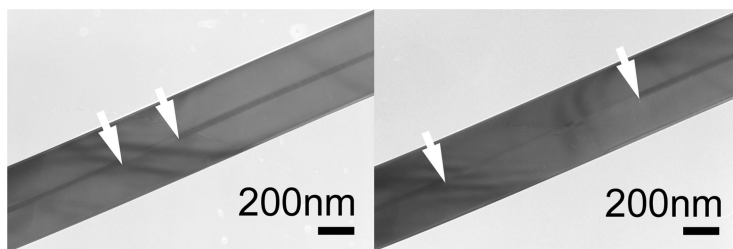


Nanoribbons Take a Bow

Because of the novel properties of carbon nanotubes, one-dimensional nanostructures such as wires, tubes, and ribbons have attracted extensive interest over the past decade. Such structures have the potential to address some fundamental issues related to dimensionality and space-confined transport phenomena and serve as a starting point for a variety of practical applications. There has been great progress in the development of new nanotubes based on metal oxides, including Ga₂O₃, a transparent conducting oxide that has been used as an insulating layer for gallium-based semiconductors. These nanotubes typically have a circular, square-like, or hexagonal-like cross section. However, Hu *et al.* (p 107) have



developed a novel form for Ga₂O₃ nanotubes: flat, ribbon-shaped tubes with a circular inner channel. These unconventional

of the Sn nanowires inside the tubes with a convergent electron beam generated in a transmission electron microscope. Hu and colleagues demonstrated that they could cut the nanowires into two segments, separate them spatially, and rejoin the pieces through electron-beam-induced melting and a beam-driven motion inside the nanotubes. The authors suggest that their work

tubes were filled either partially or completely with Sn nanowires, thus forming Sn/Ga₂O₃ metal/semiconductor nanowire structures.

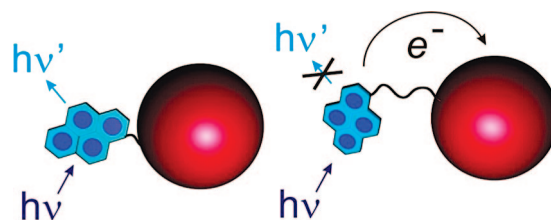
widens the current range of existing nanostructures and extends the understanding of crystal growth at the nanoscale. They add that these findings may also stimulate a practical design of new functional electron-beam-irradiation- or thermo-driven electrical switches.

After synthesizing and characterizing the tube exterior, the researchers found that they could perform delicate manipulations

Glittering Emissions from Chromophores and Gold

Many groups have sought to achieve better control of electro-, photo-, and bio-active molecules by integrating molecular systems with the unusual properties of gold nanoparticles. These efforts are a step toward understanding and exploiting the interactions between nanoparticles and the active systems as well as designing new functional materials that owe their properties to the proximity between the molecules and the metal surfaces. An example of this effect is the possibility of activating or deactivating the photophysical properties of a chromophore by a nanoparticle core. The presence of gold nanoparticles can effectively quench fluorescence of organic molecules *via* energy

transfer. This distance-dependent process has been interpreted by a variety of models. Odd-even effects, based on the number of methylene units of the chain to which the fluorophore is attached, and the nature of the anchoring group on the gold surface have both been suggested as being responsible for this behavior.



To investigate this phenomenon, Battistini *et al.* (p 77) examined the fluorescent processes of two newly synthesized pyrene derivatives bound to gold nanoparticles. The team made two structurally identical ligands, differing only in the nature

of the anchoring group, and then attached them to gold nanoparticles. They observed the same changes in fluorescent properties in both cases, varying with the ligands' proximity to the gold core. The authors suggest that the design of such tethered chromophores might be tuned to obtain a variety of fluorescence properties.

Change, Then Rearrange: Photoisomerization in Azobenzene Derivatives

Cis-trans photoisomerization of azobenzene chromophores has been extensively examined since their discovery and has been widely used in photoresponsive systems and devices. The advantages of using azobenzenes lie in their large geometrical change accompanying *cis-trans* isomerization and their photostability, enabling the development of a variety of photoresponsive functional devices such as smart polymers, liquid crystals, and molecular switches and machines. Recent work suggests that

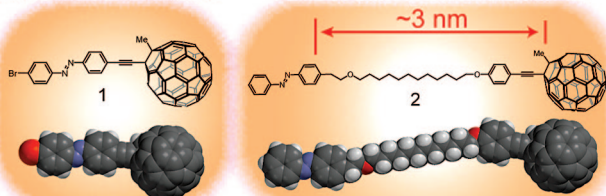
combining azobenzene chromophores and fullerenes may lead to advances in the field of molecular switching because of the novel properties of both functional groups. However, little is known about the properties of such hybrid molecules. In particular, the effect of the fullerene moiety on the photoisomerization of the azobenzene has not been examined previously.

To gain some insight into this behavior, Shirai *et al.* (p 97) synthesized fullerene-azobenzene hybrids as well as azobenzene derivatives with conjugated oligo(phenylene ethynylene)s (OPEs), organic building blocks often used for molecular devices due to their

shape-persistent nature and relatively simple synthesis. The team found that the presence of a fullerene can strongly affect the photoisomerization of azobenzenes and, in some cases, quench photoexcitation of azobenzenes such that no photoisomerization occurs. Attaching OPEs to azobenzenes also had a quenching effect, though it was significantly smaller. Since azobenzenes, fullerenes, and OPEs are common building blocks for molecular devices, the authors suggest that their synergistic effects must be taken into account when they are combined to form complex systems.

No isomerization

cis-trans isomerization



azobenzene derivatives with conjugated oligo(phenylene ethynylene)s (OPEs), organic building blocks often used for molecular devices due to their

Published online January 22, 2008.
10.1021/nn7004409 CCC: \$40.75

© 2008 American Chemical Society