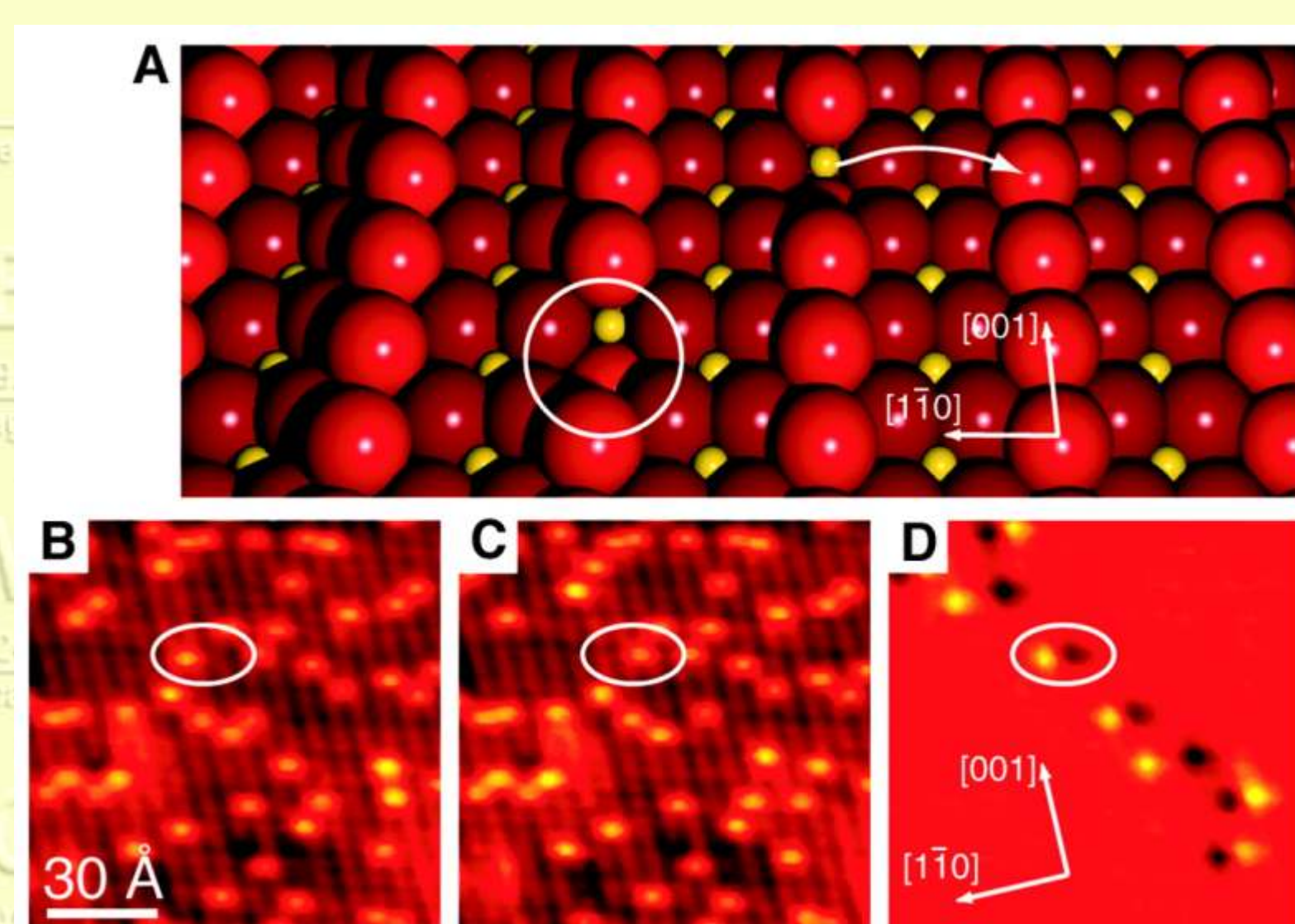


Els defectes es mouen

Researchers in Denmark have discovered a new diffusion mechanism that shows that imperfections on crystal surfaces are quite mobile thanks to a process of rapid matchmaking and breaking.

