease.

Furthermore, mutations that slow ageing in *C. elegans* by interfering with an insulin-signalling pathway also delayed the accumulation of insoluble proteins. The results suggest that disease is not the only factor to blame for protein aggregation, with ageing playing a part as well.

ORGANIC CHEMISTRY

Fantastic fluorination

J. Am. Chem. Soc. doi:10.1021/ja105834t (2010)

Attaching fluorine to small organic molecules can improve their pharmacological properties. But the process often relies on palladium catalysts and harsh reaction conditions.

Tobias Ritter and his colleagues at Harvard University in Cambridge, Massachusetts, have developed an alternative approach based on a silver catalyst. Using the relatively inexpensive silver oxide, they successfully fluorinated several small molecules, including a cholesterol drug, attaining high yields under milder reaction conditions.

Although the new method requires an additional synthetic step, it should be suitable for late-stage fluorination of complex small molecules such as pharmaceuticals, the authors say.

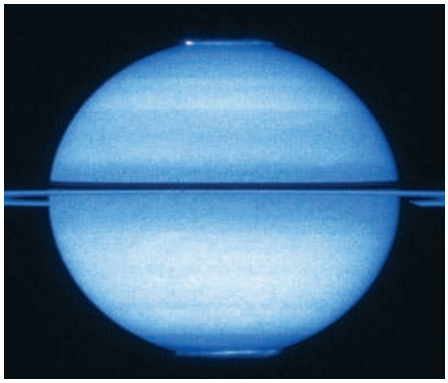
ASTRONOMY

Saturn's beat

Geophys. Res. Lett. doi:10.1029/2010GL044057 (2010)

The ringed planet has rhythm. Researchers previously observed a regular pulsation in the ultraviolet glow of Saturn's aurorae, and now show that this beats in time with the planet's radio emissions.

In the 1980s, when the Voyager spacecraft detected an electromagnetic pulse oscillating in a recurring, 11-hour period, this was thought to be tied to the planet's rotation. But over the years the beat has sped up and slowed down. Jonathan Nichols at the University of Leicester, UK, and his colleagues analysed images (pictured) from the Hubble Space Telescope to show that Saturn's dazzling aurorae change intensity in time with the radio emissions. This suggests that the two are physically linked. Further studies of Saturn's magnetosphere may uncover the reason for the radio period's odd pace, the authors say.



NASA/ESA/J. NICHOLS, UNIV. LEICESTER

MATERIALS SCIENCE

Decorating graphene

Nano Lett. doi:10.1021/nl1024744 (2010)

In order for single-atom-thick sheets of carbon, or graphene, to be used in sensors, transistors and other devices, reactive molecules must be attached to them so that the sheets can be chemically bonded to other materials. Mingdi Yan at Portland State University in Oregon and her colleagues report a simple way to do this.

They created three variants of perfluorophenylazide, a compound that reacts with graphene's carbon–carbon bonds when heated or illuminated with a mercury lamp. Each variant carried a different molecular group. By mixing each variant individually with a solution of graphene flakes, the team attached a specific molecule to the graphene, preparing the carbon sheet for further chemical bonding.

Previous methods were less controlled, so attached a variety of molecules to graphene at varying densities.

IMMUNOLOGY

Killer cells help

J. Exp. Med. doi:10.1084/jem.20092749 (2010)

The primary job of natural killer (NK) cells, a type of immune cell, is to destroy host tissue infected by pathogens. The cells