

## Top 10 Nanotech Products of 2004

**O**ur third annual Nanotech Product Guide reveals some interesting trends. The overwhelming majority of commercially available nanotech products on the market today are in sports. Last year (see “2003 Nanotech Product Guide”, July 2003), we featured Nanogate/Holmenkol’s Cerax Nanotech Ski Wax, Babolat Tennis Racquets using nanotubes and longer lasting nanoparticle tennis balls from Inmat/Wilson. Even products such as Nano-Tex’s Nano-Care water repellent and stain resistant coatings had appeared in ski jackets from Germany-based Ziener. In 2004, sports led the way for nanotechnology commercialization yet again. From golf balls to footwarmers, athlete skin care to new tennis racquets (from Wilson), consumer demand for better exercise equipment and materials is still driving nanotech revenues. With the help of our affiliated institutional research firm, Lux Research, we’ve listed the top 10 nanotech products of 2004.

### Shock Doctor Aerogel Hotbeds (Footwarmers)

Northborough, Massachusetts-based Aspen Aerogels launched a nanotechnology-based footwarmer in March of 2004. It’s used by the 2004 winner of the North Pole Marathon, the Canadian Ski Team and U.S. Military’s Elite Special Forces.

Aspen’s Pyrogel AR5401 utilizes highly insulative nanoporous aerogel technology, providing 3-20 times more thermal performance at a given thickness when compared to existing materials. It also resists compression, and does not require loft to deliver this benefit. In the case of the Elite Special Forces boots, just a 2mm thick layer of Pyrogel 5401 was needed to provide a significant improvement in field performance.

Plymouth, Minnesota-based Shock Doctor has developed a product called Hotbeds being used in military boots for improving the level of comfort in cold weather operations. Since Pyrogel AR5401 is so efficient, the Hotbeds are only 2.5mm thick. Cost: \$19.99 for one pair of Hotbeds.

### Washable Bed Mattress

In October, Simmons Bedding Company, one of the world’s largest mattress manufacturers, unveiled its latest innovation, the HealthSmart Bed, featuring a zip-off mattress top that may be laundered or dry cleaned. The top is available on all Simmons Beautyrest and BackCare mattresses targeted to sell at price points of \$1,399 and above. Its coolmax channeled fibers wick away sweat

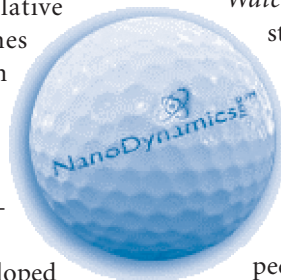
and moisture as you sleep and allow fabric to dry quickly in the laundry. In the second layer, Nano-Tex creates a semi-impervious layer that traps fluids and particles so they can be washed away. The third layer is Terry cloth treated with Teflon fabric protector that provides an extra level of protection.

### Golf Balls & The “Nano” Driver

Tokyo-based Maruman & Co. has adopted fullerenes from Honjo Chemical for use in golf club heads. New titanium fullerene materials are being used in their top of the line “New Majesty” driver, which went on sale on July 5 of this year. Compared to conventional titanium, the new driver resists bending 12% better, has a hardness 3.6% better than titanium, a 20% more resilient head (based on robot testing), and flight distance has increased 15 yards (compared to their old 360cc class driver). Since it was released, Maruman has been overwhelmed with orders, to the point where the Maruman homepage displayed an apology from the company for the two-week delay for shipments of the driver.



Buffalo, New York-based NanoDynamics (see *Companies to Watch*, September 2004) might have a nice accompanying stocking stuffer. NanoDynamics has come up with a golf ball that can correct its own flight path so it flies straighter than conventional balls. The ball won’t shift 45 degrees in midair, but the design of the ball—and the undisclosed nanomaterials it’s made of—serve to better channel the energy received from the club head and thus correct a wobble or slight drift. The ball is expected to hit stores in the spring of 2005. A sleeve of three



balls is \$24.99 and a dozen balls are \$89.99

### Personalized Skin Care

As most of us already know, marketing and more specifically packaging are what sells make -

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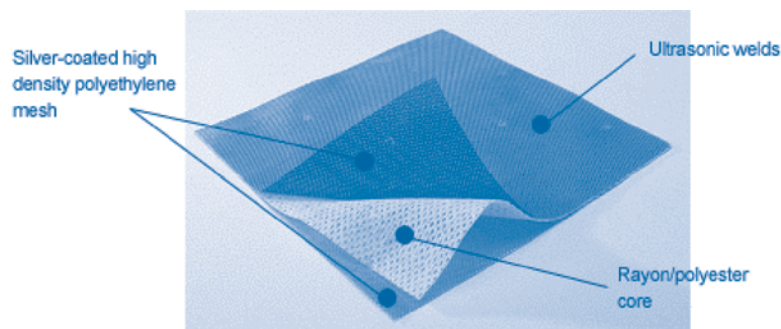
up. Nowadays technology sells, so it is no surprise that Madison Avenue has latched onto nanotechnology for selling cosmetics. Recent visitors to Barney's New York will notice Bionova's skin care booth. With "nano skin tech" prominently displayed on the walls,



