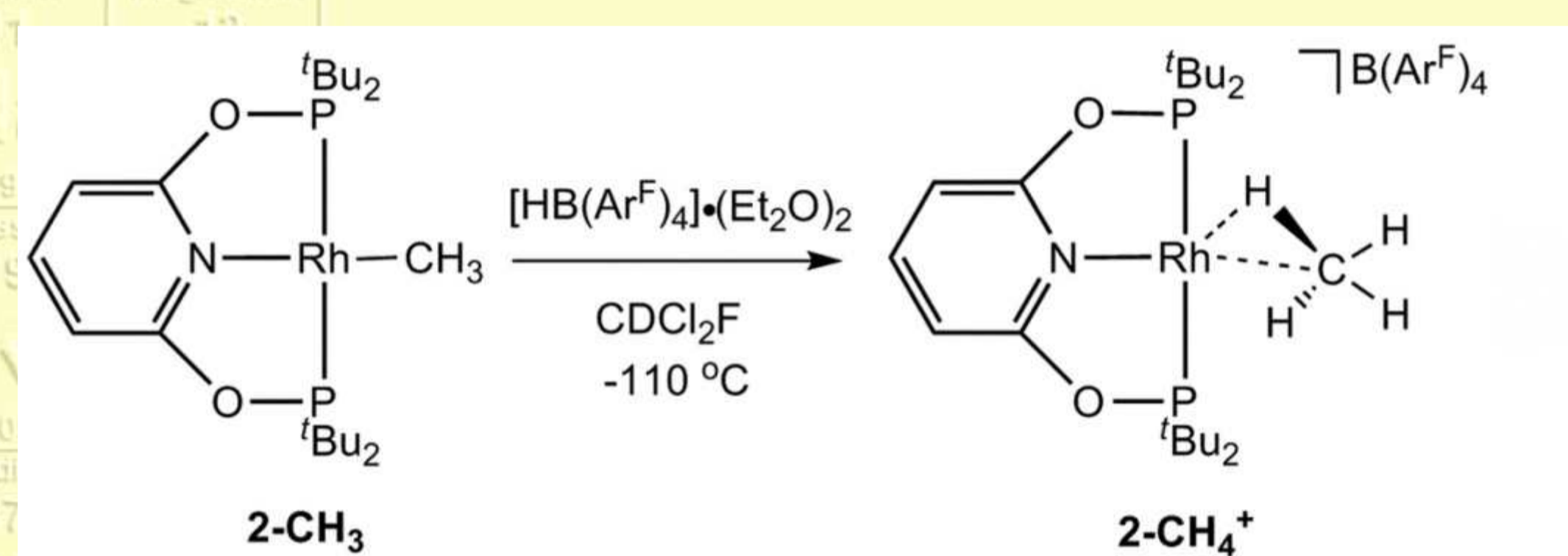


El metà, enxampat

US chemists have characterised the first stable sigma-methane complex - in which methane binds to a metal without breaking its C-H bonds. The complex provides insight into the activation of unreactive alkanes and the possibility of expanding the use of methane to eventually replace oil as a feedstock for the chemical industry (W.H. Bernskoette *et al.*, *Science*, **2009**, 326, 553)

Maurice Brookhart and colleagues at the University of North Carolina and University of Washington devised new ways of preparing rhodium-methane complexes that overcame many of the difficulties encountered by previous studies, and found exactly the right combination of metal and ligands to stabilise the normally fleeting compounds.

