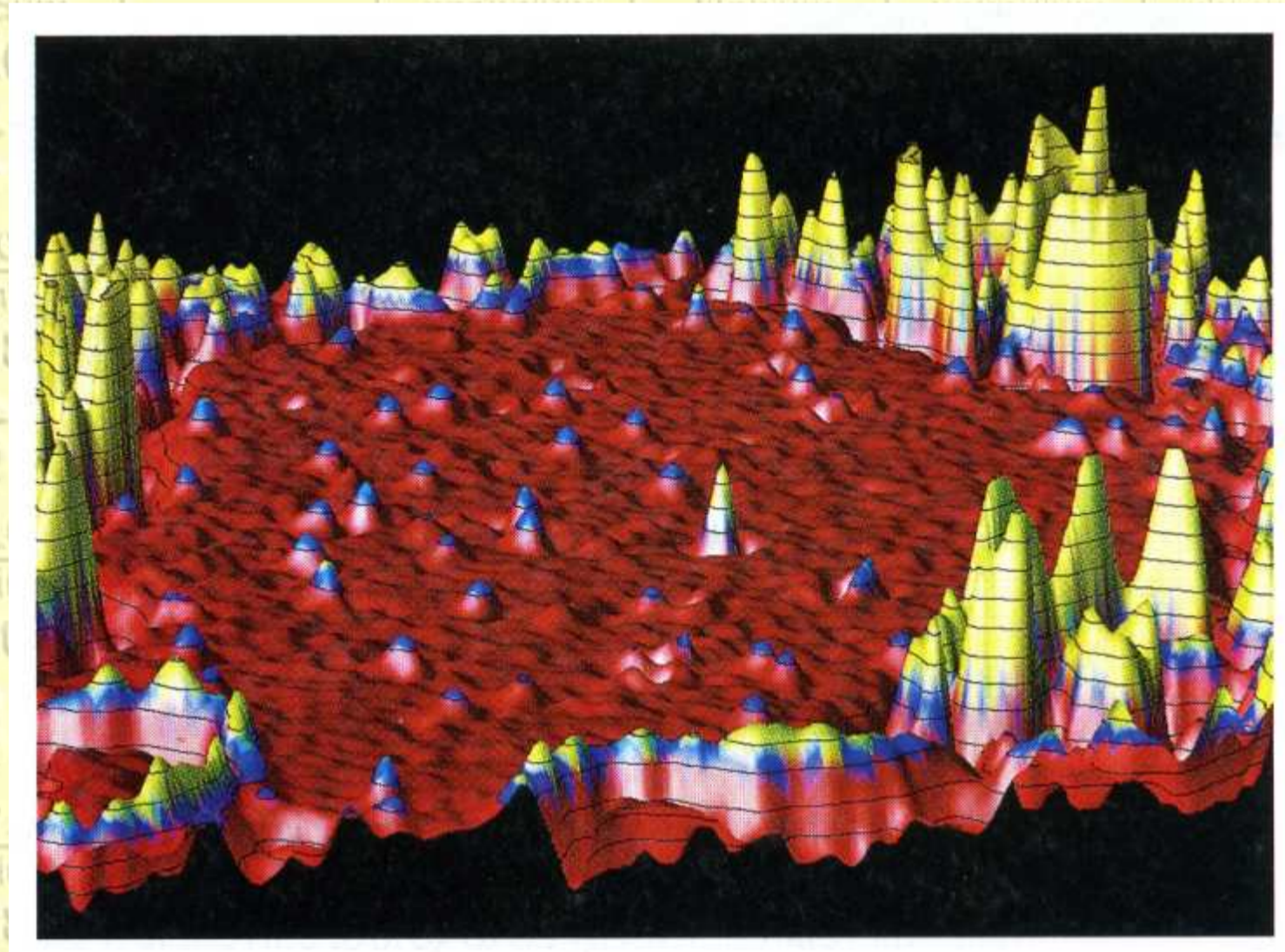


## L'hidrogen és visible

Researchers in California report success in imaging individual hydrogen atoms in a transmission electron microscope (TEM), long considered extremely difficult at best. What's more, the scientists conducted their imaging experiment with what they describe as a "run of the mill" microscope (*Nature* **2008**, 454, 319).

