Signal transduction

Ras finds itself a sticky spot

Cell **117,** 637–648 (2004)

The Ras family of proteins, which regulate cell proliferation and are mutated in around 30% of human cancers, were thought to act mainly in the cellular outer membrane. But Andrew K. Sobering *et al.* have found that, in yeast at least, a Ras protein also works in the intracellular compartment known as the endoplasmic reticulum (ER).

Previously, the authors identified a yeast protein called Eri1 that interacts with Ras and which, when mutated, has similar effects to Ras alterations. Sobering *et al.* have now found that Eri1 is part of an enzyme complex in the ER that is involved in producing glycosylphosphatidylinositol (GPI) anchors. These anchors are attached to proteins destined for the cell wall and help yeast cells to alter their shape and stick to extracellular surfaces.

The authors go on to show that yeast Ras binds and blocks this enzyme complex, so cutting the production of GPI anchors. Should the same prove true in humans, this suggests an additional way in which Ras mutations might help cancers to spread — by lowering the amounts of GPI-anchored proteins on the surface of tumour cells, so allowing them to better invade surrounding tissue or spread to other organs. **Helen Pearson**

Materials science

Self-cleaning clothes

J. Am. Ceram. Soc. **87,** 953–955 (2004)

In the classic 1951 film *The Man in the White Suit* (pictured), Alec Guinness played a scientist who invents a fabric that never gets dirty or wears out. A chemists' pipe-dream perhaps, but the prospect of a self-cleaning fibre might now be a step closer.

Walid A. Daoud and John H. Xin have found an efficient way of coating cotton cloth with nanoparticles of titanium dioxide. These particles are catalysts that help to break down organic materials, requiring only sunlight to trigger the reaction. For maximum activity, the nanoparticles must have the correct 'anatase' crystal structure, which has previously been difficult to achieve in these tiny grains.

The authors dipped a small cotton patch into a suspension of titanium dioxide held in a mixture of water, ethanol and acetic acid at about 40 °C. After just half a minute the cloth was removed, padded dry and heated to 97 °C in an oven for 15 minutes. Three hours in boiling water completed the process. The authors report a good covering of anatase nanoparticles, each

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of which measures about 20 nm across.

They speculate that catalyst-coated materials could one day lead to self-cleaning fabrics that tackle organic dirt, environmental pollutants and harmful microorganisms. But they should perhaps take note of the film's plot: fearing that his invention might threaten their livelihoods, textile manufacturers took Guinness prisoner to keep his remarkable fabric under wraps. **Mark Peplow**

Plant development

Pollen redirection

Development **131,** 2707–2714 (2004)

Unlike animals, plants do not have motile sperm. Instead, pollen, which carries the male gamete, grows down through the plant's female organs in search of ovules to fertilize. Ana Margarida Prado and colleagues now provide evidence that nitric oxide (NO) may be involved in directing pollen to its goal.

The authors found that, when a source of NO was placed close to the tip of a growing pollen tube, the tube executed a turn of more than 90° to grow away from the gaseous signalling molecule. This behaviour could be abolished by adding an NO scavenger to the growth medium, but was enhanced by adding sildenafil citrate (Viagra), showing that cyclic GMP molecules — the breakdown of which is inhibited by Viagra — might be involved in transducing the NO signal in pollen tubes.

The authors also found that pollen tubes themselves synthesize NO, in organelles positioned behind the growing tip; the resulting NO gradient would maintain growth in a straight line. But pollen must make sharp turns to reach the ovary. The authors suggest that NO could also be produced at 'turning points' within the flower, to point pollen in the right direction. **Christopher Surridge**

Neurobiology

Sense and sensitivity

Neuron **42,** 595–605 (2004)

Rod cells in the retina can detect very small changes in illumination. But how do they accurately transmit these changes to downstream nerve cells? The secret, according to Wallace B. Thoreson *et al.*, seems to lie in their unusual response to intracellular calcium, the concentrations of which alter in response to light.

Using rods from the eyes of tiger salamanders, the authors manipulated the cells to release calcium from caged calcium compounds in a controlled way. They then measured the cells' responses by analysing the electrical properties of the cell membranes to determine how many neurotransmitter molecules were being released.

In other nerve cells, the relationship between calcium concentration and neurotransmitter release is nonlinear. This is because several calcium ions must bind to a neurotransmitter-containing vesicle before the vesicle can fuse with the cell membrane and release the neurotransmitters. But Thoreson *et al.* find that rods contain a highly calcium-sensitive pool of vesicles that, over the range of calcium levels thought to be present normally, show a linear relationship between calcium concentration and neurotransmitter release. This allows rods to relay information about small changes in illumination with high responsiveness. **Laura Nelson**

Applied physics

Reinventing the light bulb

Appl. Phys. Lett. **84,** 4869–4871 (2004)

Thomas Edison's first incandescent light bulbs had filaments made from carbon (carbonized cotton thread), but these were eventually replaced with longer-lasting tungsten. Now carbon filaments might make a comeback, thanks to the discovery by Jinquan Wei and colleagues that bundles of carbon nanotubes provide robust filaments in household bulbs and have some advantages over tungsten.

The researchers replaced the filaments of standard safelights (used in photographic darkrooms) with strands composed of close-packed single- and double-walled nanotubes. These carbon filaments switch on at lower voltages (3–5 V) than tungsten, glow more brightly at the same voltage, and use less power. They survive more than 5,000 on–off cycles and operate continuously for over two weeks without degradation. The glow seems to result from a combination of ohmic heating and, at higher voltages, electroluminescence from the nanotubes. **Philip Ball**