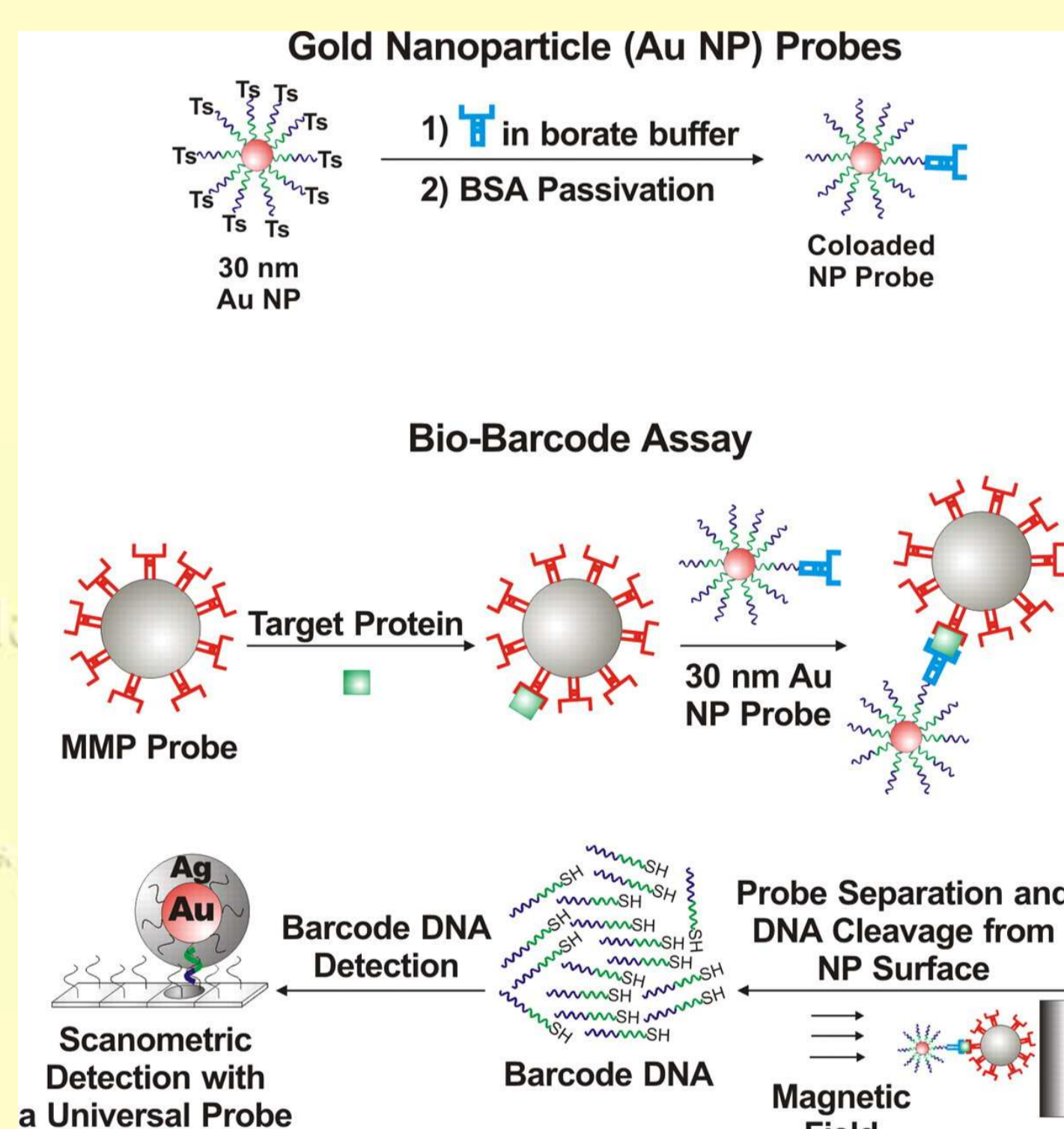
The team used a strong acid to protonate a rhodium methyl (Rh-CH₃) complex and form the methane ligand within the coordination sphere of the metal centre, rather than trying to introduce methane from the solution.



Nano-or per detectar càncer

The recurrence of prostate cancer could soon be spotted years earlier thanks to a new highly sensitive test developed by US and Austrian researchers. The team's bio-barcode assay uses gold nanoparticles and DNA as amplification agents to detect prostate specific antigen (PSA), a protein associated with prostate cancer, and is 300 times more sensitive than other commercial tests (C.S. Thaxton *et al.*, *Proc. Natl. Acad. Sci.*, **2009**, 106, 18437).

The immunoassay is made of two components, a PSA antibody-functionalised gold nanoparticle decorated with DNA strands, and a magnetic microparticle functionalised with a second PSA antibody. In solution, these two particles both bind to PSA, sandwiching the protein between them. The sandwiched probes can then be magnetically separated thanks to the presence of the magnetic particle. The DNA that decorates the gold nanoparticles is then removed and detected using a scanometric assay, indicating how many sandwiched probes were formed and thus the level of PSA present in the sample.

