



It's Happening Now

Gecko tape and blue morpho makeup aren't on the market just yet. Many reports on nanotechnology focus on future possibilities, describing how nanotechnology could change the world. Those possibilities are certainly interesting to contemplate. But perhaps more interesting are the ways that nanotechnology has already affected our lives.

Take, for example, the gas in your car. That gas was extracted from crude or unprocessed oil, the stuff that comes out of the ground—and nanotechnology has made a big difference to how much gasoline is extracted from every barrel of oil.

Crude oil is a mixture of hundreds of different hydrocarbons, compounds made of hydrogen and carbon. When crude oil is refined, large hydrocarbon molecules are broken into smaller ones in a process called *cracking*. How much gasoline can be extracted from a barrel of crude oil depends on the efficiency of the cracking process.

Back in 1962, researchers at Mobil Oil dramatically increased the efficiency of the cracking process, upping the quantity of gasoline extracted from a barrel of oil by a whopping 40 percent. They accomplished this revolutionary change in petroleum refining with a porous crystal called zeolite. Riddled with openings small enough to distinguish among molecules of different sizes and shapes, zeolite acts as a catalyst, an additive that accelerates and increases the efficiency of a chemical reaction. (Those zeolite crystals qualify as nanotechnology because the holes that riddle them are tiny—less than a nanometer across in some cases.) According to a 1992 National Academy of Sciences estimate, the shift to a zeolite catalyst saves the United States more than 400 million barrels per year of oil.

That change in 1962 didn't make the newspaper headlines. It was a change in an industrial process—not something to get worked up about. It wasn't called "nanotechnology" back then, but that's what it's called now.

Mobil's use of zeolite can be said to be one of the first broad-scale applications of nanotechnology. It's an example of what Mark and Daniel Ratner, authors of *Nanotechnology: A Gentle Introduction to the Next Big Idea*, call "stealth nanotechnology." That's nanotechnology that's hidden in other products, nanotechnology that we, as consumers, don't even notice, though it stealthily makes a difference in our lives.