Professor Flemming Besenbacher and coworkers [*Science*, **299**, 377 (2003)] have followed individual diffusion events on a TiO₂ crystal surface using a rapid and high-resolution scanning tunneling microscopy (STM) method. In the presence of gaseous oxygen surface atoms undergo a type of rearrangement that "heals" the defects and creates new ones elsewhere, in effect causing oxygen vacancies to diffuse along specific crystal directions.

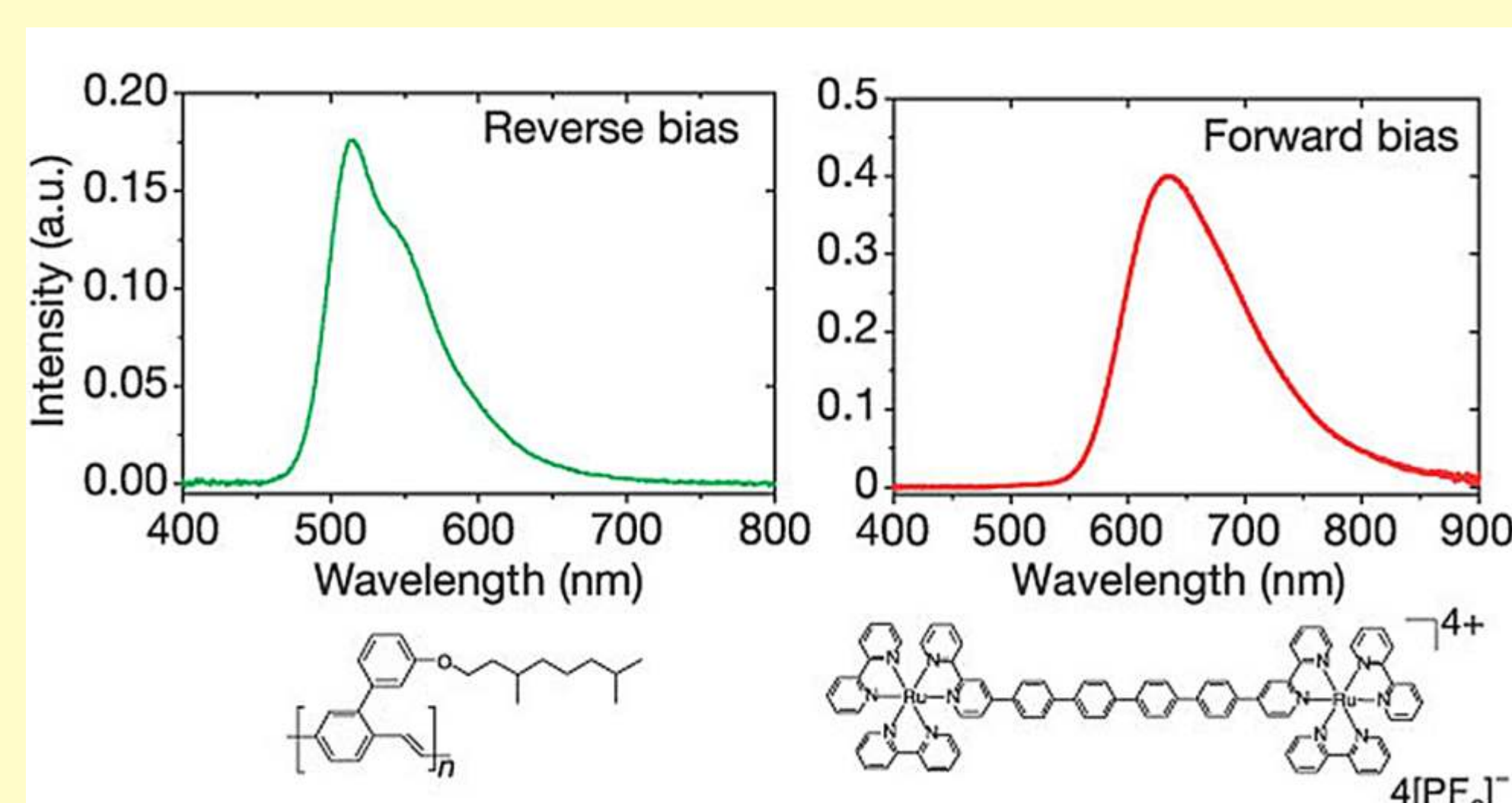


(A) Ball model of the TiO₂(110) surface. A bridging O vacancy is marked by a circle. The arrow denotes the observed vacancy diffusion pathway. (B and C) Two consecutive STM images extracted from movie S1 (~8.5 s/frame). (D) Difference image, in which (C) is subtracted from (B). Bright protrusions indicate the presence of vacancies in (B), whereas dark depressions indicate the new vacancy positions in (C).

La Química de la Coordinació i els sentits I- Del verd al vermell