One of the keys to success in the new microscopy method is the nature of the material that supports the imaged atoms. The research team, which includes University of California, Berkeley, physics professor A. Zettl and coworkers, devised a simple method of preparing and handling clean samples of graphene—one-atom-thick sheets of carbon—that are transparent under the team's imaging conditions.

Then, by using graphene as a support material, the researchers directly imaged individual hydrogen and carbon atoms that adsorbed onto the film from residual gases in the TEM vacuum system. They also recorded images of adsorbed carbon chains. In addition, the Berkeley team recorded videos that capture the evolution of the lightweight atomic and molecular entities in real time. These advances may lead to new ways of directly observing reaction dynamics of complex molecules.

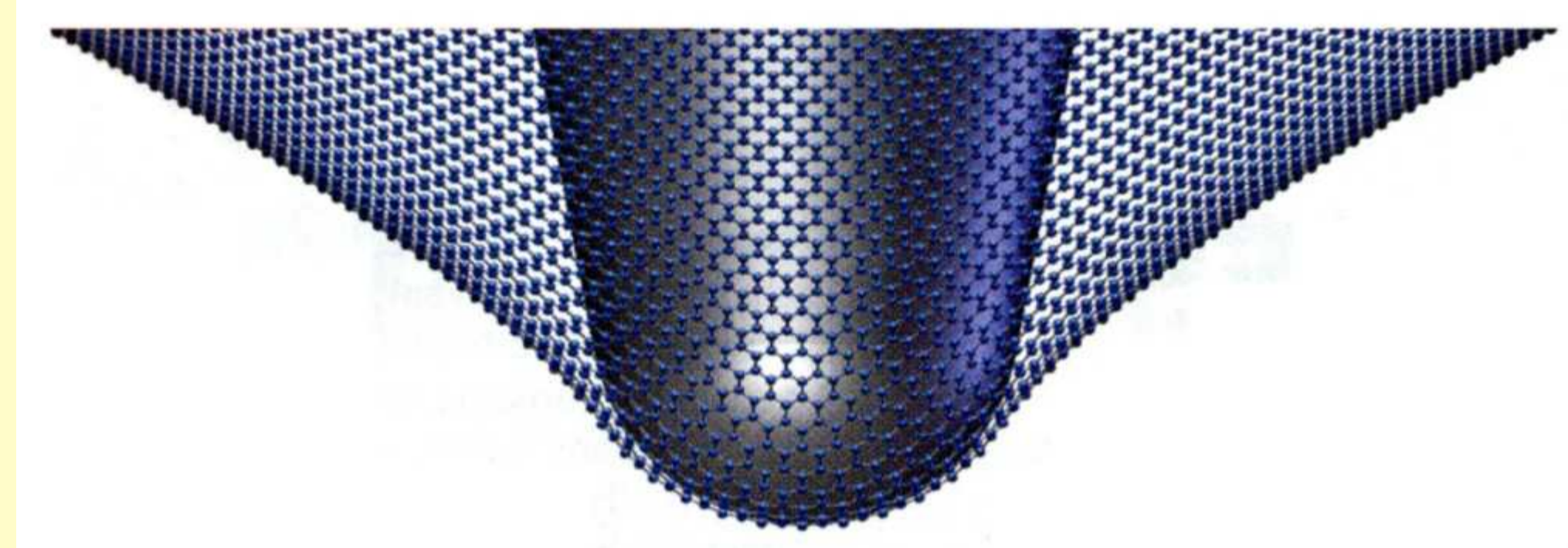


## El material més resistent

Scientists have long suspected that graphene—chicken wire-like, two-dimensional sheets of carbon—is the strongest material ever examined. Now, that's been verified by mechanical engineering professor J. Hone of Columbia University and colleagues (*Science* **2008**, 321, 385). The task has been difficult because the slightest impurity or defect greatly affects a material's intrinsic strength.

