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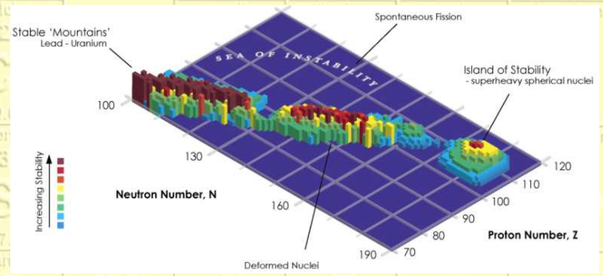
El ^{270}Hs, gairebé estable

Theoretical physicists predicted years ago that some nuclei of elements much more massive than uranium should survive for a relatively long time—possibly long enough to probe their chemical properties—if they could be synthesized. On the chart of nuclides, theoreticians pinpointed a region with coordinates corresponding to 114 protons and 184 neutrons and indicated that nuclei with those "magic" numbers of subatomic particles should lie at the center of an island of stability. The nuclear longevity is due to the closing of proton and neutron shells. Experimentalists, though, haven't yet found a route to reach the center of the island. Other theoreticians calculated the effects of subshell closings in other superheavy nuclei. They concluded that an isotope of hassium containing 108 protons and 162 neutrons (^{270}Hs) should survive a long time—much longer than the millisecond or shorter lifetimes typical of most of the heaviest nuclides.

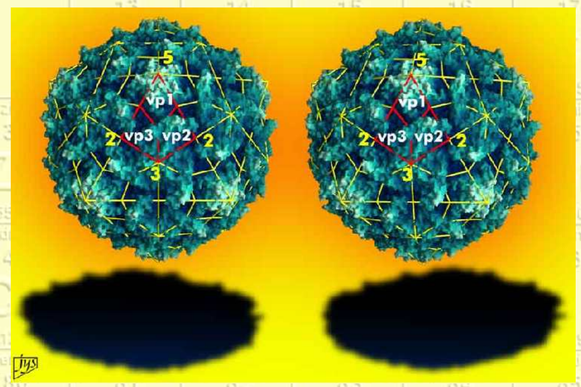
Now, an international team of experimentalists has detected four of those atoms and probed some of their chemical properties during the roughly 30 seconds the nuclei survive (*Phys. Rev. Lett.* **2006**, *97*, 242501). The findings confirm the predictions and provide new statistical data with which such theoretical models can be refined. The team includes 24 scientists from 10 research institutions.



Un virus *pesat*

The masses of individual virus particles and the mass variability of each population of a virus can yield important information about the nature and structure of these genetically diverse biological entities. A group led by Huan-Cheng Chang of Academia Sinica, Taipei, Taiwan, has now developed a method for measuring the mass of a single whole virus to within ±1% precision, compared with typically ±15% precision for previous methods (*Angew. Chem. Int. Ed.* **2006**, *45*, 8131).

The method uses a "gentle" ionization technique, known as laser-induced acoustic desorption, to generate intact viral ions. The ions are collected in a cylindrical ion trap equipped with transparent electrodes, and they oscillate in the electric field with a frequency that depends on their mass and charge. The frequency is determined by analysis of light scattered from individual particles when laser light is beamed into the trap. The team used the method to measure the masses of three types of viruses with diameters between 80 and 300 nm and masses in the range of 10^8-10^9 daltons.

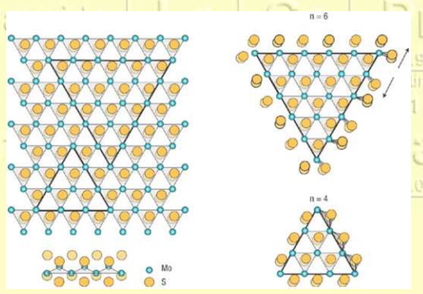


L'activitat dels nanocatalitzadors depèn de la forma i la mida

With legislation in the U.S., Europe, Japan, and elsewhere calling for ever lower levels of sulfur in fuels, scientists are redoubling their efforts to sort out the reaction mechanism that drives hydrodesulfurization, a process in which sulfur is stripped from hydrocarbons and converted to volatile hydrogen sulfide in the presence of MoS_2-based catalysts.

Previous studies indicate that the edges of thin, supported MoS_2 nanoclusters, which are often equilateral-triangular in shape, contain highly active catalytic sites, which are especially active when the clusters are very small. The high activity is often attributed to the unique coordination of edge atoms and the presence of reactive edge defect sites. But those features have not been explored in atomic-resolution detail until now.

