

Why use nano-objects in Consumer Products



Catalytic -
batteries



Physical/Mechanical

strength with
low weight,
water/stain
resistance



Electrical –
computer chips,
conductors



Biological – drugs,
cosmetics

Identification of
contaminated food,
anti bacterial packaging

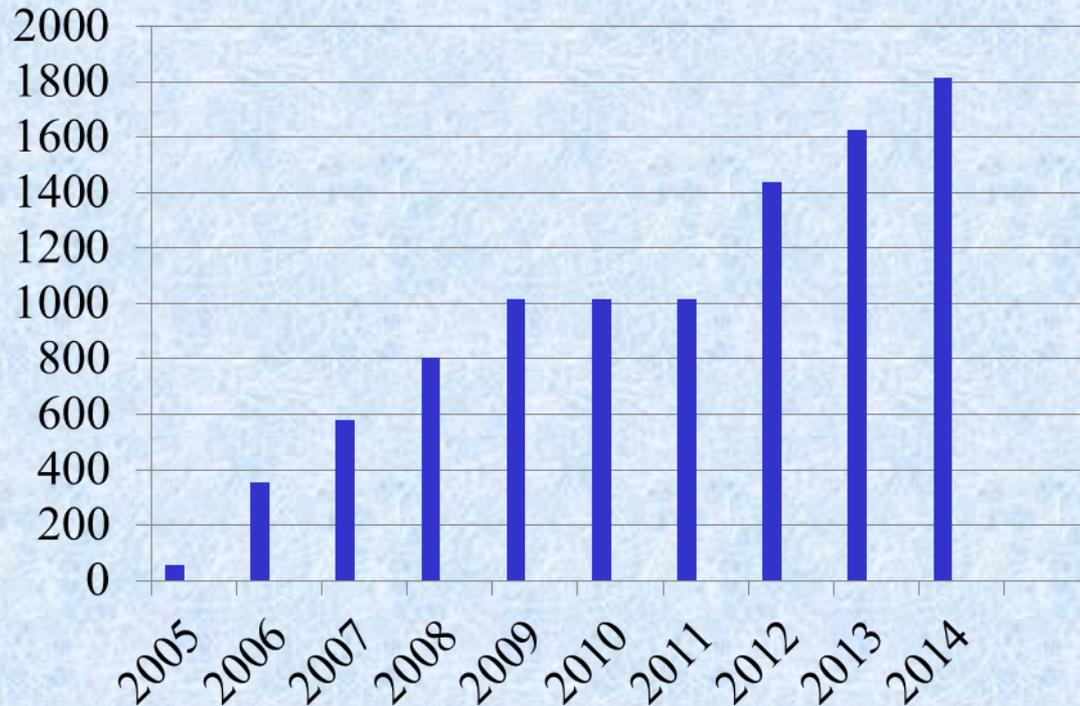


Scratch resistant
paint

Coating to
repel dirt



Consumer Products Reported by Suppliers



From Nanotechnology Consumer Products Inventory (CPI), Woodrow Wilson International Center for Scholars and the Project on Emerging Nanotechnologies

Nano-objects Used in Consumer Products

- **Nano silver** – anti-bacterial properties e.g. Bandages, medical devices, coatings, paint, clothing, furnishings, toothpaste, pacifiers, teddy bears
- **Nano carbon tubes** – strength, light weight, electrical conductor 1000 more efficient than copper, drug delivery e.g. Sports equipment, computer monitors, auto bumpers
- **Nano titanium** – strength, UV protection e.g. sports equipment, sunscreens (titanium dioxide), self cleaning windows
- **Nano silica/silicon** – anti-graffiti & anti scratch paints, skin products,
- **Nano zinc** – UV protection, sensors, light emitting diodes
- **Nano gold** – imaging, pregnancy tests

Benefits for Consumers

- **Medical field**
 - Drugs with reduced side effects,
 - Implantable sensing devices real time measurement of body functions
 - Rebuilding nerves and tissues
 - Improved imaging for diagnostics
 - Anti-bacterial agents
- **Energy Efficiency**
 - Improved production of alternative energy,
 - Improved batteries and fuel cells, for storage of energy
 - Reduced energy consumption - lighter vehicles, insulation
- **Environmental**
 - Removal of contaminants from water and soil
 - Sensor arrays to identify presence of contaminants

Benefits for Consumers

- **Food Safety**

- Packaging that warns of contaminated food
- Nutrients that are taken directly into the cell
- Sensors that identify animal pathogens in food animals



- **Nice to have**

- Cosmetics to prevent aging
- Stronger hockey sticks
- Scratch resistant auto paint
- Self cleaning windows
- Wrinkle/stain resistant clothes

Anti-microbial.
X-Static® Work Socks
X-static® yarns have a layer of pure silver that's permanently bonded to the surface of the fibre for anti-microbial/anti-odour performance. Sizes M-L.
(P7774/P7775) \$9.99 PAIR.
25% OFF \$7.49 PAIR

