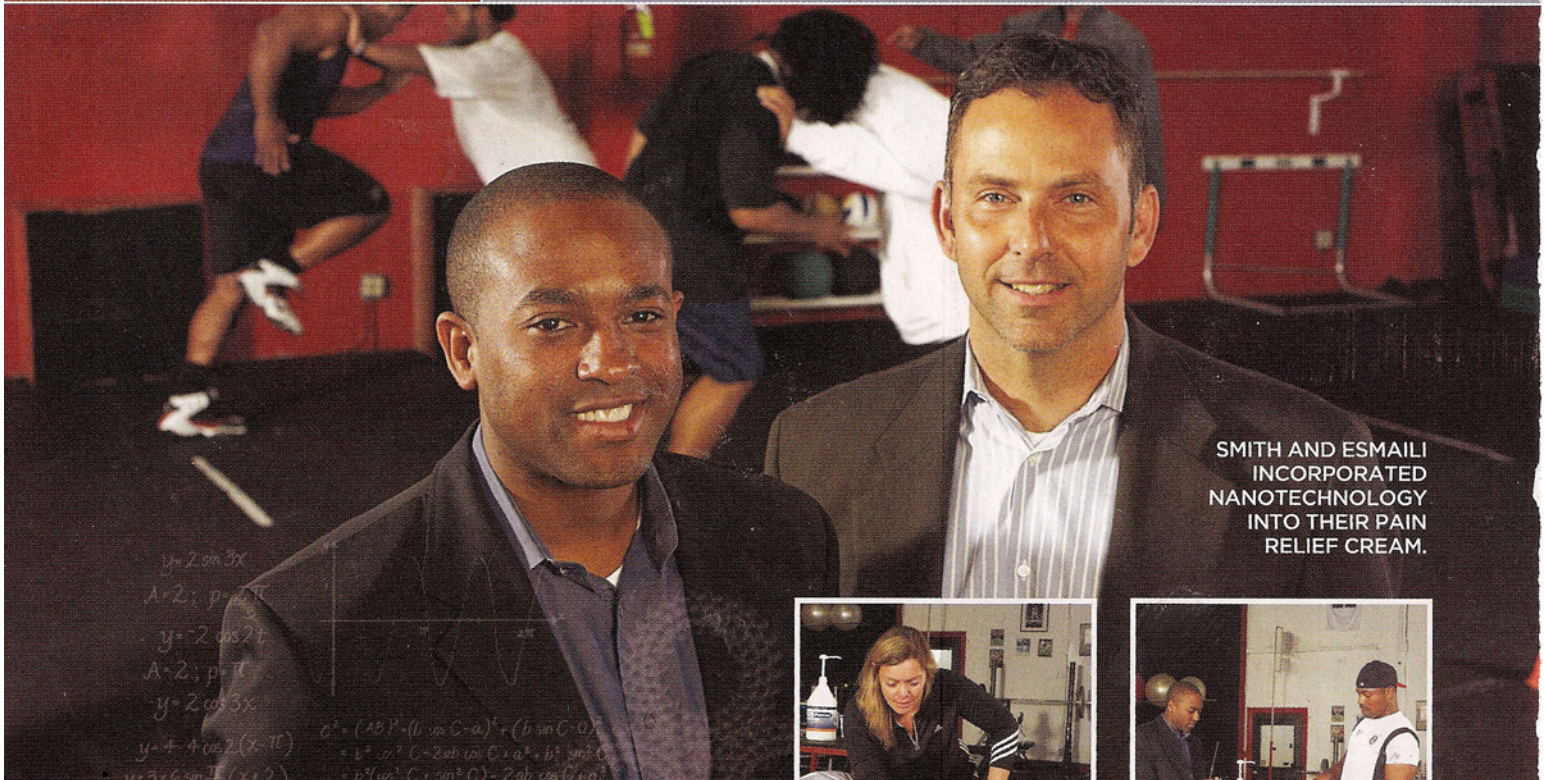


Extraordinary

Products in a Growing Market

Nanotechnology promises revolutionary applications for everything from pain relievers to self-cleaning windows

