

# Nanotechnology's Invisible Threat

## Small Science, Big Consequences

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**Editor's Note:** The following is adapted from a Natural Resources Defense Council (NRDC) "Health Facts" factsheet, published in December 2006. For more information on NRDC's nanotechnology program, visit [www.nrdc.org/policy](http://www.nrdc.org/policy).


From mascara to tennis balls to baby wipes, tiny nanoparticles are hidden in many of the products we use every day. But nanotechnologies are still new, and there are big unanswered questions about their potentially harmful effects on our health and the environment. Current regulations fail to guarantee consumers that these new technologies are safe to use. That's why NRDC and others are pushing the government to move quickly to catch up to the technology and ensure the safety of consumer products.

### The Potential Health Risks

Nanotechnologies involve manipulating ultrafine particles in a size range of 1 to 100 nanometers; the head of a pin is comparatively large at about 1 million nanometers across. Nanoparticles are increasingly finding uses as ingredients in commercial products. But the very qualities that make nanoparticles commercially desirable can also render them more toxic than their normal-sized counterparts. Because they are so small, nanoparticles are extremely mobile; they are able to enter the lungs, pass through cell membranes, and possibly penetrate the skin. Once inside the body, they seem to have

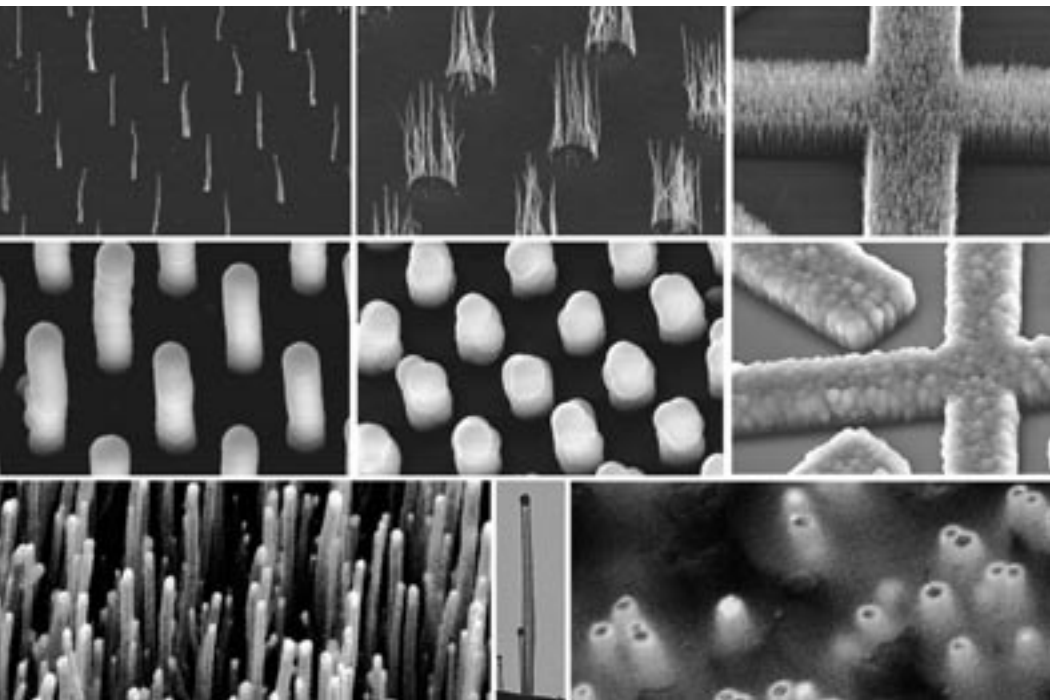
**What to look for on the label**

The words "nano" and "ultrafine" on a list of ingredients indicate that a product contains nanomaterials, and is potentially unsafe.



unlimited access to all tissues and organs, including the brain, and likely also the fetal circulation, and may cause cell damage that we don't yet understand. Studies of ultrafine air pollution have shown that inhalation of nano-sized particles increases the risk of asthma attacks and of death from heart attacks, strokes, and respiratory disease.