Nanotechnology Based Consumer Products on the Global Market

<p>Automotive</p> <ul style="list-style-type: none"> • Air and Oil Filters • Waxes, engine oil • Anti-scratch finishes • Air purifiers • Catalysts to improve fuel consumption • Tires 	<p>Clothing and Textiles</p> <ul style="list-style-type: none"> • Wrinkle and stain resistant apparel • Anti-bacterial and anti odour clothing • Anti-bacterial fabrics • UV resistant and protective clothing • Flame retardant fabrics 	<p>Cosmetics</p> <ul style="list-style-type: none"> • Skin creams and moisturizers • Skin cleansers • Sunscreens • Lipstick, mascara, make-up foundations • Make up removal
<p>Electronics</p> <ul style="list-style-type: none"> • Batteries • Displays-electronics • Organic Light Emitting Diodes • Data memory • Anti-bacterial and anti static coatings on keyboards, phones • DVD coatings • MP3 players • Computer processors and chips 	<p>Food and Food Additives</p> <ul style="list-style-type: none"> • Energy drinks • Nutritional supplements • Food storage containers • Anti-bacterial utensils • Cutting boards • Plastic wrap • Nano-tea, chocolate shakes, canola active oil 	<p>Household</p> <ul style="list-style-type: none"> • Anti-bacterial furnishings • Anti-bacterial coatings • Air purifiers and filters • Self cleaning glass • Anti-bacterial, UV resistant paints • Solar cells • Cleaning products • Disinfectant sprays • Fabric softeners
<p>Personal Care/Health</p> <ul style="list-style-type: none"> • Hearing aids and Contact Lenses • Body wash • Cellulite treatment • Tooth powder • Shampoos, hair gels • Deodorants • Insect repellents • Anti-bacterial creams • Bandages • Home pregnancy tests • Drug delivery patches 	<p>Sports Equipment</p> <ul style="list-style-type: none"> • Golf balls and clubs • Tennis rackets and balls • Baseball bats • Hockey sticks • Skis and snowboards • Ski wax • Bicycle parts • Wet suits • Shoe insoles • Anti fogging coatings 	<p>Toys and Children's Goods</p> <ul style="list-style-type: none"> • Stain resistant plush toys • Anti-bacterial baby pacifiers, mugs and bottles • X-boxes and play stations • Anti-bacterial stuffed toys <p>Medical Applications under development</p>

Nanotechnology: The Future is Coming Sooner Than You Think

- Sensors on plastic film wrap to detect spoiled food
- Nanoparticles that provide anti-bacterial protection
- Nano capsules that release nutrients if Nano sensor detects vitamin deficiency
- Pesticides in nano capsules that would only release pesticide in insects stomach
- Textile fabrics that will charge your cell phones
- Delivery of chemotherapy drugs directly to cancer cells
- Automatic release of insulin when sensors indicate glucose level too low

Concerns Raised About Consumer Products

- The impact of nanomaterials on the health of the public and the environment is largely unknown. - Buyer Beware Scenario
- The basic definitions, measurement tools and procedures are under development.
- Scientists, governments, NGOs have raised concerns about the potential risks to human health and the environment.
- The Canadian public has little confidence in government being able to effectively manage the impacts of nanotechnology and yet they do not trust industry to regulate it itself .

Concerns Raised About Consumer Products

- Commercialization of consumer products is far out stripping studies on health effects and legal oversight.
- Products containing nanomaterials are not labelled
- Consumers recommend that labelling of products containing nano materials is needed immediately so that they can make informed purchasing decisions.
- Potential to pass through cell membranes, air, water and soil.
- No pre-market evaluation for many consumer products

Public Knowledge

*“Silence
Deafening
Silence”*

- Public knowledge about and involvement in the issues posed by nanotechnology are very limited.
 - Major source of information is the media
 - 65 to 80% surveyed knew little or nothing about nanotechnologies.
 - attitude of the Canadian public is more optimistic than in Europe
- Over 1600 consumer products using nanomaterials on market
 - 70 to 80% of consumers do not know these products are on the market
- **The challenge is how to realize the societal benefits of nanotechnology while minimizing adverse impacts**

Ethical, Legal and Societal Issues

- How nanotechnology research and applications are introduced into society?;
- How transparent decisions are – who makes them?
- How sensitive and responsive policies are to the needs and perceptions of the full range of stakeholders – Who benefits? Who is placed at risk?
- Impact on the environment?
- Positive and negative economic impact?
- Impact on privacy?

The answers to these questions will determine public trust and the future of innovation driven by nanotechnology.

Public Risk Perception

Factors associated with increased concern*

- Unfamiliar risk
- Poorly understood exposure
- Scientifically unknown or uncertain risks
- Risks not under personal control
- Involuntary exposure
- Risk to children
- Risk to future generations
- Effects dreaded
- Media attention
- Inequitable distribution of benefits and risks
- Effects irreversible
- Caused by human actions or failures

High to medium probability of transformation to “Crisis”

* Institute of Risk Research, Univ. of Waterloo

Conclusion

The challenge is how to realize the societal benefits of nanotechnology while minimizing adverse impacts

Questions?



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