RESEARCH HIGHLIGHTS

Selections from the scientific literature

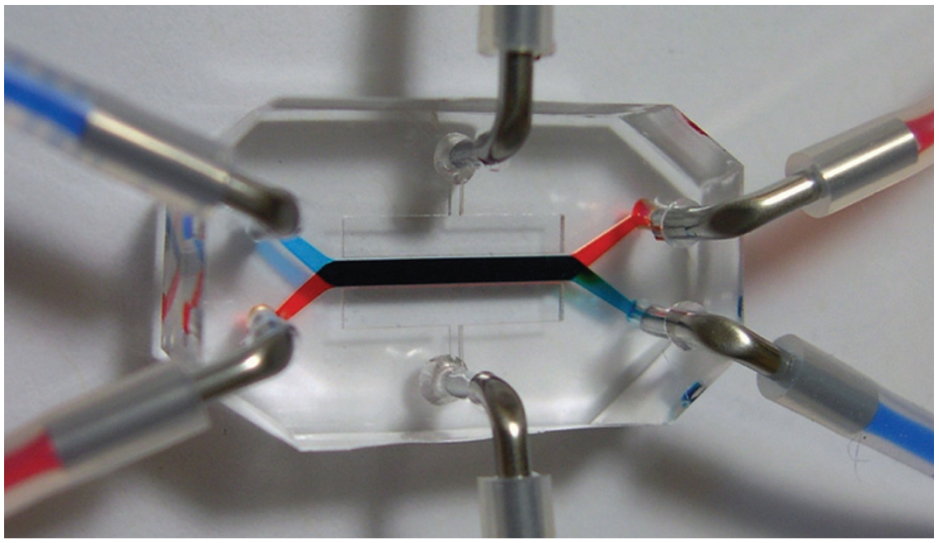
CHEMISTRY

Hydrogen can be stored as acid

Hydrogen gas holds promise as a carbon-free fuel, but is difficult to store and transport because it is highly flammable, diffuse and has a low energy density. Jonathan Hull at Brookhaven National Laboratory in New York and his colleagues have found a possible way to store hydrogen as an aqueous solution of formic acid (HCOOH), which has a higher energy density.

At ambient temperature and pressure, an iridium catalyst dissolved in water causes H_2 to react with carbon dioxide to form the acid under mildly basic conditions. Acidifying the solution triggers the release of pure pressurized H_2 gas. Because of the mild conditions needed for the reactions, the work could eventually lead to a mechanism for H_2 storage.

Nature Chem. **http://dx.doi.org/10.1038/nchem.1295 (2012)**



R. SOC. CHEM.

BIOENGINEERING

A pulsating gut on a chip

A coin-sized device created by a team at Harvard University mimics the structure and physiology of the human intestine by supporting gut microbes and imitating the organ's rhythmic motion.

Donald Ingber and his colleagues at the Wyss Institute in Boston, Massachusetts, built the chip (**pictured**) out of a clear polymer. It contains two microscopic fluid channels separated by a porous, flexible membrane. Human gut epithelial cells, which line the gut's surface, cover the membrane and supported the growth of a common gut bacterium, *Lactobacillus rhamnosus*. The researchers simulated gut contractions, or peristalsis, by applying suction through two side chambers. In response, the epithelial cells formed folds similar to the finger-like protrusions, or villi, that line the inner intestinal wall.

The gut tissue layer blocked the flow of small molecules between the channels, and this barrier function improved with the presence of the bacteria. The authors say that their device is a better intestinal mimic than cells in static culture and suggest that it could be used for drug screening and toxicity tests.

Lab Chip **http://dx.doi.org/10.1039/C2LC40074J (2012)**

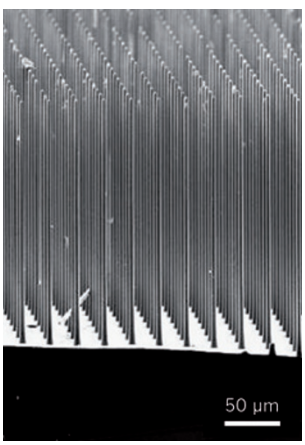
MATERIALS

Slicing silicon with less waste

Cutting silicon blocks into thin wafers for solar cells and other applications generates a lot of wasted metal because of the width and vibration of the mechanical sawing wire typically used. Sungho Jin at the University of California, San Diego, and his colleagues report a way to etch silicon into various intricate shapes that produces an order of magnitude less waste than conventional approaches.

The authors adapted a common etching technique, depositing a catalytic gold and iron layer on top of certain sections of a silicon wafer and using other chemicals to dissolve those parts of the silicon away. Strong neodymium magnets guide the chemical etching, allowing the researchers to slice silicon in any desired direction, forming sheets, microneedles, nanowires (**pictured**) and tunnels. Magnetically guided chemical etching makes thinner cuts than mechanical sawing, thus reducing waste.

Nano Lett. **http://dx.doi.org/10.1021/nl300141k (2012)**



AM. CHEM. SOC.

ZOOLOGY

All the better to see whales with

The giant eyes of the world's largest squid seem to be specially adapted to spot approaching predatory sperm whales.

Dan-Eric Nilsson at Lund University in Sweden and his colleagues examined a photograph of an adult giant squid (*Architeuthis* sp.) and a full-size colossal squid