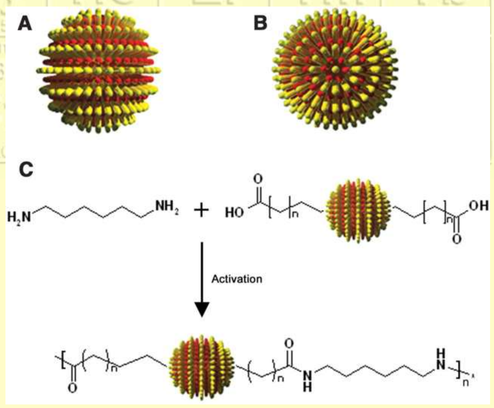
On the basis of scanning tunneling microscopy (STM) measurements, Jeppe V. Lauritsen and coworkers (University of Aarhus) have shown that nanoclusters with six or more molybdenum atoms along an edge coordinate sulfur differently than do nanoclusters containing fewer than six edge molybdenum atoms (*Nat. Nanotechnol.* **2007**, *2*, 21). The team also reports that the smaller clusters are less stable (more reactive) and more prone to vacancy defects than the larger clusters. And they note size-dependent differences in the clusters' STM signatures, which indicate the clusters' differing electronic structures.



Nanopartícules d'or que es comporten com a àtoms

Using a little topology and a few thiol ligands, materials scientists have managed to corral a gold nanoparticle's thousands of atoms and make them behave like one divalent atom (F. Stellacci *et al.*, *Science* **2007**, *315*, 358). Transformed from a multivalent mass to tidy two-handled building blocks, the nanoparticles can then be hooked together into a tiny string of golden beads.

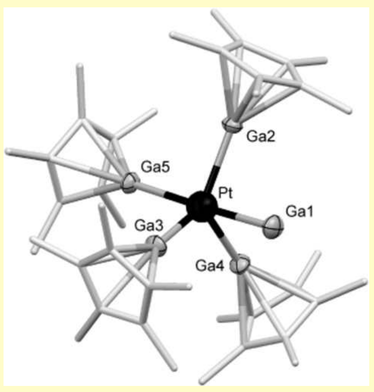
To establish an orderly divalent bonding motif in the unruly nanoparticles, Stellacci's group (Massachusetts Institute of Technology) took advantage of what topologists call the "hairy-ball theorem." Basically, the theorem states that if you've got a sphere covered in hair, it's impossible to comb those hairs so they all lie flat. No matter what you do, two hairs at opposite points on the sphere will stand straight up. Applying the theorem to a gold nanoparticle "sphere" coated with a mixture of two types of thiol ligand "hairs," the researchers reasoned they could swap the thiols at those polar positions with thiol chains bearing a terminal carboxylic acid. With an acid-functionalized chain at each of its poles, the particle selectively bonds with other molecules as though it were a divalent atom. Once they'd done the thiol swap, Stellacci's group simply condensed the divalent particles with 1,6-diaminohexane, creating polymer-like strands up to 20 nanoparticles long.



Ga^+ i In^+, acceptors purs

Compounds with low-valent Group 13 elements, in particular the series ECp* (E=Al, Ga, In; Cp*=C_5Me_5), are fascinating carbenoid -donor ligands for transition-metal-metalloid complexes and clusters. Now, a platinum derivative in which a naked Ga^+ or In^+ cation behaves as a pure acceptor ligand has been prepared (G. Fremking and coworkers, *Angew. Chem. Int. Ed.* **2006**, *45*, 5207).

The bonding of the Ga^+ ligand to the closed-shell 18-electron complex [Pt(GaCp*)$_4$] is a result of the (soft) Lewis acidic properties of Ga^+ ligand in contrast to the Lewis basic GaCp* ligand. DFT calculations have confirmed the electronic structure of these species, and suggest that Ga^+ and In^+ ligands are metal analogues of H^+.



Breus

- Han mort F. Albert Cotton (Philadelphia, 1930) i Fred Basolo (Illinois, 1920), que degut als seus libres i publicacions han estat considerat dos dels químics inorgànics més influents de la segona meitat del segle XX.
- La *Royal Society of Chemistry* ha posat en marxa un *blog* (http://prospect.rsc.org/blogs/cw/) i un *podcast* (http://www.rsc.org/chemistryworld/podcast/cw_podcast.xml).
- Petites quantitats de llet neutralitzen les beneficiones propietats antioxidants del tè (*Eur. Heart. J.* **2007**, *28*, 219).
- Es compleixen dos-cents anys de la prestigiosa editorial de llibres científics *John Wiley & Sons*.

L'element número **32**, **germani,** que correspon a l'ekasilici predit per Mendelejev l'any 1871, va ser descobert el 1886 per Clemens Winkler. El seu nom prové del mot llatí *germania*.