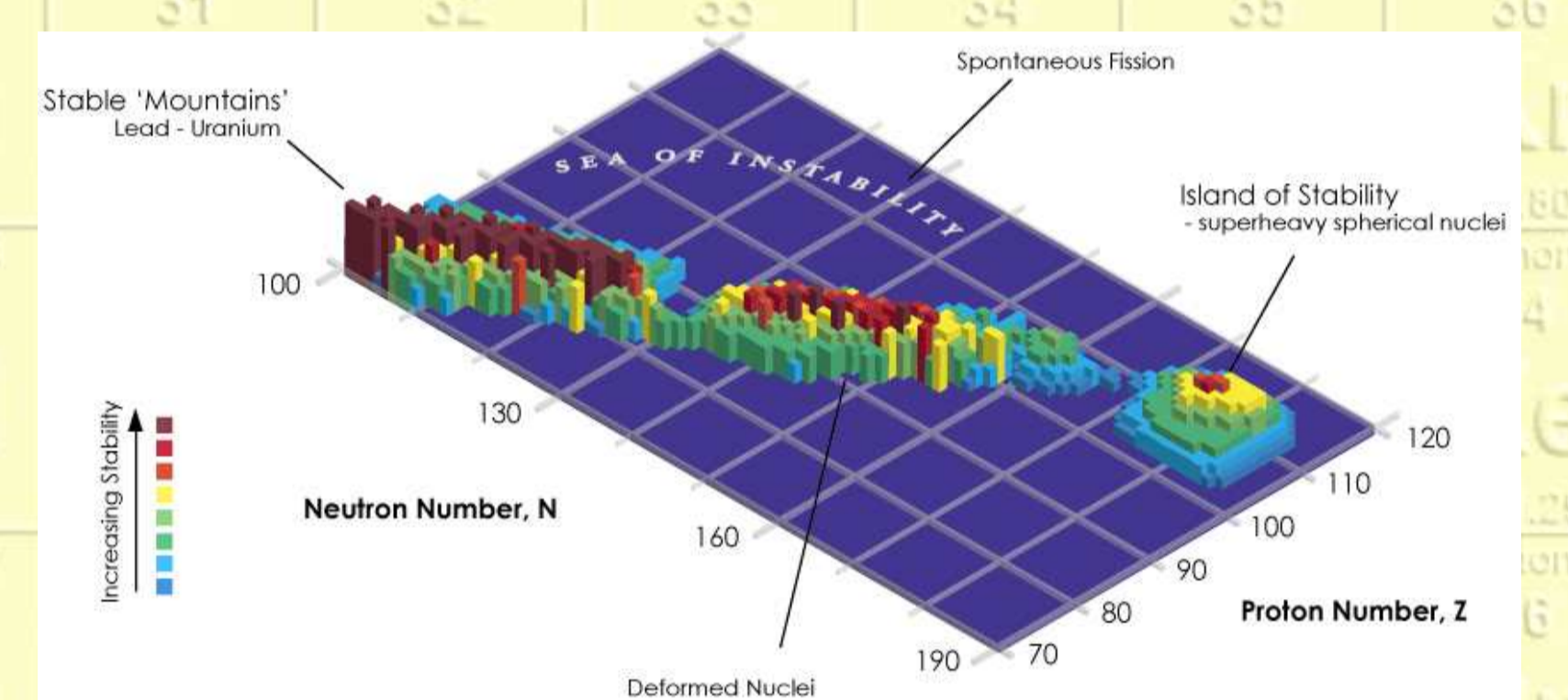


Confirmat l'element 114, Uuq

US scientists have confirmed the discovery of element number 114, first made over a decade ago by a team in Russia. By smashing a high energy beam of calcium-48 ions into a plutonium-242 target, the team managed to detect two nuclei of element 114, which is predicted by some to be bordering the so-called 'island of stability' for superheavy atoms (L.Stavsetra *et al.*, *Phys. Rev. Lett.*, **2009**, 103, 132502).