this New York-based cosmetics company is based on 25 years of scientific research conducted by Russian scientist Dr. Michael Danielov, CEO and founder of Bionova. Bionova offers "personalized skin care" and says approximately 50% of their sales come from their customized products. Through a series of online or in person interview questions, Bionova scientists tailor face, hand, and body creams based on a person's sex, age, race, skin type, and lifestyle habits like levels of exercise. As an example, in August Bionova introduced a Tennis Skin Care line. The Bionova Grand Slam skin care line claims to provide skin protection for the climatic conditions of all four major tennis tournaments: the skin scalding sun of the Australian Open; the gritty grime of Roland Garros' red clay that can assault skin with abrasions; the wet Wimbledon weather combined with the potential allergic reactions to grass. And for NYC's U.S. Open, the stuff is supposed to protect against the oppressive humidity and pollution that can cause calluses and blisters. A 1-ounce vial of Tennis Player Sun & Wind Protection - Dry Skin cream costs \$60.

### Nanosilver Wound Dressing for Burn Victims

Nucryst Pharmaceuticals, a division of



Canadian-based Westaim Corporation [WEDX], develops and manufactures dressings for serious burns and chronic wounds. Silver has long been known to kill bacteria. Nucryst's nanosized silver particles increase surface area improving its antibacterial effectiveness against 150 types of microbes, including drug-resistant bacteria. Nucryst reports that its nanosilver product Acticoat kills bacteria in as little as 30 minutes, and acts continuously over several days. While the product has been on the market since 1999, Nucryst partner Smith & Nephew [SNN] paid a \$5 million fee to Nucryst for reaching one of its sales and regulatory milestones in the first quarter of 2004. Just how well have their dressings done? Sales has increased from \$3 million in 1999 to \$16 million in 2003 and Acticoat is used today in more than 100 of the 120 major burn hospitals in North America.

### Military-grade Disinfectants

Used on Navy submarines, cruise ships, aircrafts and healthcare facilities, San Jose, CA-based EnviroSystems' EcoTrue nanoemulsive disinfectant cleaner cleans and disinfects in one step. In the post SARS virus scares of 2003, Boeing [BA] recommended EcoTru for use in airplanes. The recommendation helped EnviroSystems attract 30 airlines as customers, up from four, since the SARS scare began. Currently EcoTrue is the only EPA-registered Tox Category IV disinfectant product in the U.S.



This means there are no harmful dermal (skin), ocular (eyes), inhalation (breathing), or ingestion (swallowing) effects when using

## The Insider

As I write this, CNBC has just wrapped up a full week of nanotech coverage. Sure some of it wasn't nanotech, but only loyal subscribers will know the products and companies we've previously called out as nano-pretenders opportunistically trying to cash in. We also saw stocks like NANX, ALTI and TINY surge on the coverage as the classical Keynesian "beauty contest" played itself out. For more analysis on some of Nanosphere stocks be sure to read this month's "Word on the Street." If you can get some late holiday shopping done, take advantage of our exclusive annual feature with this year's all new top 10 Nanotech Product Guide. And be sure to read this month's Thinking Small with Mike Knapp. He's a polished exec running a company and technology that I'm so convinced could change the world that my partners and I have put our money behind it.

Here's wishing you and your family nothing but the best in the new year! Write to me as always at nanotech@forbes.com. Here's to thinking big about thinking small!...

EcoTru. Just how does it work? Conventional disinfectants must be dissolved in a solvent such as water or alcohol and made to flood – in effect "drown" – the host organism with a toxic chemical. This method of infection control requires a tradeoff. To ensure microorganisms are killed, the toxic chemical must be present at levels that cre-

## Nano in the News

### Nanopretender? Artwork & Beyond Inc Changes Name to Advance Nanotech, Inc

Former seller of framed artwork online as well as online charity art auctions, Artwork & Beyond changed the name of the company to Advance Nanotech Inc. on November 14, and began trading under that name with the new ticker symbol [AVNA.OB]. Started in 1980 as Colorado Gold & Silver, Inc., the company ceased mining operations in 1999 and then acquired BankNet Kft and LM Hungary Parts Supply and Distribution Co., two companies organized under the laws of Hungary. Needless to say: Caveat emptor.

ate health and contamination risks. EcoTru's nanoemulsion formulation works very differently. Nanospheres of oil droplets are suspended in water to create a nanoemulsion requiring only miniscule amounts of EcoTru's active ingredient, PCMX. The nanospheres carry surface charges that efficiently penetrate the surface charges on microorganisms' membranes, much like breaking through an electric fence.

