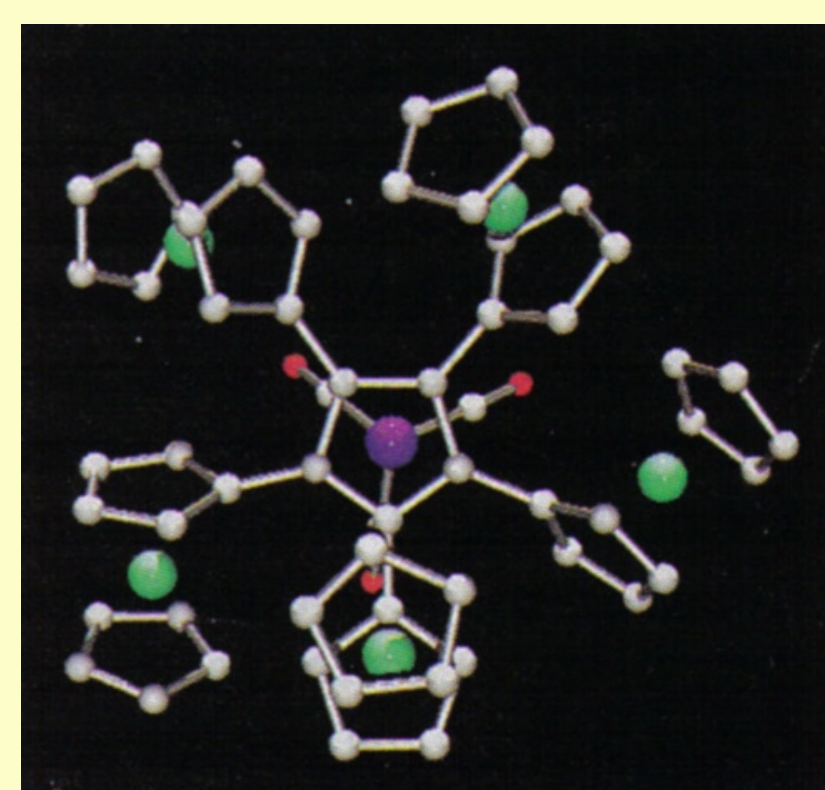


El superlligand:

The first synthesis of metal cyclopentadienyl (Cp) complexes substituted with five other metal cyclopentadienyl groups has been accomplished by K. Peter C. Vollhardt of the University of California, Berkeley, and coworkers (*Angew. Chem. Int. Ed.*, **2006**, 45, 1794). These "super Cp" complexes are of interest for fundamental chemical studies and are expected to function as substrates or ligands in magnetic and electronic materials and as metallic "minisurfaces" in catalysis.

A decade ago, Vollhardt's group succeeded in making the pentacyclopentadienyl-substituted manganese complex (C₅H₄)₅C₅Mn(CO)₃. But the researchers' attempts to metalate the radial Cp substituents failed. After some trial and error, the team has now devised a strategy to directly add metal-Cp groups to the C₅Mn(CO)₃ core. For example, reaction of (C₅I₅)Mn(CO)₃ with five equivalents of (CpFeC₅H₄)₂Zn produces the ferrocenyl-substituted manganese complex (CpFeC₅H₄)₅C₅Mn(CO)₃.

In subsequent chemistry, Vollhardt's group was able to "anneal" some of the pendant Cp groups together by eliminating some of the metal atoms and thereby form complex fused-ring systems. The researchers also were able to "liberate" the ferrocenyl-substituted complex by UV irradiation to form (CpFeC₅H₄)₅C₅R, where R represents hydrogen or a phenoxy group.