Yuri Oganessian and his team at Dubna, Russia, were the first to claim to have created nuclei of element 114 - but any such claim has to be thoroughly verified and the experiments repeated independently before the element can be considered for admission to the periodic table. Heino Nitsche and a team from the University of California at Berkeley spent eight days bombarding their plutonium target with calcium ions in an attempt to create the elusive element 114. 'We expected to see maybe six to eight nuclei, but we only found two!' says Nitsche. The characteristic decay sequences and energies matched very well with the Russian data for two isotopes of element 114.

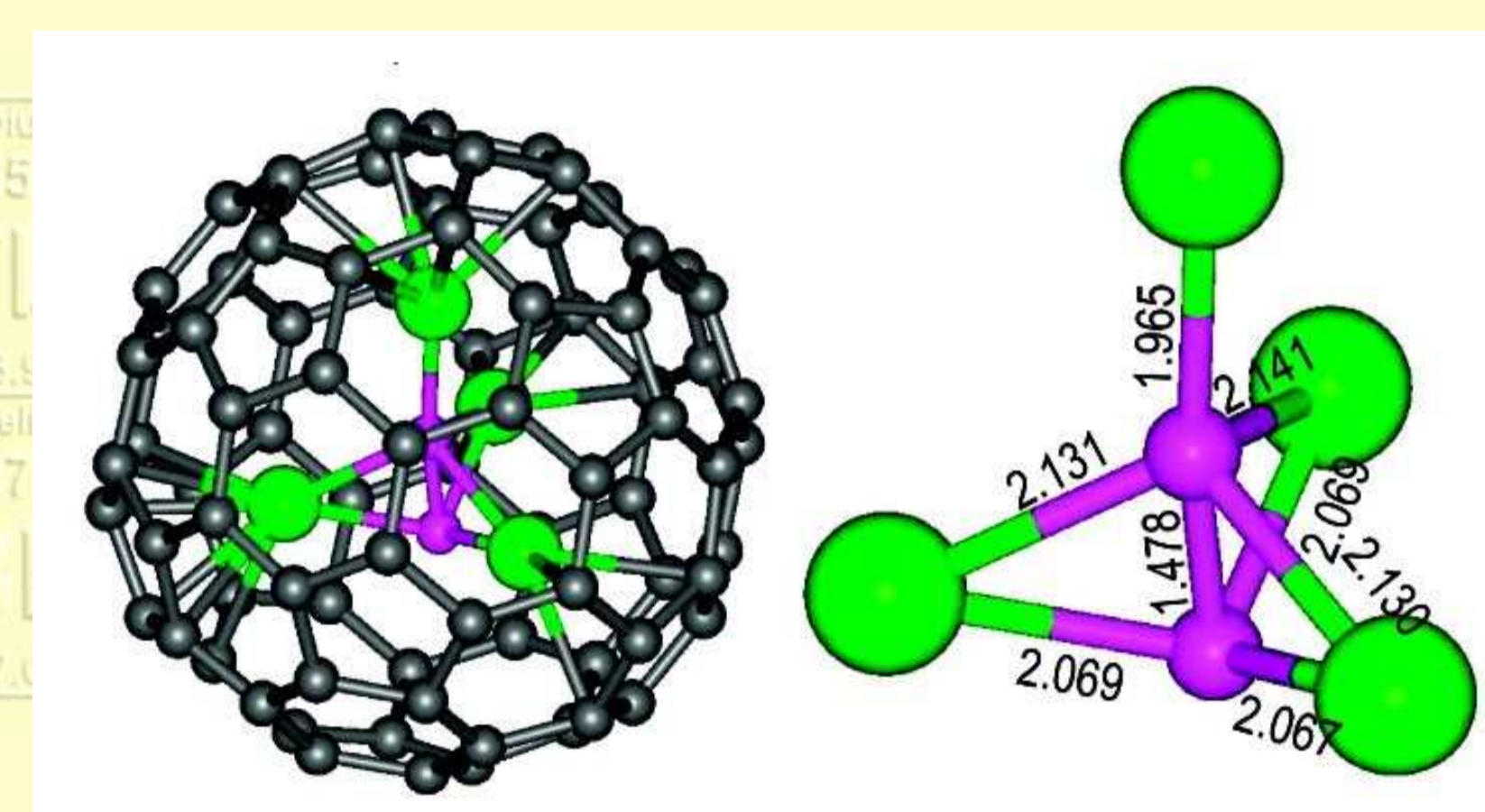
Confirmation of the existence and lifetimes of isotopes of element 114 is a big step in the hunt for a tantalising 'island of stability' predicted by theoreticians, where the lifetimes of super-heavy elements could be measured in hours, days or even millions of years.