Scientists have in the past attempted to measure the strength and stiffness of nanotubes and multiple layers of graphene. Instead, the Columbia group has managed to stretch a single sheet of graphene over an array of circular holes and to use an atomic force microscope tip to indent and break through the graphene sheet into the holes.

The measured strength is over 200 times that of structural steel, and over 20 times that of advanced carbon fibers. The authors write that the work "serves as a benchmark for structural and mechanical applications."



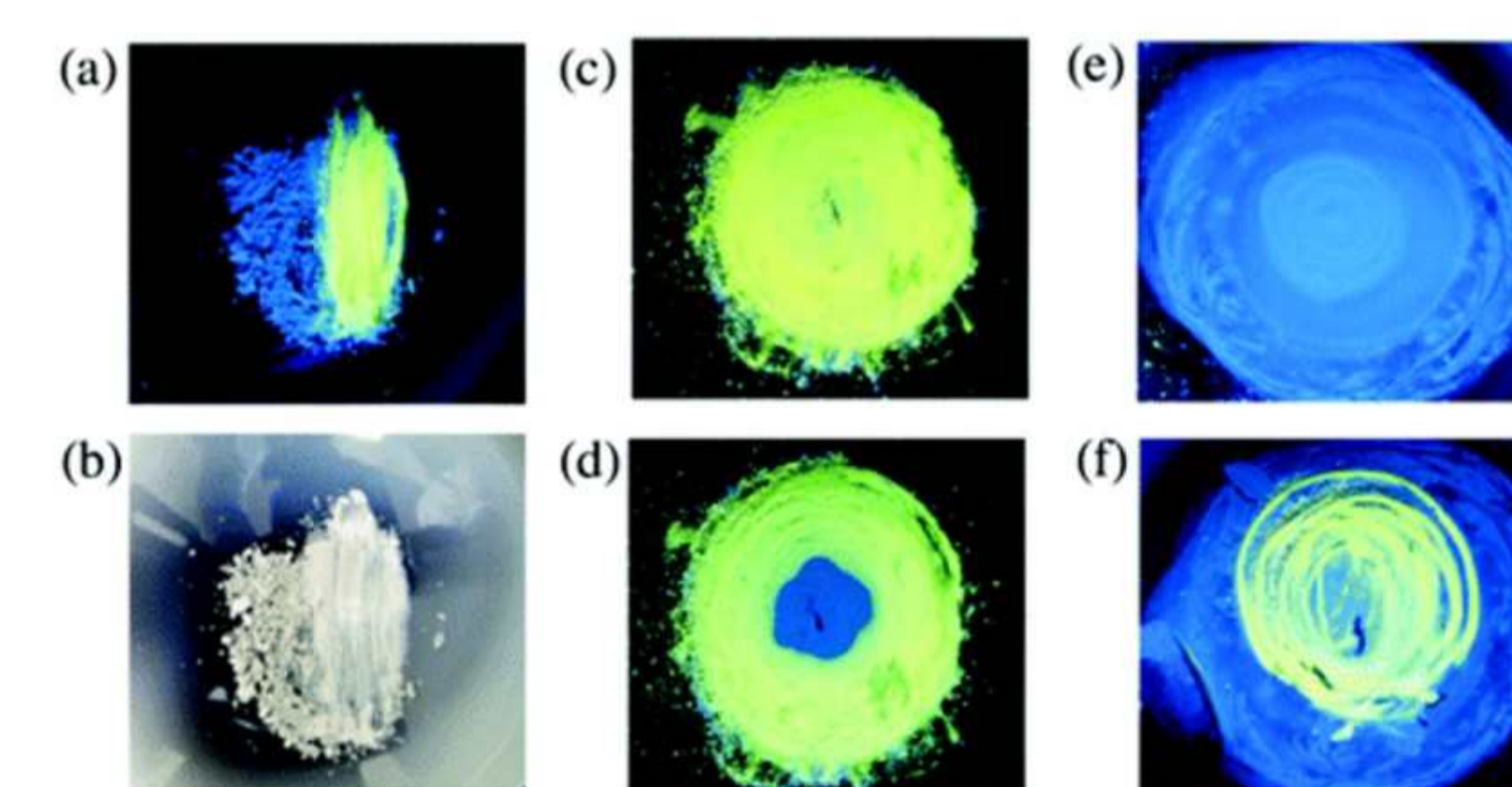
## De quin color és l'or?