Els nanotubs de carboni, útils en medicina

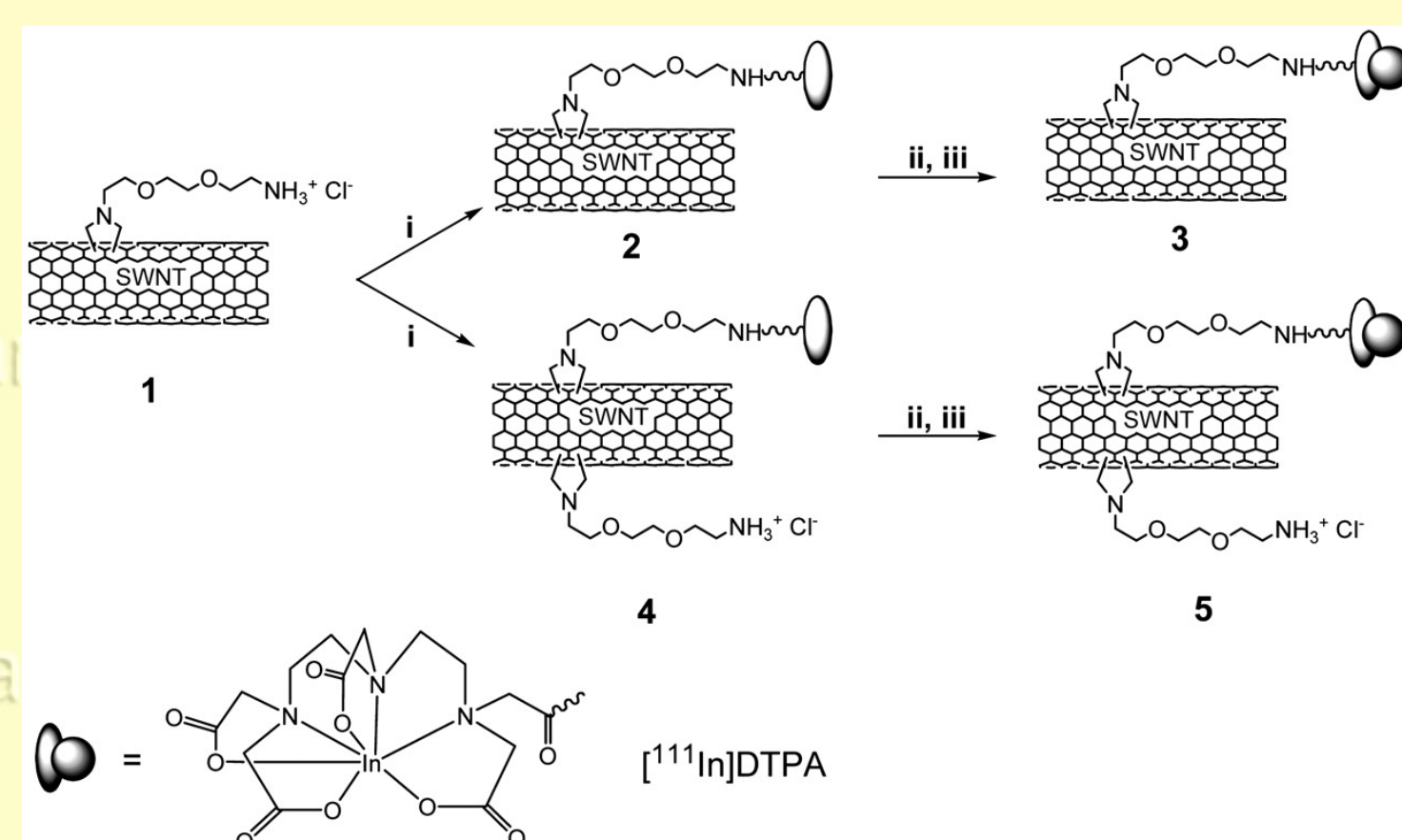
A new study could allay some of the fears about health and safety issues relating to carbon nanotubes and open the door for exploring the use of such nanomaterials in the human body (Kostas Kantarellos and coworkers; *Proc. Natl. Acad. Sci. USA*, **2006**, 103, 3357).

In the study, mice were intravenously administered functionalized, water-soluble carbon nanotubes, either single-walled or multiwalled. Electron microscopy analysis revealed that both types of nanotubes are excreted intact in urine.

From the point of view of biomedical applications, identifying the pharmacological limitations and advantages of such nanostructures is imperative for any kind of therapeutic or diagnostic application that involves administering or implanting carbon nanotubes in patients.

The researchers solubilized the nanotubes by functionalizing them with hydrophilic amino groups. They then covalently linked the amino groups to a diethylenetriaminepentaacetic chelating agent. The radioactive isotope indium-111 complexed with the agent was used for imaging the nanotubes.

The new study has dismissed many of the worries of using nanotubes in therapeutics, showing that solubilized nanotubes "flush through [mice] without being retained in organs".

