

Nanotech: not just for Star Wars anymore

By Alan Breznick

Stain-resistant pants with tiny nanowiskers that protect clothing fabric. Hypoallergenic sunscreens with atomic nanoparticles that filter out harmful ultraviolet (UV) light rays. Tires containing carbon black compounds that boost car traction and handling. Paving stones coated with nanoparticles that break down air pollutants from car emissions. Bathroom toilets that can clean themselves.

These are five of the initial products that the much-hyped but often misunderstood field of nanotechnology has already given the world. They are likely just the beginning. Thanks to ever-increasing research and technology development at the atomic, molecular, and macromolecular levels, nanotech is starting to churn out scores of promising drugs, materials, substances, devices, and other products.

Take the emerging supply of synthetic antibiotics, for example. Using cutting-edge nanotech methods to work at the microscopic molecular level, chemists have crafted a new line of antibiotics that can tackle methicillin-resistant staph bacteria selectively and with greater effectiveness than the drugs now being used. The researchers rely on nano-sized plastic balls with drugs chemically bonded to their surface to deliver the medicine to the bacteria cells.

Pearl Chin, MBA '00, knows all about nanotech's vast potential. As managing director of Seraphima Ventures, a New York-based financial consulting firm that evaluates and advises nanotech startups, she spends her days and nights checking out investment opportunities in the burgeoning field.

"The ability to manipulate matter at the very smallest levels gives us so much better and tailored control at designing technology solutions," says Chin, who also sports a PhD in materials science and engineering from the University of Delaware and a BE in chemical engineering from Cooper Union. "Nanotechnology is just an approach

to solving problems now that we are able to work and see at smaller resolution on the atomic scale."

Chin does not count herself among some of the science's more wide-eyed proponents, who believe that nanotech will solve all of the world's problems. But neither does she agree with many of the discipline's loudest critics that nanotech will destroy the world "with the threat of nanobots running amuck."

Instead, she sees nanotech steadily producing more useful products, as both public and private R&D spending climb over the next few years. Indeed, Seraphima Ventures' Web site

Courtesy of Pearl Chin



Pearl Chin, MBA '00, managing director of Seraphima Ventures, draws on her background in materials science, engineering, chemistry, and business to assess and advise nanotech startups.

(www.seraphimaventures.com) lists a dozen startups that the consulting firm is now advising. The lineup includes companies developing everything from puncture-proof surgical gloves and optical tweezers to handheld explosive detection devices and nanotubes for military uses.

"These companies all produce real products to sell," the Seraphima site notes. "They do not just have IP. Most will be producing revenues within two years and three companies are already producing revenues."

Citing figures from the National Science and Technology Council and other sources, Chin notes that the U.S. government now spends about \$1 billion a year on nanotech research, or about 25 percent of the total spent on the science by all national governments worldwide. Various industry projections call for global government spending to jump to \$6 billion this year, on top of the estimated \$18 billion that has been invested so far.

At the same time, Chin points out, U.S. institutional venture capitalists pumped about \$480 million into nanotech startups last year, up from \$410 million in 2004. She cites market analyst estimates that the industry will be worth \$1 trillion by 2015.

"The most common misconception is that we will have to wait 20 to 50 years before we will see any products and benefits from nanotechnology," she says. "Considering nanotechnology started a lot farther back than most people realize, that makes nanotechnology not new but old news."

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Government Funding of Nanotech R&D by Region of World (in millions of U.S. dollars)

Region	2000	2001	2002	2003	2004	2005E
Europe	200	225	400	1150	1380	1518
Japan	245	465	720	810	960	1152
USA	270	465	697	1074	1149	1264
Rest of World	110	144	293	454	644	876

Source: Cientifica 2006 (www.cientifica.com)