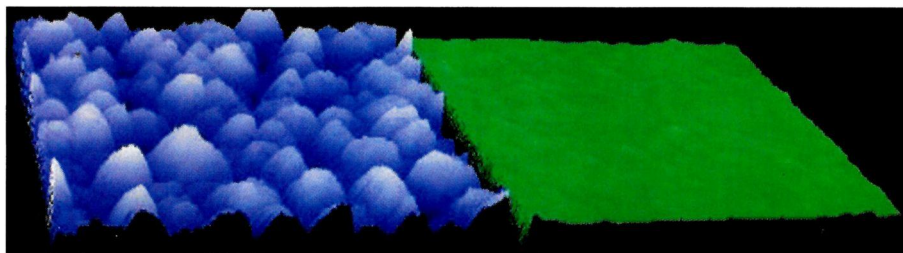


Edited by Alison Wright

Except where otherwise stated, these news items are taken from the Institute of Physics Publishing's news service, which is available at "http://PhysicsWeb.org".

The rough and smooth



Piling atoms on a substrate can produce a rough surface as forces between the atoms cause them to build up in peaks (as left, which shows a 10-atom thick layer of silicon). Understanding this mechanism means that atoms can be manipulated to produce surfaces that are smoother (right).

Scientists at Twente in the Netherlands have demonstrated the effect of "steering" when making thin films of copper atoms on a surface. Long-range attractive forces "steer" incoming atoms towards existing peaks of atoms in the substrate, thereby increasing the roughness of the surface. This effect is even

stronger for atoms grazing the surface.

Understanding the causes of roughness will lead to the ability to produce smoother surfaces, but roughness could also be deliberately encouraged to make arrays of surface ridges as templates for magnetic nanowires, for example.

AIP

Mars has magnetic stripes

New data from NASA's Mars Global Surveyor may indicate that Mars once had plate tectonics similar to those that exist on Earth.

On Earth, as magma flows from ridges between tectonic plates and cools, iron in the magma aligns with the planetary magnetic field. In time, the material spreads out from the ridge, and planetary field reversals cause a pattern of magnetic stripes to be formed.

A team of physicists from France and the US have discovered similar stripes around some ridges and craters on the surface of Mars. The stripes are more strongly mag-

netized than on Earth (possibly because Mars has a higher concentration of iron in its crust) but are also longer and wider, suggesting that the magma flowed more quickly or that the planetary field flipped less frequently. Some of the younger surface ridges do not have magnetic stripes, which is consistent with tectonics ceasing some 4 billion years ago as the iron-rich core of Mars cooled and froze.

However, other physicists believe the magnetic stripes are too strong to be explained by plate tectonics and are perhaps the result instead of chemical activity.

The age of CAMP

Probably the largest outpouring of lava from the Earth's core took place about 200 million years ago, forming a huge expanse of basalt across the ancient super-continent Pangaea. As tectonic forces tore Pangaea apart, forming the Atlantic Ocean, the basalt of the Central Atlantic Magmatic Province (CAMP)

fragmented, and this now lines the Atlantic rim in Europe, Africa and the Americas.

Now geophysicists from Berkeley, Trieste, Padova and Sao Paulo have identified basaltic deposits in northern and central Brazil, extending the known size of CAMP by 2.5 million to around 7 million km².

The abundance of the isotopes argon-40 and 39 date the basalt samples to 200 million years ago and the position of the magnetic

Chips to be smaller, faster and cheaper?

Collaborative research by Cambridge and Hitachi has produced a new semiconductor memory device.

The phase-state low electron (hole) number drive memory (PLEDM™) cell allows the instant recording and accessing of massive amounts of information. The cell is smaller than existing devices and consumes very little power. It would make equipment such as computers and mobile phones both lighter and more economical.

Conventional devices employ a transistor and capacitor in the memory cell, but now the newly developed transistor, which is fabricated on silicon dioxide substrates using standard processes, has been stacked onto the gate of a conventional transistor to make a cell of $0.2 \times 0.4 \mu\text{m}$ in area with a read/write time of less than 10 ns.

The new cell is a promising candidate for the multigigabit memory chip that is expected to become available early in the next century. It could replace current data storage devices, such as hard disk drives.

AlphaGalileo

Early warning

A novel technique that can be used for breast cancer scanning could avoid the need for a biopsy, which is currently used to identify cancerous tissue.

Tumour tissue is about 40 times as conductive as normal tissue. Therefore, cancers can be identified by applying just 1 V across a patient's body. A scanner employing this method has recently been approved for use in the US.

New Scientist

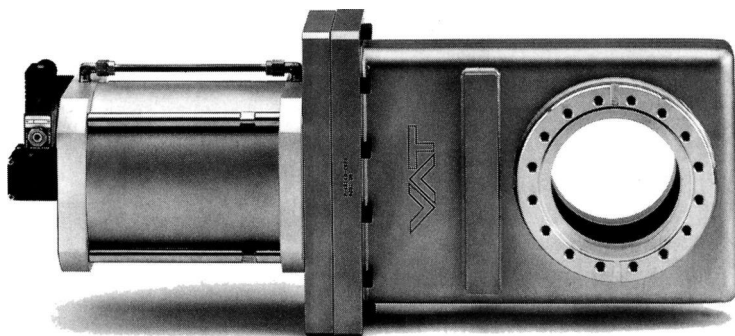
pole of the samples indicates the same age. Their normal polarity also indicates that CAMP formed within 4-5 million years - very brief by palaeontological standards - because before and after there were long intervals of reversed polarity or frequent polarity reversals.

The measured CAMP age matches the boundary between the Triassic and Jurassic, and the volcanic activity may be linked to mass extinctions at that time.

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