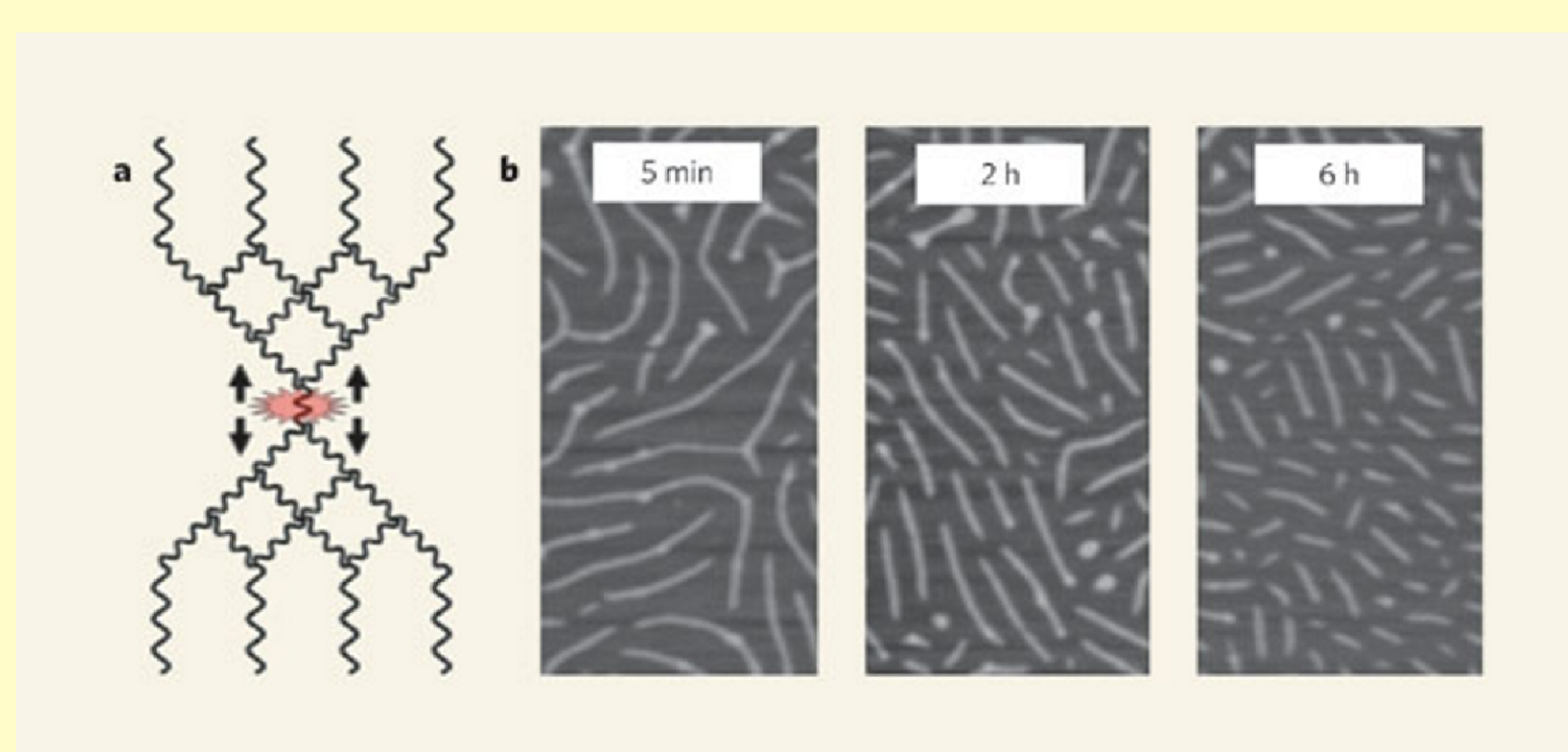


Atracció fatal: adsorcions que trenquen enllaços

Covalent carbon-carbon bonds in organic molecules are considered tough and difficult to break. It's therefore counterintuitive that the relatively weak attractive forces at play when molecules adsorb to a surface would be strong enough to break these bonds.