Una matriosca de ful·lerens

A metallofullerene version of a matryoshka—the famous Russian nesting dolls—has been made for the first time by chemists in China (*J. Am. Chem. Soc.*, **2009**, 131, 16646). The molecule features two carbon atoms trapped inside a tetrahedral cluster of four scandium atoms, which itself is caged within an icosahedral C₈₀ fullerene.

The compound, chemically identified as C₂@Sc₄@C₈₀-I_h, was synthesized, isolated, and characterized by a team led by Chun-Ying Shu of Beijing's Institute of Chemistry. The researchers prepared the metal carbide endofullerene using the Krätschmer-Huffman arc discharge method in which they applied a potential to a scandium-packed graphite rod between two electrodes in a chamber filled with inert helium gas. The group employed a battery of spectroscopic analyses to determine the molecule's structure and used density functional theory calculations to verify its nested nature. The six-atom cluster C₂@Sc₄ rotates freely inside the C₈₀ fullerene cage according to the spectroscopic characterizations.



Breus

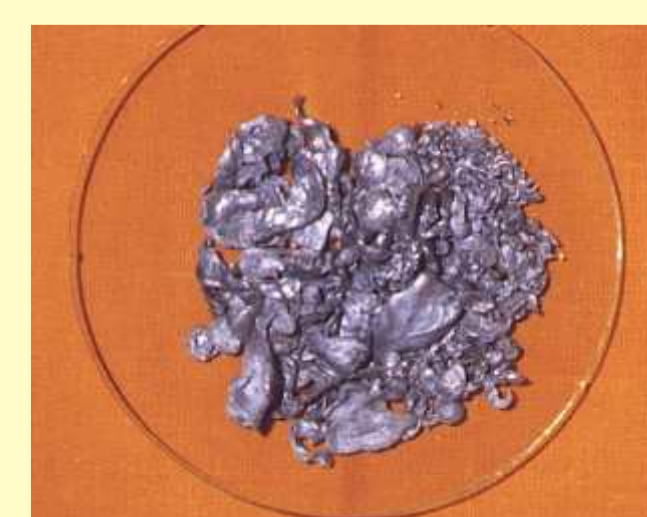
- El mes de desembre passat es va celebrar el 400è aniversari de la primera classe de Química, impartida per Johannes Hartmann a la Universitat de Marburg (*Chemistry World*, 30 oct. 2009)
- Científics d'Estats Units i de França afirmen que el terme "nanopartícula" hauria de redefinir-se per les seves implicacions en temes de salut, de seguretat i ambientals, de cara a una futura regulació (*Chemistry World*, 14 set 2009).
- Com cada any, la revista *Science* ha publicat la llista dels descobriments científics més rellevants de l'any 2009, entre els que es troba la síntesi del grafè, ressenyada a *Notícies Inorgàniques*, **41**.

Avui recomanem

La Royal Society ha creat la web *Trailblazing* ("marcant camí") en la que hi figuren documents escrits a mà sobre alguns dels descobriments científics més importants dels darrers 350 anys

<http://trailblazing.royalsociety.org/>

L'element



L'element número **48**, **cadmi**, fou descobert per Friedrich Stromeyer l'any 1817, com a impuresa en el carbonat de zinc, anomenat cadmia. El nom prové del personatge mitològic grec *Cadmos* (μ), a qui se li atribueix la introducció de l'alfabet a Grècia.

Element poc abundant, es troba en els minerals de zinc, amb qui comparteix moltes propietats. Atesa la seva elevada toxicitat i capacitat cancerígena, les aplicacions habituals com a pigments, en acers i estabilitzadors de plàstics estan caient en desús. L'aplicació actual més important i quasi exclusiva és en les bateries Ni-Cd recarregables, que no obstant estan sent substituïdes per les de níquel i hidrurs metàl·lics.

A pesar de la toxicitat, és present en l'enzim anhidrasa carbònica en diatomees marines.