A simple polymer-based electroluminescent device that can be switched between glowing red or green by reversing the direction of the current flow has been invented by scientist in the Netherlands [L. De Cola and coworkers, *Nature*, **421**, 54 (2003)].

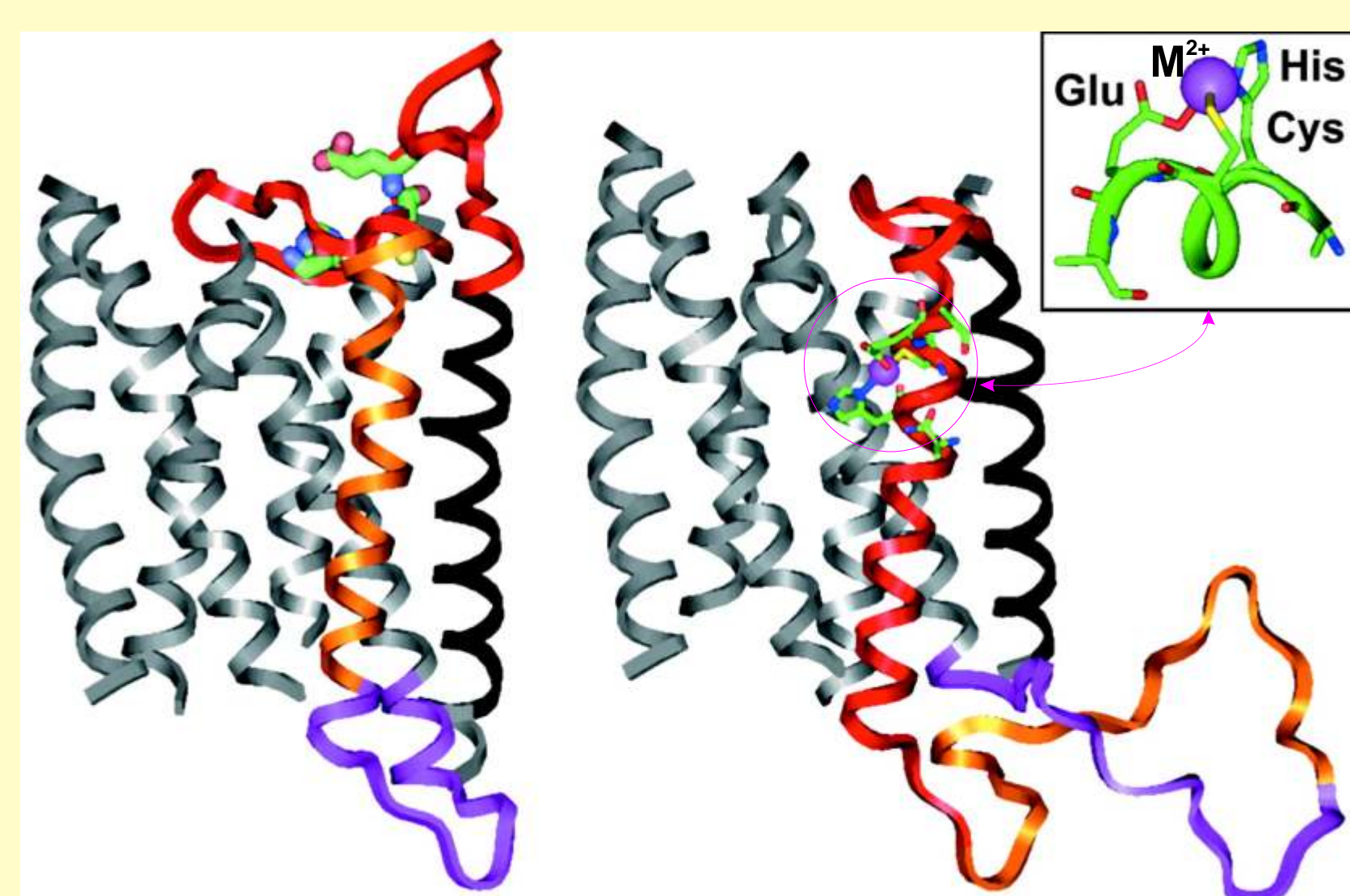
Key to the device is a semiconducting derivative of poly(phenylenevinylene) blended with a phosphorescent complex consisting of two ruthenium centers linked by a tetraphenylene bridge. The doped material is sandwiched between two electrodes, one of gold and one of indium tin oxide (ITO). When a positive voltage is applied to the ITO electrode (forward bias), the light-emission process of the ruthenium complex is triggered, producing the complex's characteristic red glow. When the bias voltage is reversed, the direction of the current is reversed. Light emission from the complex ceases and the polymer, in its excited state, now emits green light, which is determined by the polymer's band gap.