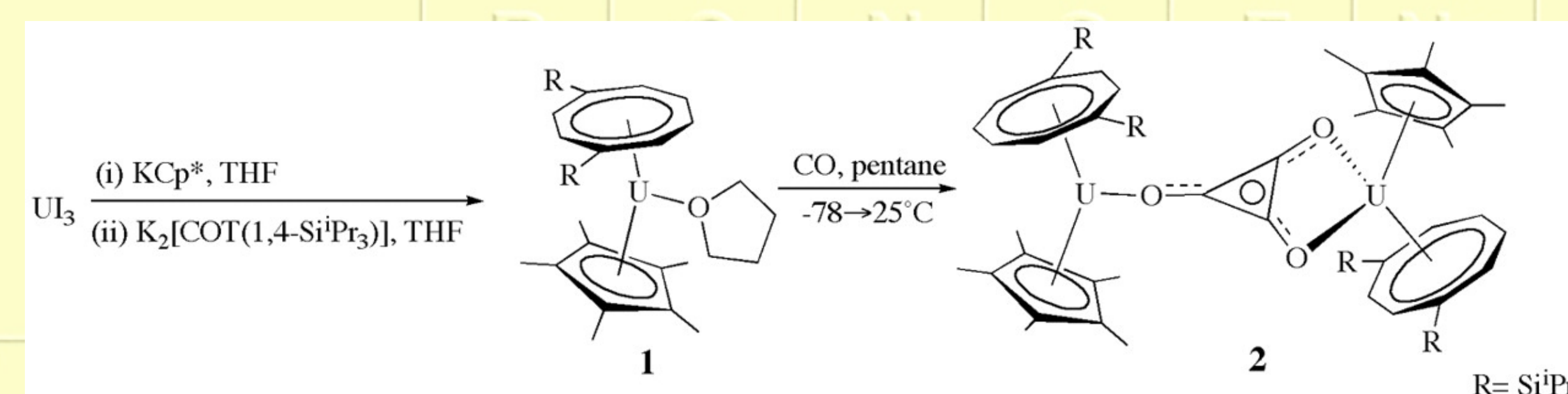
But break they do, according to new research—at least in macromolecules with highly branched architectures. Sergei S. Sheiko at the University of North Carolina and coworkers used atomic force microscopy (AFM) to show the covalent bonds that make up the backbones of brush-like macromolecules spontaneously rupture after adsorption on a substrate (*Nature* **2006**, 440, 191).

When the molecules adsorb, the side chains spread unevenly over the substrate, predominantly along the polymer backbone. The physical interactions of the side chains with the substrate consequently induce tension that concentrates along the backbone, stretching and eventually snapping it.



L'urani trimeritza el CO

The metal-mediated cyclotrimerization of carbon monoxide to form C₃O₃²⁻ has been accomplished for the first time by a team of U.K. chemists (*Science* **2006**, 311, 829). Cyclic aromatic oxocarbon dianions, C_nO_n²⁻ (n = 3 to 6), are being explored as potential building blocks to make fuels and commodity chemicals. The three-membered homolog has been prepared from the four-membered species, but unlike the other members of the series the direct synthesis of C₃O₃²⁻ from CO remained elusive until now. Geoff Cloke of the University of Sussex and his colleagues used a strongly reducing U(III) complex to crack the strong CO triple bond at room temperature and pressure in pentane; the C₃O₃²⁻ species formed as a ligand sandwiched between two of the uranium complex molecules (shown, R = triisopropylsilyl). The synthesis could become an industrially important method of C-C bond formation using coal- and biomass-derived CO as petroleum supplies dwindle.

