

# Nanotechnology in Public Health

## Wisconsin Department of Health Services

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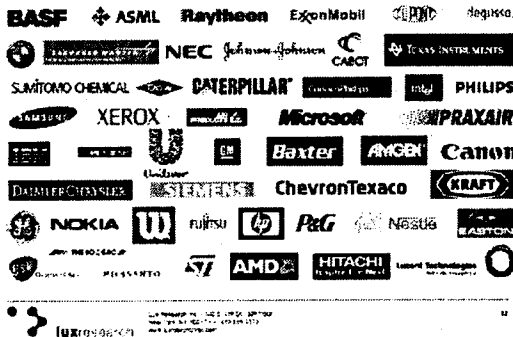
Carrie Kahn  
Department Legislative Liaison

### Nanotechnology and Public Health

US companies and universities hold more than 7,000 patents  
on nanotechnology and nanomaterials  
More than \$100 billion of nano-enabled products are sold  
each year

Large corporations are embracing nanotechnology to  
drive product innovation

*Industry Week,  
May 2007*



## Nanoscale Particles

- Fullerenes or buckyballs
- Metal oxides (titanium, cerium, aluminum, zinc and silicon)
- Quantum dots
- Nanotubes – single and multi walled
- Nanowires, yarns and fabrics
- Dendrimers
- Iron, silver, and copper nanoparticles
- Nanoclays

## DHS Role

- DHS' role is to protect public health
- Specific activities include:
  - Provide leadership on issues that affect public health
  - Technical consultation to regulatory programs
  - Risk and hazard assessment expertise
  - Health Surveillance
  - Case studies and follow-up on complaints
  - Biomonitoring – Lead, PCBs, Mercury
  - Public education and outreach

## Products that could result in human exposure to nanomaterials

- Many products we use contain engineered nanoparticles
- What are the benefits?
- Is there an exposure hazard?

## The Family Car



Nanoparticle-treated upholstery

Nanotube-strengthened paint is more resilient and stays clean and shiny longer

## The Washing Machine

### **SAMSUNG Introduces Korea's First "Silver Sterilization Washing Machine"**

on Apr 15, 2003

**Nanosilver particles kill 99.9%  
of bacteria without having to  
boil the laundry.-**



## NANOSILVER Disinfectant Spray

Protect your family by helping prevent the spread of harmful bacteria and controlling mold and mildew.

### How to use

- . Shake can well, Hold can 15-20cm from pre-cleaned surface and spray surface until covered with mist.
- . Allow to stand 10 minutes to air dry.
- . No need to wipe.

### Where to use

- . Around toilet areas
- . On telephone handsets
- . On door handles
- . In empty kitchen bins
- . On shower bases
- . In pet areas
- . In sick rooms
- . On toys
- . Under sinks etc.



## Nanosilver Beauty Soap

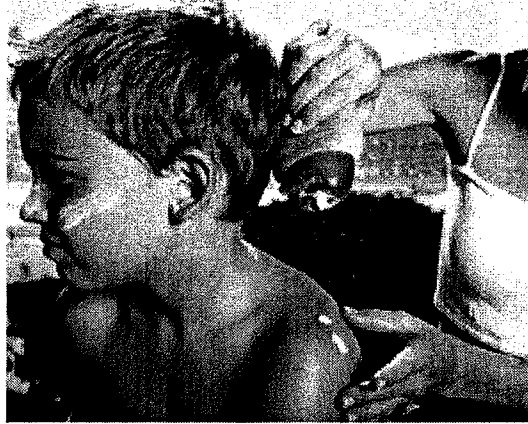


## Nanosilver Toothpaste



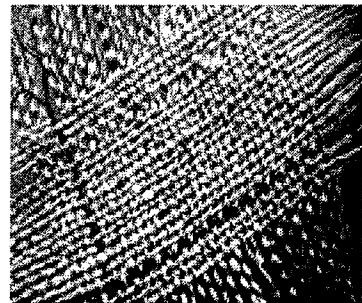
## Your Sunscreen

Sunscreens contain nanoparticles of zinc oxide that can harm colon cells and may be toxic if ingested.



*Chemical Research in Toxicology, April 2010*

## Your Shirt?



Strong, light and flexible 'smart' clothing materials can be produced through a technological breakthrough in the dry spinning of carbon nanotube fibers to make yarn.

Science Magazine, 2004

# Scientific Literature

- Hundreds of articles have been published since 2000 on the biological effects of various nanomaterials.
- DHS tries to monitor the literature
- This is the type of information we would use to provide advice and outreach

The screenshot shows a web browser window displaying the Scientific American website. The article title is "Silver Beware: Antimicrobial Nanoparticles in Soil May Harm Plant Life". The sub-headline reads: "A new study finds that the popular microbicidal silver nanomaterial negatively impacts the growth of plants as well as kills the soil microbes that sustain them". The author is identified as "By Nichole Zelenka | August 9, 2010 | 11:15". The page includes a search bar, navigation links for "Log In or Register" and "Log In to SA Digital", and a sidebar for "THE PRINT EDITION" with subscription options. A large image on the right shows a person working with a stack of blocks. The browser's address bar shows the URL: "http://www.scientificamerican.com/article.cfm?id=silver-beware-antimicrobial-nanoparticles-in-soil-may-harm-plant-life".

Jaurand et al. 2009 Mesothelioma, Dausset et al. 2009, page 1161.pdf Adobe Reader

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# Particle and Fibre Toxicology

BioMed Central

Review **Open Access**

## Mesothelioma: Do asbestos and carbon nanotubes pose the same health risk?

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Wise et al. 2010 Nanosilver cytotoxic, genotoxic to fish cells.pdf Adobe Reader

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Aquatic Toxicology 97 (2010) 34–41

Contents lists available at ScienceDirect

# Aquatic Toxicology

Journal homepage: [www.elsevier.com/locate/aquatox](http://www.elsevier.com/locate/aquatox)

## Silver nanospheres are cytotoxic and genotoxic to fish cells

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## **What Do We Know?**

- Nanotechnology has been around for 25 years
- Nanomaterials are designed to have unique properties
- Other states are looking into regulating nanomaterials, but no state currently does
- There is no uniform labeling requirement
- Many of the products we use contain nanoparticles

## **What We Need to Learn -**

- What types of nanomaterials are being produced, used and sold in Wisconsin?
- Which consumer products contain nanomaterials?
- What is the life cycle of nanomaterials?
  - What happens to nanomaterials in the environment? This is likely different for each type.
  - Can these enter the food chain? Do they bioaccumulate?
  - Can they contaminate our water, air or indoor environment?
- How do these materials affect the health of workers, consumers, wildlife and plants?
- Can we use risk assessment methods to establish safe levels of exposure?

## Current Work

- The Wisconsin DHS, DNR, UW and SLH have been working together for ~ 2 years to study products that contain nanosilver.
- We hope to be able to monitor nanosilver and other nanoparticles in environmental samples like house dust, wastewater, sediment and perhaps fish tissue

Thank you!

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