II- L'olfacte i els cations

Professor Kenneth S. Suslick and coworkers (University of Illinois) have analyzed genome data for olfactory receptors, which are transmembrane proteins with seven characteristic α -helices spanning the cell membrane [*Proc. Natl. Aca. Sci. USA*, **100**, 54 (2003)]. They identified in 75% of the receptors a common metal-binding site on a loop that sticks out from the membrane.

Upon binding a metal ion (Zn²⁺, Cu²⁺), the receptor shifts from a structure shown on the left to the one shown at right. Binding of an odorant to the metal triggers further events that the brain interprets as smell.

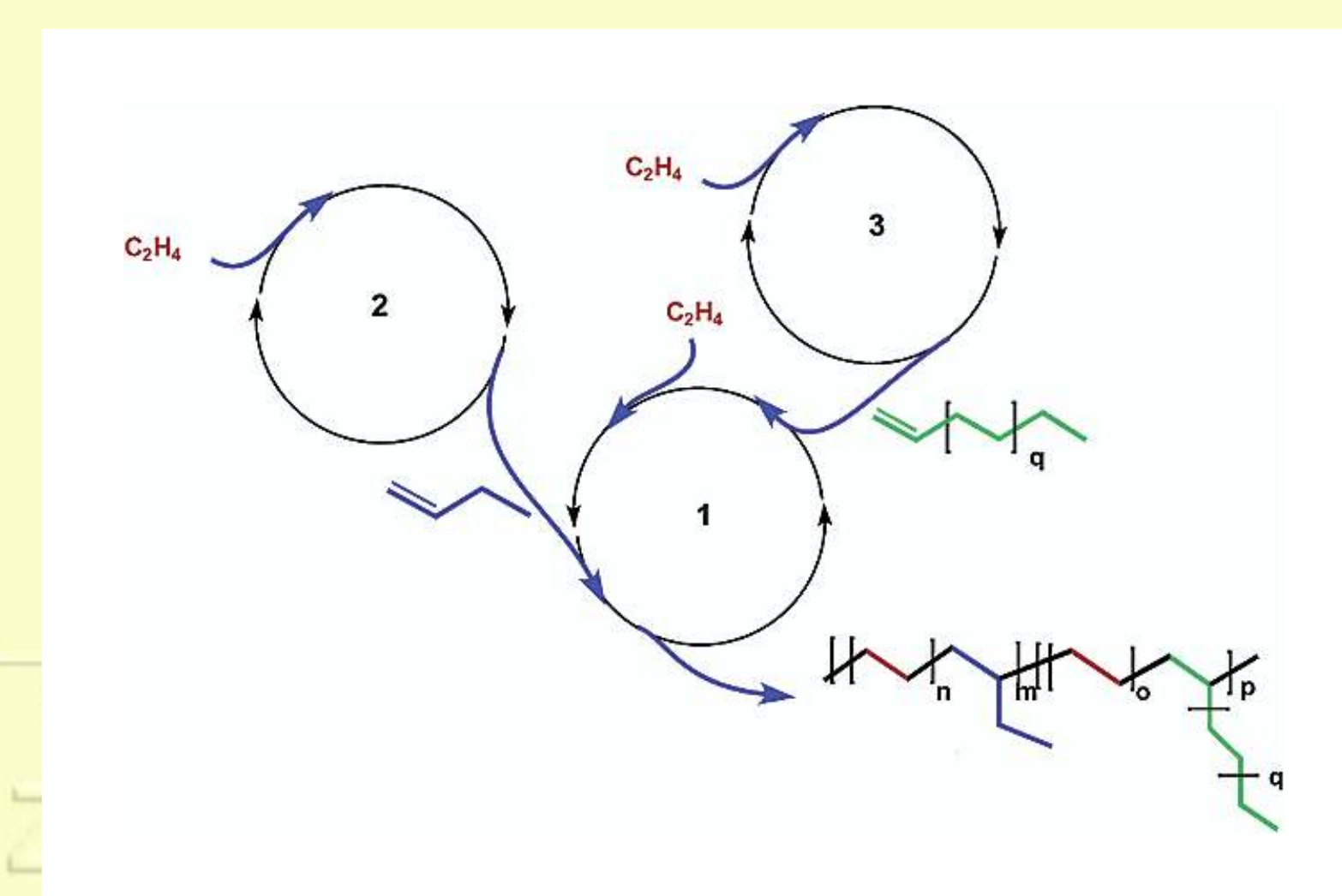


Mélange à trois

A three-component catalyst system has been used to prepare branched polymers with structures that cannot be obtained with a single catalyst or a pair of catalysts working in tandem [G. C. Bazan and coworkers, *J. Am. Chem. Soc.*, **124**, 15280 (2002)].

The catalyst trio includes two organonickel compounds and an organotitanium compound. One of the nickel-based catalysts converts ethylene to 1-butene, while the other converts the olefin to a distribution of 1-alkenes. The titanium compound incorporates ethylene and the products of the other reactions into branched polyethylene.