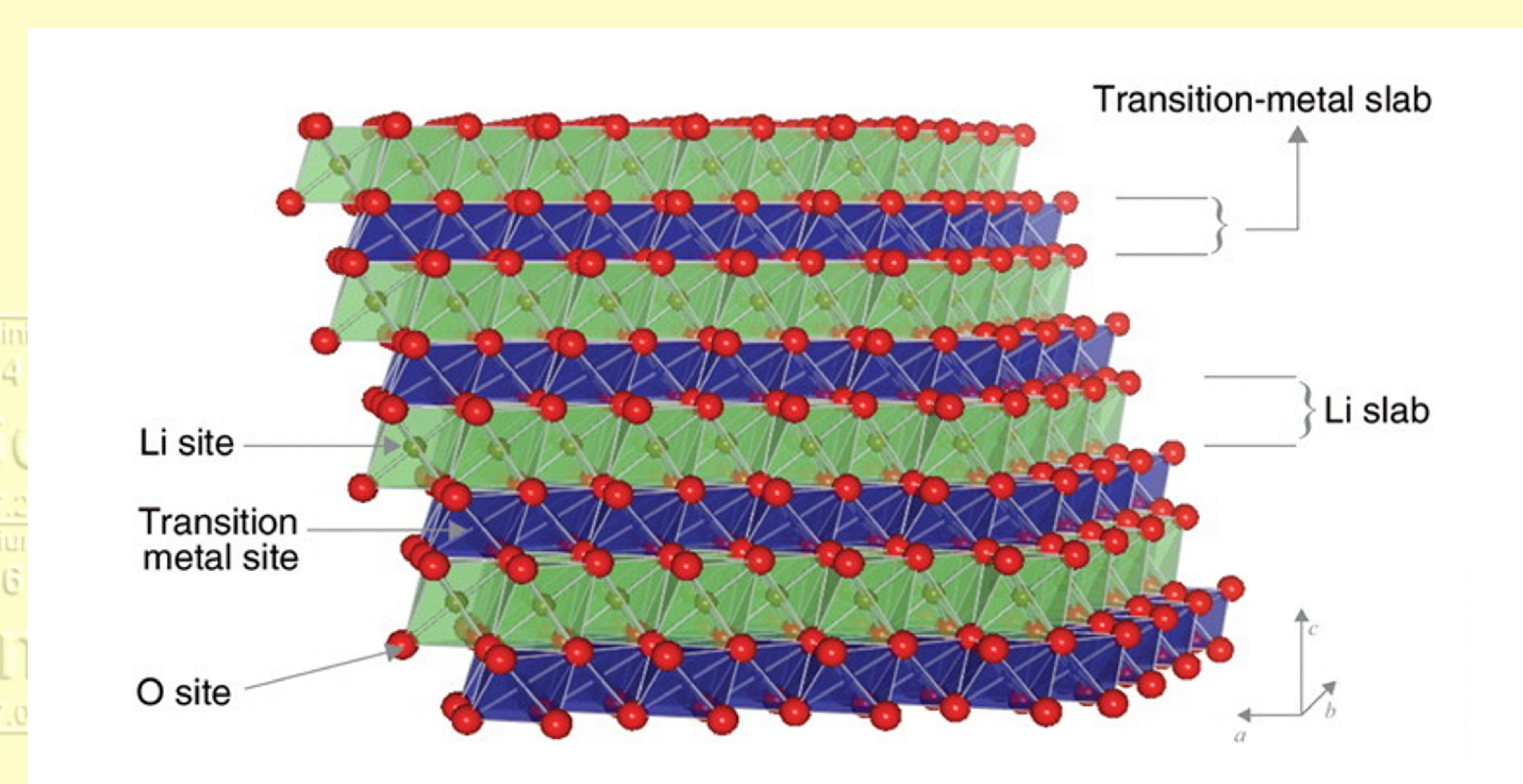


L'ordre millora les bateries

Lithium-ion batteries may get a shot in the arm, thanks to a modified version of a not-so-new material. Substituting one transition metal for another in the lithium compound commonly used in electrodes may boost the ability of future batteries to store and release energy quickly, according to a new study.

Because they pack more energy on a size and weight basis than other types of batteries, rechargeable lithium batteries corner the market in the portable electronics arena. Other types of products could benefit from lithium batteries' high storage capacity (energy density). But manufacturers have been slow to implement the batteries because for some applications—for example, heavy-duty portable power tools and hybrid electric vehicles—lithium batteries haven't generally been able to discharge or recharge quickly enough.

Now, a combined theoretical and experimental study finds that the charge and discharge rates of batteries featuring well-ordered lithium nickel manganese oxide [Li(Ni_{0.5}Mn_{0.5})O₂] electrodes are significantly faster than those employing the conventional electrode material, lithium cobalt oxide (G. Ceder *et al.*, *Science* **2006**, 311, 977). The findings counter earlier studies in which the nickel-manganese compound had been judged to be a poor candidate for improving the performance of lithium batteries.



Breus

- Les proves que el premi Nobel Peter J. W. Debye col·laborà amb el règim nazi han fet que la Universitat d'Utrecht canviï el nom del seu principal Institut de Química i Física [*Chem. Eng. News*, 1 de març de 2006].
- La Universitat de Sussex tanca el seu Departament de Química, un dels més prestigiosos del Regne Unit [*Chemistry World*, març de 2006]
- Mesures d'ESCA han permet comprovar experimentalment l'existència d'estats d'oxidació negatius del platí en el compost BaPt₂ [A. Karpov *et al.*, *Chem. Commun.*, **2006**, 838].
- S'ha calculat l'energia de dissociació del U_hF, i s'ha comprovat la importància dels orbitals g en la química de l'element 126 [G. L. Malli, *J. Chem. Phys.* **2006**, 124, 71102]

L'element número 27, **cobalt**, va ser descobert el 1735 per Georg Brandt. El seu nom prové del mot alemany *kobald*, que vol dir *follet*.