### BASF's Superhydrophobic Spray

BASF [BF] is now wielding its nanotech muscle in the building material industry, especially in concrete, brick facings, limestone, and plasters. In the near future, your home may be coated with Mincor, an additive to improve the hydrophobic effect of building materials. Its extreme water repellence minimizes contact and adhesion among water drops and surfaces. Rain water pearls up immediately. In addition to extremely hydrophobic polymer constituents, Mincor also contains nanoparticles. This reduces the adhesion of water and particulate soiling to a minimum. Dirt particles are simply rinsed away by rain water. Pre-marketing started in 2003 and product introduction to end-user markets is on the way, says Ruediger Iden, Senior Vice President of Polymer Physics at BASF. Currently the fluid formulations of Mincor are delivered in 20 kg and 170 kg barrels and sold through BASF Future Business. BASF is currently looking for distributors.

### Clarity Defender Automotive Glass Treatment

It's an invisible barrier for windshields. It repels rain and helps prevent snow, ice, bugs, and tar from sticking. It's Valley View, Ohio-based Nanofilm's new product, Clarity Defender. A Clarity Defender treated windshield increases driver vision 34% on a



rainy night, which can add about 1 second to driver response time. At 60 mph that's an extra 88 feet of pavement. Clarity Defender, for sale on Amazon.com, is the first of an automotive product line being launched in 2005 by Nano-film, which we featured last December for their coating technologies in sunglasses. Nanofilm deposits coating layers of 150 nanometers and 20 microns thick, respectively. Then it uses chemical self-assembly to form a polymer coating, 3-10 nanometers thin, on the outer layer of the anti-reflective lenses.

### Flex Power Joint & Muscle Pain Cream

Recently featured on CNBC, Berkeley, California-based Flex-Power may give BenGay (owned by Pfizer [PFE]) and Mineral Ice (Bristol-Myers Squibb [BMY]) a run for their money. Started in 1999 by ex-UC Berkeley soccer player and pro-athlete money manager Bijan Esmaili and Rasheen Smith, Flex Power claims to use 90 nanometer liposomes produced with an undisclosed partner "in the healthcare sector" to soothe aching muscles. With an army of 20 pro athletes as investors, including Jason Kidd and Hakeem Olajuwon, Flex-Power said it's not necessarily nanotech patents or a scientific breakthrough driving the product, but the litany of high profile users and sports teams using the \$20/jar creams. Will the early guidance they received from Power Bar founder Brian Maxwell help turn this into another celebrity-endorsed success story like the George Forman Grill?



### 3M Dental Adhesive

Having a porcelain veneer, tooth restoration, or root canal work soon? Your dentist just may put nanoparticles in your mouth to help your new crown stick better. As we featured in our September story "3M: Practicing Nanotechnology Without the Hype", 3M ESPE, a 3M [MMM] subsidiary in dental adhesives, announced a new option in total-etch dental adhesives: Adper Single Bond

Plus Adhesive. The new adhesive incorporates a silica nanofiller technology that forms a stronger bond to tooth enamel and does not need to be shaken by dentists prior to using to prevent clustering of the particles which can decrease the performance. Dental care is one area to keep an eye on as companies from 3M to BASF to Colgate Palmolive [CL] are working on advancements in toothpaste using nanohydroxyapatite (see "Nanohydroxyapatite in Your Smile, May 2003), a material which is increasingly being looked at for bone regeneration in periodontal surgery.

### 2005 Outlook

What's in the pipeline for 2005? You guessed it, more sports. In September, State College, Pennsylvania-based NanoHorizons said it began selling a line of metallic nanoparticles that are compatible with standard polymer manufacturing process. Silver, gold and other metals that kill bacteria and odor-causing microbes can be incorporated into shoes, athletic equipment and other plastic or nylon products. "We're working with a company that does socks right now and should have a sock on the market within the year," says Dan Hayes, director of operations for NanoHorizons. Richardson, Texas-based Zyvex also announced they're working with a sporting company, Easton Sports. Easton's Bicycle Division will incorporate Zyvex's Carbon NanoTube (CNT) additive, NanoSolve, into many of its 2005 line of bicycle components.

We also expect to see more nano-enabled drugs from companies like Elan [ELN], which have developed sophisticated nanomilling and nanoparticle reformulation technologies. While there are already a few drugs on the market developed using nanotechnology (an anti-nausea medication for chemotherapy patients called Rapamune by Wyeth [WYE] and Novavax's [NVAX] Estrasorb transdermal lotion for estrogen replacement therapy), many more such as Starpharma's [ASX: SPL] topical microbicide VivaGel are in clinical trials. **N**

#### Semiconductor Industry Association (SIA) Launches Nanoelectronics Research Initiative

The SIA announced earlier this month it launched a Nanoelectronics Research Initiative (NRI), an effort designed to integrate research from universities, the federal government, and the U.S. semiconductor industry. NRI research areas include materials, device structures, and assembly methods for microelectronic devices with feature sizes smaller than 10 nm, the range at which most existing semiconductor technologies, materials, and production processes cease to work.