Gentle grinding of a new Au(I) complex in solid form changes its luminescence behavior, Japanese researchers report. UV light reveals the induced change in the compound as it goes from blue to yellow (a). The color change, which isn't apparent in visible light (b), can be reversed by exposing the fully ground powder (c) to drops of dichloromethane or other solvents (d). Powder turned completely blue by solvent (e) reverts to yellow after the solvent evaporates and the solid is again ground with a pestle (f). Chemists H. Ito, M. Sawamura, and colleagues at Hokkaido University, in Sapporo, detected no degradation in luminescence even after 20 cycles of blue-to-yellow conversion of the [(C<sub>6</sub>F<sub>5</sub>Au)<sub>2</sub>(μ-1,4-diisocyanobenzene)] complex (*J. Am. Chem. Soc.*, **2008**, 130, 10044).

X-ray and IR studies suggest that grinding transforms the more stable crystalline blue phase into an amorphous yellow phase and alters the coordination of the isocyanide ligands to the gold atoms. Such compounds could be used in recording and sensing devices.

A movie is available:

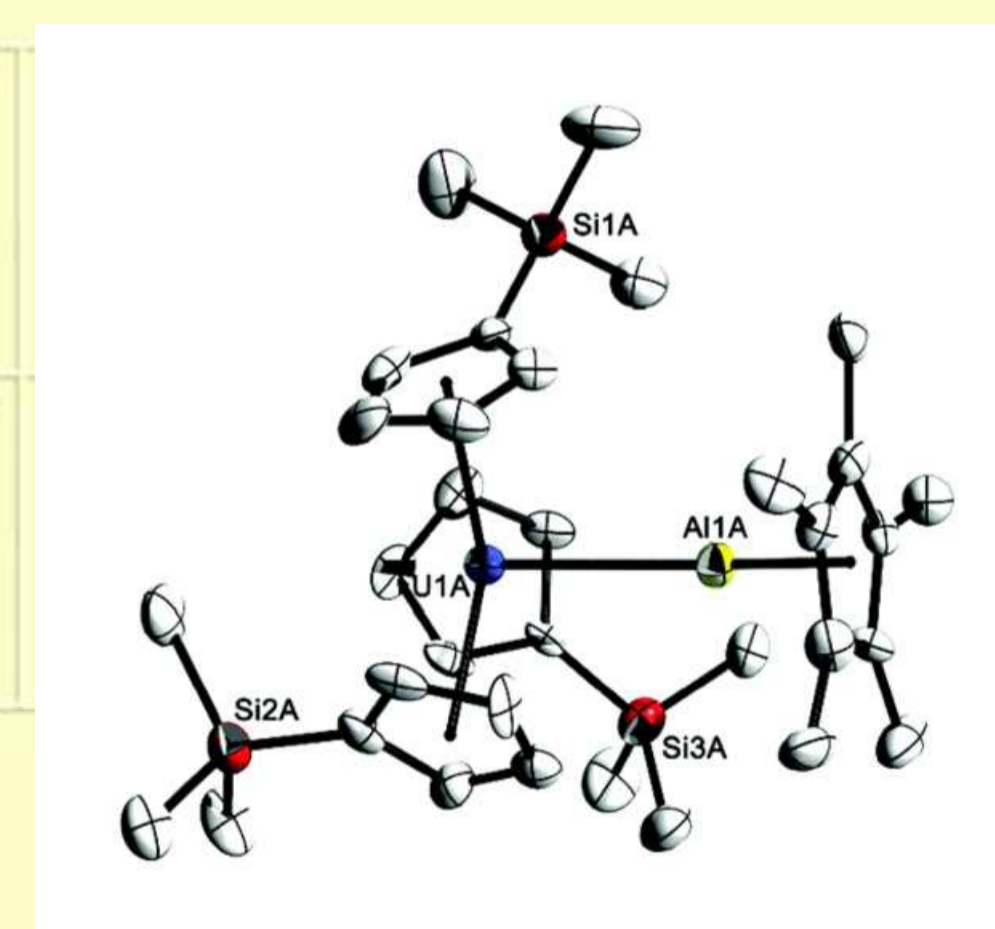
<http://pubs.acs.org/subscribe/journals/jacsat/130/i31/objects/ja8019356/ja8019356-File003.mpg>



