

Top Nano Products of 2005

Josh Wolfe, Forbes/Wolfe Nanotech Report

Finally, we are living in a nanotech age. There are a lot of real products being produced with this new science of the small, and this year's annual Nanotech Product Guide is chock full of exciting and useful consumer products.

As always, we were careful to exclude products using nanotechnology as little more than marketing fluff. We focused on items where nanotechnology is significantly improving a process or product.

Like last year's guide, Top 10 Nanotech Products of 2004, our 2005 guide shows significant new developments in the sports, cosmetics and textile industries.

Thanks to nano-encapsulation, the food industry is also developing a taste for nanotechnology, as you will see in the slide show, including a chocolate-flavored chewing gum as well as a wide array of fat-free products.

From apparel to armor, nanotechnology is already bearing fruit as a viable commercial science. The impact of nanotechnology is continuing to grow in small-molecule drug development at biotech companies. With the help of research universities and continued advances in science, next year's list of top nano products promises to be even harder to pick.

1. Tiny Chips Are Suddenly Hip - Apple Computer's iPod Nano



Apple Computer's latest marketing campaign for the 4 GB pencil-thin iPod Nano player may be the event that kicks public awareness into overdrive. But does this device represent nanotechnology or marketing hype? The answer is "yes" on both counts. Inside the iPod Nano are memory chips from Samsung and Toshiba. Samsung, the biggest producer of NAND and DRAM flash memory chips in the world, uses semiconductor manufacturing methods with precision below 100 nanometers. This precision, in part, is what enables the iPod Nano's 4 GB NAND flash memory.

2. Fat Busting With Nanotech - Shemen Industries Canola Active

A healthier version of canola oil has been created by NutraLease, an Israeli startup, using 30 nanometer capsules, which, because of their small size can seep through tissues for better biodelivery of nutrients. Another Israeli company, Shemen Industries, is using the process to create Canola Active, a brand of cooking oil infused with plant phytosterols that inhibit the absorption of cholesterol in the blood and lower the risk of heart disease.

NutraLease's nanoscale structures form a liquid carrier that improves absorption of phytochemicals and reduces LDL cholesterol levels by up to 14%.

3. Tootsie Roll's Nanotech Nemesis - O'Lala Foods Choco'la Chewing Gum

Cocoa butter has never been compatible with the polymers that give gum its elasticity. In fact, the fats found in chocolate will cause chewing gum to fall apart. Chicago-based O'Lala's solution is to incorporate nanoscale crystals, modifying surface morphology and giving its gum a creamier

texture and chocolate flavor. Choco'la gum is commercially available in suburban supermarkets north of Chicago at specialty chocolate stores and on the company's web site. A pack of 12 pieces will cost you about \$1.25.

4. A Nanotech Facial - Zelens Fullerene C-60 Face Cream

Zelen Fullerene C-60 Day Cream, as the name implies, incorporates nanoscale Fullerene C-60, a derivative of the late Nobel Laureate Richard Smalley's buckminsterfullerene carbon. It turns out that the material has remarkable antioxidant properties. Zelens claims its newly released day cream is the first to harness the power of Fullerene C-60 carbon for cosmetics applications. That helps to explain the product's £150 (\$250) price tag. Unless you're traveling to the U.K., add on a shipping charge. Customers on this side of the pond can obtain a jar via direct order by e-mailing enquiries@zelens.com.

5. A Nano-ville Slugger- Easton Sports Stealth CNT Bat

Easton Sports, based in Van Nuys, Calif., teamed with Zyvex in Richardson, Tex. to create the Easton Stealth CNT bat. The "CNT" stands for carbon nanotube technology from Zyvex's NanoSolve product line. The spaces between the fibers in your ordinary, run-of-the-mill carbon fiber bat contain only resin, which weakens the bat's power. Easton's solution was to disperse Zyvex's material into the base resin. The result is a bat that gives sluggers of all ages optimized flex, responsiveness and more "kick" through the hitting zone for maximum performance--within legal limits of the game, of course. Swinging this kind of technology at the plate will cost you \$175 and up.



6. Casual Apparel With Nano-Style - Nanotex

Nano-Tex in Emeryville, Calif., made our top ten last year for its contribution to dryer, more comfortable mattress covers. The company returns this year with a long list of nano-enhanced clothing with fibers that have tiny whiskers aligned by proprietary spines to repel liquids, reduce static and resist stains--without affecting feel. Nano-Tex plans to launch an extension of its Coolest Comfort family of patented moisture wicking enhancements for resin-treated knits and other cotton garments. The enhancement keeps consumers dry and comfortable by pulling moisture away from the body at least ten times faster than most resin-treated cotton fabrics available today.

7. Stink-Proof Nano Sox - ARC Outdoors, ArcticShield Socks

Another nano-improved apparel application made our list: Military PX stores stateside and abroad are now selling ArcticShield polyester socks from ARC Outdoors in Broken Arrow, Okla. They incorporate 19-nanometer silver particles within their fibers. Long known for its antimicrobial properties, silver has been used previously to provide protection against odor and fungus in socks. The material never bonded well with polymers, however, and needed to be applied as a spray, or woven directly into the fabric as an uncomfortable metal thread. NanoHorizons developed a proprietary process that solved this silver-to-polymer bonding problem. Now sold as E47 Polyester Master Compound, it helps to make a comfortable synthetic fiber sock with permanent resistance to odor and fungus.

Shiny Happy Homes

8. Behr NanoGuard Paint

and

9. Pilkington Activ Glass

Now available at Home Depot and other retailers, Behr Kitchen & Bath paint incorporates NanoGuard technology developed by Behr Process in Santa Ana, Calif. Nano-sized additives

lend greater density to the water-based acrylic latex carrier. As the carrier dries, the NanoGuard additives help create a harder, more durable film resistant to water, mildew, stains and grease. Coated with a few dozen nanometers of a photoactive film, Pilkington's new Activ [sic] glass effectively cleans itself, as natural radiation from sunlight chemically reacts with organic dirt deposits on the surface. When it rains, or when you turn a hose on it, the hydrophilic film causes water droplets and dirt to spread evenly over the surface.

10. Cleaner Air Through Science - NanoTwin Technologies, NanoBreeze Air Purifier

A patented NanoTube is the active component behind the NanoBreeze Air Purifier from Salem, N.H.-based, NanoTwin Technologies. The tube itself is large enough to handle, but it is wrapped in a fiberglass mesh coated by a layer of titanium dioxide crystals that measure 40 nanometers in size. Switched on, the NanoTube radiates UV light that charges the crystals to create powerful oxidizing agents that destroy airborne germs and pollutants circulating over the tube's surface.