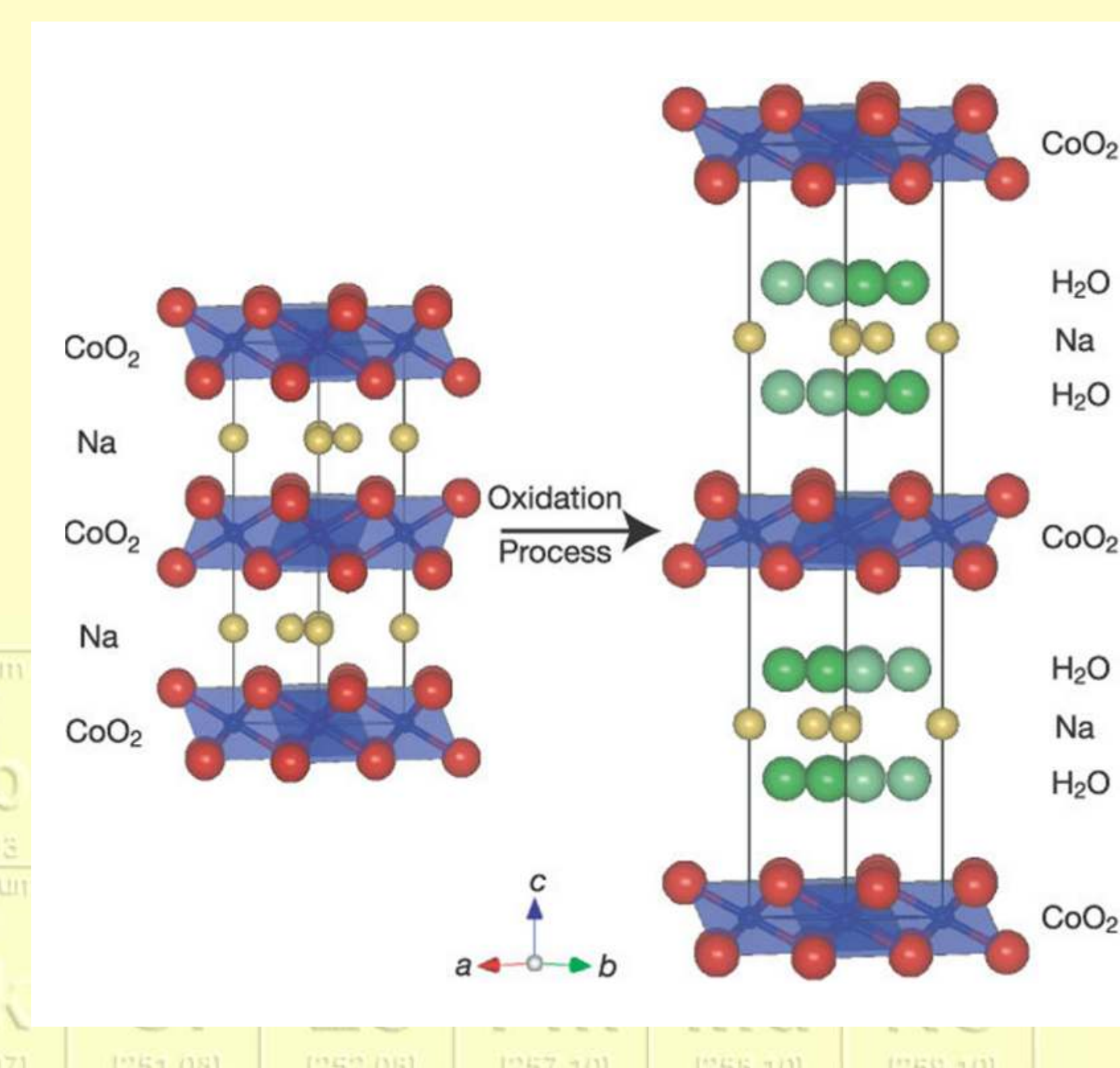
The extent and type of branching exhibited by the products can be controlled by adjusting the composition of the catalyst mixture.



Superconductors amb aigua

A new type of layered superconductor that contains intercalated water has been prepared in Japan [*Nature*, **422**, 53 (2003)]. Kazunori Takada of the National Institute for Materials Science (Tsukuba) and coworkers have prepared a cobalt oxide that becomes superconducting at about 5 K. It is believed to have the approximate composition Na_{0.35}CoO₂·1.3H₂O.

The compound appears to consist of two-dimensional CoO₂ sheets separated by a thick insulating layer of Na⁺ ions and H₂O molecules. The expanded separation of the CoO₂ layers caused by introducing H₂O molecules in the washing step seems to be essential for inducing superconductivity in the new material.



Breus

- Els primers autobusos europeus amb hidrogen com a combustible són a punt de circular a Barcelona.
http://www.tmb.net/cat/tmb_per_tu/pertu_bhidrogen.jsp
- L'article de Pearson sobre els àcids i les bases durs i tous [*J. Am. Chem. Soc.*, **85**, 3533 (1963)] és el 13è més citat dels publicats al JACS en els seus 125 anys d'història.
- Els al·lens de silici no són lineals. S'ha preparat el primer compost estable amb agrupacions Si=Si=Si, que té un angle d'enllaç de 136° [M. Kira and coworkers; *Nature*, **421**, 725 (2003)].
- Aquest número recomanem la web de Chemweb, un portal de química: <http://www.chemweb.com>

L'element número 9, fluor, va ser descobert per Henry Moissan l'any 1886, fet pel qual fou guardonat amb el premi Nobel l'any 1906. El nom prové del caràcter fluorescent del mineral fluorita (CaF₂).