By *Ericka Blount Danois*



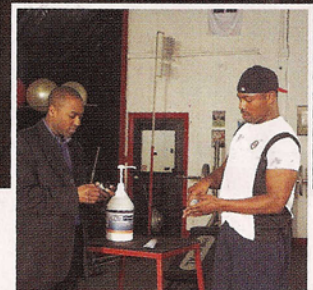
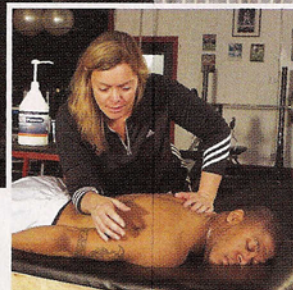
SMITH AND ESMAILI INCORPORATED NANOTECHNOLOGY INTO THEIR PAIN RELIEF CREAM.

ENTREPRENEURS RASHEEN SMITH AND Bejan Esmaili had a million-dollar idea that began brewing in the late '90s. At the time, reports of traumatic renal complications suffered by such NBA all-stars as Sean Elliott and Alonzo Mourning, allegedly side effects from taking oral painkillers, dominated sports headlines. Smith and Esmaili, recognizing the market's need for a pain reliever that would not need to be taken internally, developed a product that uses nanotechnology to penetrate the skin and deliver relief right at the site of aching joints and muscles.

In the beginning stages of developing the product, the two tested a variety of formulations—a heating (as opposed to cooling) sensation and several scents—before they came up with Flex-Power, an odorless heating cream in 2001. Smith, 29, and Esmaili, 42, spent \$250,000 developing the product and testing it on professional athletes, many of whom were personal friends of theirs from college.

The development of the product was not without its trials. Once, in 2004, they were waiting for a shipment to send out to a fitness center chain in Japan that had a six-week lead time. Still in the early days of their business venture, Smith and Esmaili would check the product themselves before shipping it out. When they opened it, the cream was green instead of its normal beige color, and it had a gassy smell. This problem added four weeks to the shipping time. "It was fine though," says Smith. "Luckily we had a really great relationship with the client."

Good client relationships set Flex-Power apart from the beginning, but what spelled success was its use of nanotechnology. Under a microscope the cream looks like millions of tiny capsules called liposomes. Each liposome in Flex-Power resembles the layers of an onion, and each layer encapsulates the ingredients—



trolamine salicylate, methylsulfonylmethane, and glucosamine—found in most over-the-counter pain relievers. Those "capsules" penetrate the skin and provide faster, sustained pain relief.

Flex-Power is poised to make a giant leap in revenues in part because of the popularity of the nanotechnology industry worldwide. In 2006, Flex-Power grossed revenues of \$2.1 million; in 2007, revenues are projected to grow to \$7 million. More than 20 athletes, including Jason Kidd, Hakeem Olajuwon, and Manu Ginobili, have become investors in the company. What percentage they make up was not disclosed, but their enthusiasm for Flex-Power is clear.

"This product is something I use, and so do other professional athletes and teams," says New Jersey Nets superstar Kidd, an investor who will be featured in future marketing campaigns. "So I understand the business opportunity. I owned PowerBar stock, and I was part of the success of their growth and their sale to Nestle, including doing marketing with them. I see a lot of parallels with this opportunity with Flex-Power."

TINY TECHNOLOGY

Nanotechnology is the engineering of matter under 100 nanometers—defined as one-billionth of a meter. By comparison, a strand of human hair is about 80,000 nanometers thick. This isn't science fiction; nanotechnology can be found in everyday products ranging from dental adhesive to windshield treatments that keep automotive glass clear in harsh weather to sporting equipment that promises enhanced performance. "You can take advantage of the unique properties that occur at those sizes and the development of products using these properties," says ^{Dr.}

Scott Livingston, a nanotechnology expert with Axiom Capital Management in New York City.