Until we know the risks of nanomaterials, these products remain potentially dangerous to consumers. They also pose a potential hazard to the workers who are exposed to them during product development, production, use, and disposal. To this end, labor unions and environmental justice advocates have joined together to call on the EPA to move quickly to fully disclose hazards and take protective action to prevent harm to workers and their families from nanomaterials.<sup>1</sup>



Carbon-based nanotubes, pictured above, may cause damage to the brain, lungs, cardiovascular and nervous systems. Photo courtesy of NASA.

*"The potential danger to human beings and the environment is literally incalculable if we don't understand how nanotechnology can interact with our bodies and our world." - Rep. S. Boehlert (R-NY) September 2006*

## The Nanotechnology Boom

Nanotechnologies are very likely the future of chemistry. Despite the as-yet-unknown effects of nanotechnologies on human health, manufacturers are already incorporating nanoscale particles into hundreds of consumer products. Products as diverse as suntan lotion, house paint, and stain-proof clothing already contain nanoparticles. Future nano-engineering techniques are likely to produce hybrid combinations of nano-sized, chemical-biological and chemical-mechanical substances.



## Nanosilver pesticides

In December 2006, EPA announced that it will regulate a large class of consumer items made with microscopic silver, referred to as nanosilver, which is incorporated to kill bacteria into a wide range of consumer items, including shoe liners, socks, toothpaste, pillows, food storage containers, bandages and air fresheners. Silver has been known for years for its biocidal properties in its bulk form, as well as for its hazardous health effects. It is more efficient as nanoparticles.

Any company that makes a claim that its product will kill bacteria with nanosilver should, under EPA guidelines, subject its products to the risk assessment review created by the "unreasonable risk" standard in the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA). However, as with traditional pesticides, manufacturers that do not make pesticidal claims will not be subject to EPA regulation.

## Demand Regulation of Potentially Harmful Substances

It is crucial that regulation of these nanosubstances advances as quickly as the technologies that are generating them. But the current approach to chemical regulation is slow, costly, and has failed to prevent deadly chemical exposures. NRDC has developed a four-part framework for how nanomaterials should be regulated to protect consumers who use these products and the workers who manufacture them.

- **Prohibit the untested or unsafe use of nanomaterials.**

This places the burden on industry to provide assurances of safety, rather than on regulators to prove harm.

- **Act on early warnings to protect communities and workers.** Health-protective regulations should be set if there is any evidence of risk, even if uncertainty remains regarding the nature and magnitude of the harm.<sup>3</sup>

- **Conduct full life-cycle environment, health, and safety (EHS) impact assessments before putting nanotechnologies on the market; assess nanomaterials as new substances, since their unique physical properties impart unique hazard profiles.** Independent testing is urgently needed to understand the hazards of nanomaterial exposure across the lifecycle of a product. The results of these tests should be made available to the public.

- **Facilitate full and meaningful participation by public and workers in nanotechnology development and control; consider the social and ethical impacts of nanotechnologies.** The potential of nanotechnologies to transform the global social, economic, and political landscape means we must move the decision making out of corporate boardrooms and into the public realm.



## References

- 1 Comments on risk management practices for nanomaterials, especially as it relates to exposure of workers. K. Burns, Docket ID Number EPA-HQ-OPPT-2004-0122, October 27, 2006.
- 2 See [www.nanotechproject.org](http://www.nanotechproject.org) for a more complete consumer inventory.
- 3 The Louisville Charter for Safer Chemicals, [www.louisvillecharter.org](http://www.louisvillecharter.org).

From top: Antibacterial Water Tap by Nano Care Technology, Ltd., Antibacterial Tableware by Nano Care Technology, Ltd., Antibacterial Lock by Nano Care Technology, Ltd., Antibacterial Kitchenware by Nano Care Technology, Ltd., Contour-Foam Silver Crescent Travel and Nap Pillow by Sharper Image.