Periodic graphics

A collaboration between C&EN and Andy Brunning, author of the popular graphics blog **Compound Interest**

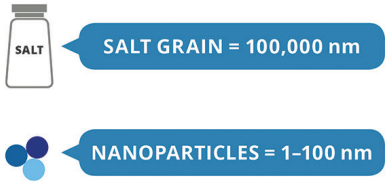
More online

To see more of Brunning's work, go to **compoundchem.com.** To see all of C&EN's Periodic Graphics, visit **cenm.ag/periodicgraphics.**

EVERYDAY USES OF NANOTECHNOLOGY

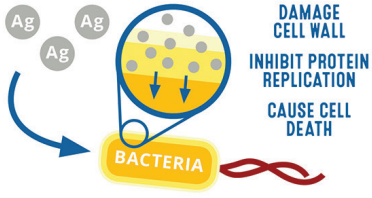
National Nanotechnology Day (Oct. 9) is a yearly event in the U.S. to celebrate the tiny tech. Here, we take a look at various consumer products that utilize nanotechnology and the chemistry behind them.

WHAT IS NANOTECHNOLOGY?



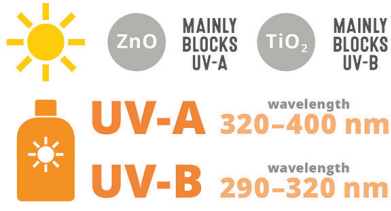
Nanotechnology involves the applications of nanoparticles, which are collections of atoms or molecules less than 100 nm across. Because of their small size, the particles have properties that can differ from those of larger amounts of the same material.

ANTIMICROBIAL USES



Products such as bandages, soaps, and surgical implements use silver nanoparticles for their antimicrobial effects. However, the particles' effectiveness in some applications has been questioned, and the materials may cause environmental problems.

SUNSCREENS

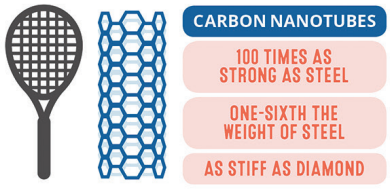


Many sunscreens contain titanium dioxide and/or zinc oxide nanoparticles because the materials can absorb UV radiation. Titanium dioxide also finds use in some foodstuffs as a whitening agent.

CLOTHES

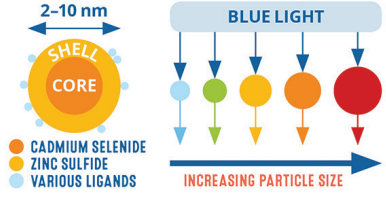
UV-absorbing titanium oxide and zinc oxide nanoparticles can be incorporated into clothes to prevent sunburn and sometimes to act as antistatic agents. Silicon dioxide nanoparticles can prevent stains and help clothing repel water.

SPORTS EQUIPMENT



Sports equipment such as tennis rackets and bicycles are sometimes built using nanomaterials including carbon nanotubes. The nanotubes improve strength and durability and decrease weight. Titanium nanoparticles can also be used.

QUANTUM DOTS



Quantum dots, which are nanoparticles of semiconductors such as cadmium selenide, absorb light of one color, such as blue light, and emit it as another depending on particle size. The particles are more energy-efficient than light-emitting diodes.