According to the National Science Foundation in Arlington, Virginia, the worldwide market of products incorporating nanotechnology generated about \$120 billion in 2005. The Foundation estimates that the market will reach about \$180 billion in 2007 (about \$70 billion in the U.S.), and it is estimated to increase to \$1 trillion worldwide by 2015. Foundation experts say that nanotechnology has the potential to become a defining technology of the 21st century, driving economic growth and providing significant benefits to manufacturing, human health, energy conservation, and the environment.

WASH LESS WINDOWS

Vincent R. Valles Sr., owner of Dur-A-Shield International and EverClean Technologies Inc. in Palm Coast, Florida, has joined the nanotech revolution. Valles' company uses nanotechnology in its EverClean Solution, a product that makes windows self-cleaning.

Because Valles' other company, Dur-A-Shield, also works with coatings-to roofs and other surfaces using a tough polymer shield that protects against biological growth-he was contacted by the inventor of the self-cleaning window product who lived in Japan. "It just seemed to be a natural evolution out of that," says Valles, 73.

It took 18 months from the time he was approached to get the product on the market. He cashed in stocks and invested about \$50,000 for research and development and to bring the product in from Japan; about \$5,000 for the cost of the delivery system; and about \$12,000 to \$15,000 for marketing. The product contains titanium dioxide and peroxotitanic oxidizing agents, which create a microcrystalline coating. The titanium dioxide absorbs sunlight and acts as a catalyst to decompose organic matter. The peroxotitanic acid speeds up the breakdown of organic matter and the coating reduces surface tension, allowing rain or the quick spray of a hose to wash dirt away.

EverClean applies the product in a three-step process. In the first step, the company has a professional window cleaner

NANOTECH HERE, NANOTECH THERE, NANOTECH (ALMOST) EVERYWHERE."

Nanotechnology is used in more products every year to help make them more efficient and durable or to enhance their performance. The items below show the range of industries using this cutting-edge technology.



1) Worry Free

Imagine a technology that transforms the molecular structures of fibers, creating fabrics that resist spills, allow stains to wash out easily, provide long-

lasting protection, keep your body cool and comfortable, resist static, look better longer, retain their natural softness, and breathe naturally. That's what Nano-Tex fabrics do.

(Price varies; www.nano*tex.com)

2) Rain, Rain Go Away

Just give the NanoNuno umbrella a good shake after a heavy rain, and watch it dry right away. The nanotechnology in this product produces a microscopic, rough nanostructure that dirt and moisture simply roll off of. Since moisture does not penetrate the fabric, there is no tedious drying (Price: £49.95; www.proidee.co.uk)



3) Car Wash

Eagle One introduces the first polish and wax, NanoWax, utilizing advanced nanotechnology to fill fine scratches and conceal skid marks. It also makes the car shine and leaves no wax residue behind. (Price: \$5.95; www.valvamedia.com)



4) Breath of Fresh Air

The NanoBreeze Room Air Purifier decomposes indoor air pollution and is ozone free. The nanotechnology in NanoBreeze rips apart dangerous airborne molecules and renders them benign. The NanoBreeze decomposes allergens and mold spores, kills bacteria and viruses, and reduces exhaust fumes and vapors. (Price: \$129.99; www.nanobreeze.com)



5) Recharge It

The Medis 24/7 Fuel Cell POWH Pack is a disposable Charger/portable auxiliary power source for small, portable electronic devices, such as cell phones The Power Pak uses nanotechnology in its catalyst materials. The catalyst is a thin layer of material that is used in anodes and cathodes. Using this nanotechnology obviates the need for precious metals in the system, thereby lowering the retail cost. (Price: \$19.99 for the fuel cell, \$24.99 for the starter kit; www.medistechno/ogies.com).

clean the interior and exterior windows of a house. Second, the windows are pretreated with alcohol and distilled water to remove any film that may be on the surface. In the final step, one coat of the product is applied with a high-volume, low-pressure sprayer-similar to those used in silk screening-that will last up to 10 years. The coating is extremely fine (100 nanometers or less in thickness) and transparent.