## L'alumini no té por

A novel complex that contains a uranium-aluminum bond adds to the growing field of metal-metal bond chemistry (*J. Am. Chem. Soc.*, **2008**, 130, 10086). The molecule, created by J. Arnold, J. L. Krinsky, and S. G. Minasian of the University of California, Berkeley, is the first to contain a bond between an actinide and a group 13 metal. That the bond doesn't require any bridging groups to hold it together means the uranium-aluminum interaction is a reasonably strong one, all on its own.

The uranium-aluminum interaction is stabilized by a pentamethylcyclopentadiene (Cp\*) ligand and three trimethylsilyl-substituted cyclopentadiene ligands. Arnold's group drew its initial inspiration from several lines of work in other labs, including the discovery of bonds between lanthanides and the Cp\*Al ligand and the knowledge that Cp\*Al is loosely analogous to carbon monoxide, which is known to bind to lanthanides and actinides. The group is now exploring the reactivity of the complex and working to synthesize related compounds.



## Breus



- El 9 de setembre s'ha inaugurat al CERN el Large Hadron Collider (LHC), que pretén buscar noves partícules, entre elles el bosó de Higgs. En aquest experiment hi participen membres de la Universitat de Barcelona (<http://public.web.cern.ch/public/>)



- D'entre les 50 empreses químiques més importants del món el 40% són europees, el 26% d'Amèrica del Nord, el 16% del Japó i la resta corresponen a països emergents (*Chem. Eng. News*, 28 de juliol).



- El so únic dels Stradivarius podria estar relacionat amb la extraordinària uniformitat de la densitat de la seva fusta (B. C. Stoel et al., *PlosONE* 3(7), e2554. DOI: 10.1371/journal.pone.0002554)

## Avui recomanem



*Linus Pauling and the Nature of the Chemical Bond: A Documentary History* es una actualització de la pàgina web dedicada a un dels científics més il·lustres del segle XX. Es compon de tres seccions, i explica la gestació de la teoria de l'enllaç químic d'una manera original.

<http://osulibrary.oregonstate.edu/specialcollections/coll/pauling/bond>

## L'element



L'element número **41, niobi**, fou descobert l'any 1801 per Charles Hatchett a Anglaterra i inicialment fou anomenat Culombi; no va ser fins l'any 1950 que la IUPAC acceptà el nom actual, que prové del grec Niobe ( ) la germana de Tàntal, ateses les grans similituds amb aquest altre element.

La principal aplicació és en la fabricació d'acers inoxidable emprats en la indústria de l'automòbil i en aliatges usats en la construcció de gasoductes i ginys espacials. Forma part del mineral anomenat *coltan*, d'interès fonamental en les telecomunicacions i causant de moltes de les guerres recents al centre d'Àfrica.