Using a single-walled carbon nanotube as a highly confining reaction vessel, researchers have polymerized a fullerene derivative to form a linear, unbranched polymer that has never before been observed. The technique may allow other unprecedented linear polymers to be synthesized.

With supercritical carbon dioxide as the solvent, the researchers inserted molecules of the known fullerene epoxide \( \text{C}_6\text{O} \) into nanotubes. The \( \text{CO}_2 \) was then allowed to escape from the nanotubes. The resulting peapod structure consists of epoxide molecules lined up in a single row inside the nanotube, which is only wide enough (about 1.4 nm) to accommodate one row of fullerenes.

The nanotubes were then heated to 260 °C in a vacuum, causing the strained epoxide rings to accommodate one row of fullerenes.

Craig L. Hill of Emory University, Atlanta, and coworkers have shown how this electron-lane polymerization is a linear chain, \( \text{C}_6\text{O}_n \), that, in principle, can be as long as the length of the nanotubes (D.A. Britz et al., *Chem. Commun.*, 37 (2005)).

Titani immobilitzat, catalitzador actiu i selectiu

Gratifying titanium-calixarene complexes onto silica produces effective epoxidation catalysts, according to a study from the University of California, Berkeley. Alexander Katz and coworkers have shown that the immobilized form of the catalyst (shown) is more than 20 times more active and far more selective than the solution-phase compound in olefin epoxidation reactions using organic hydroperoxides as oxidizing agents (*J. Am. Chem. Soc.*, 126, 16478 (2004)).

The researchers propose that the multidentate and bulky structure of the calixarene ligand keeps the metal centers isolated from one another during reaction with alkenes. Separating the titanium centers prevents oligomerization, which would lead to formation of unreactive and unselective Ti–O–Ti structures. The team notes that the catalysts are robust and reusable and exhibit long-term stability under ambient storage conditions.

Un nou al·lotrop del fòsfor

New structural forms of elemental phosphorus have been revealed in studies carried out by German researchers (*Angew. Chem. Int. Ed.*, 43, 4228 (2004)). Phosphorus occurs in nature in various phosphate-bearing rocks, and for some 350 years it has been known that pure phosphorus can be prepared by reducing these materials. Several phosphorus allotropes consisting of P, and other units have been identified, with the white, red, violet, and black color modifications being the main forms. Arno Pfitzner of the University of Regensburg and Hellmut Eckert of the University of Münster and coworkers have now isolated two red-brown forms, one each from solutions of (CuI)\(_2\)P\(_4\) and (CuI)\(_2\)P\(_2\). They prepared the compounds by reacting Cu with red phosphorus. The German team used electron microscopy and NMR to identify the red-brown forms as rod-shaped P\(_4\) units (shown), noting that red-brown phosphorus is distinctly different from the amorphous red phosphorus, which is also thought to be polymeric.