The only maintenance required is to rinse the exterior of the window with water from a garden hose every 60 to 90 days. But even rain will keep the windows clean, and they will dry spotless. "We are using the same technology employed by the major window manufacturers who apply the self-cleaning coating during the window production process," says Valles. "The only difference is that our product is now available as an aftermarket spray application." In fact, EverClean is the first company to introduce the product in the aftermarket in the U.S.

Since the business began last year, Valles' client base has been strictly homeowners, primarily those 55 and older who have discretionary income. This year he branched out to com-

mercial buildings, and later he would like to court government clients. Customers range from the U.S. to Europe; and soon-to-be clients are located in Norway and Mexico. EverClean's startup costs were an estimated \$17,000, and the company currently has seven employees. It generated \$70,000 in revenues for 2005 and \$970,000 for 2006; it is projected to make a huge leap to \$1.5 million to \$2 million for 2007.

Smith, whose Flex-Power is used by many athletes, is looking to break into mass marketing by focusing on distribution into sports and health-related stores like the Vitamin Shoppe and Sports Authority. Though it's challenging to persuade buyers to try a new product, Smith predicts that retailers will catch on soon to the independent nanotechnology boom.

"I think we are one of the products like Netscape was for the Internet, that can bring attention to nanotechnology and open the door for other consumer products down the road," says Smith. "We could be the first company to be a leader and pave the way to more tangible, everyday products that integrate nanotechnology." **BE**

6) Keep it Clean

BEHR Paints' new Premium Plus Interior Sateen Kitchen and Bath Enamel uses nanotechnology to form a barrier against mildew and stains in kitchens and bathrooms. The paint's key ingredients are reduced to nano-size particles that enhance the performance of the paint, resulting in an extremely hard, durable finish. The product offers water resistance, easy stain removal, superior stain blocking resistance, and improved application properties. (Price: \$26.98; www.behr.com)



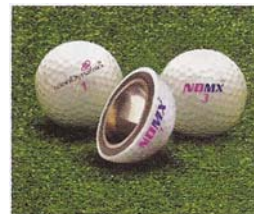
8) High-Tech Support

Wacoal Sport Science offers a full-length Insulator Sport Support bra top that features patented CW-X Conditioning Web support technology. The garment features Auto-Sensor, a new nanotechnology fabric that has thermal, moisture-wicking, temperature-regulating, and antibacterial properties. The CW-X Sport Support bra has mesh webbing built into each bra cup. The webbing encapsulates each breast separately, creating a floating inner support that is uniquely comfortable. (Price: \$60 and up; www.cw-x.com)



7) Tee Off

NanoDynamics golf balls focus on the physics of a golf ball's rotation. Rotation of a golf ball increases turbulence, which generates lift. Through selection and control over material properties, such as modulus of elas-



ticity and specific gravity, the ball can be designed so that it breaks less on inclines and is less prone to be nudged "off-line" by imperfections in the green's playing surface. (Price: \$19.95 for three; www.ndmxgolf.com/technology.php)

9) Match Point

The Head Nano Titanium Extreme Tennis Racket has taken the original titanium weave and integrated nanotechnology into it, making the racket stronger, more stable, and able to produce more power. The oversize head provides a large sweet spot. (Price: \$64.95; www.head.com)

10) Home Run Power

Easton Sports uses carbon nanotubes in its Stealth Comp CNT baseball bats. Because nanotube fibers are incredibly strong-16 times stronger than steel and one-billionth of a meter in size-engineers can customize bat barrels to create bigger sweet spots and maximize performance along the length of the barrel. (Suggested retail price for bat: \$419.95; www.eastonsports.com)

