Nanotechnology and Insurance

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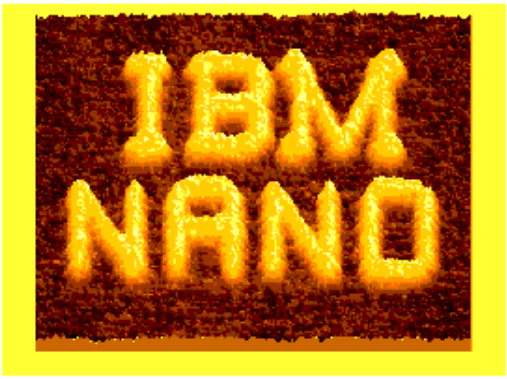
What is It?

- A nano particle is very small – 1-10 nanometers
  - Nano = 1/billion
  - 1/80,000 the thickness of a human hair
  - 10 hydrogen molecules side by side = 1 nanometer
- Nano particles commonly exist in nature
  - seawater contains nano particles
  - ordinary combustion produces them
  - industrial processes create them
- Nano technology is controlling the pr
  materials at the atomic level



“The advent of nanotechnology is considered to be the biggest engineering innovation since the Industrial Revolution.”

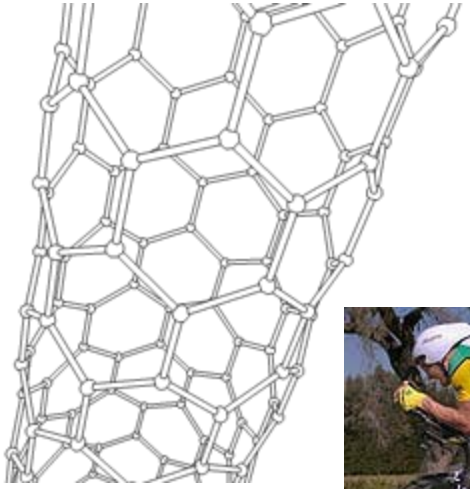
-Gwinn & Vallyathan, Dec. 2006

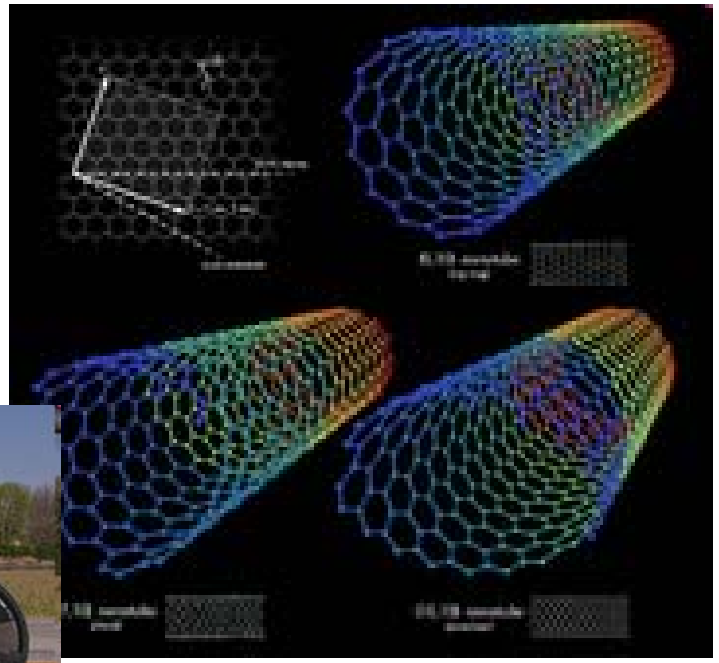
What is It?

- Creates ability to fabricate new materials
  - e.g.: carbon molecules in the shape of a tiny tube, having superior strength
- Tiny machines can be built at the molecular level

- Controlling production of materials at nano scale
  - allows pure products that achieve theoretical potential
    - to conduct electricity or heat
  - changes color
    - gold that looks red
  - changes performance
    - ceramics that can bend

Carbon Tubes: Common and Expensive Application





How is it used now?

- Common in consumer products
  - suntan lotion
  - facial cream
  - sports equipment
- Used in pharmaceuticals to improve the effectiveness of the drug
- Offers dramatic material properties to industrial and energy production equipment

Growth in Uses

- The genie is out of the bottle
- The number and scope of applications will increase dramatically
- By one credible estimate, the worldwide market for nanotechnology products is estimated to reach US$1 trillion by 2015 (Roco, 2005).

Textiles

- Nanotechnology adds many desirable properties to textile materials
  - stain, moisture, wrinkle resistance
  - "Sharkskin" swim suit worn by Michael Phelps to set several world records
- "There is no doubt that in the next few years nanotechnology will penetrate into every area of the textile industry." –Dr. Karin Eufinger

Insurance Exposures

- Products liability
- Workers' comp
- Environmental Impairment
- Professional liability

Human Injury

- Manufactured nano particles could be dangerous because
  - not water soluble
  - designed to be stable as nano particles
  - they can be highly reactive to tissue
  - they can pass through cell barriers, even brain barrier
  - would be difficult to purge or neutralize in the body

Workers' Compensation

- Bodily harm to employees from nano particles – if causation was clear – would be a compensable claim
- No coverage exclusions would be permitted
- Claims would tend to be catastrophic, involving many workers and serious injury
- Lag from exposure to manifestation would be many years
- Liability claims against third parties would be likely
  - manufacturers of nano materials and products
  - tool and equipment makers

Medical Treatment

- We have sketchy, hypothetical ideas of the physical assault on humans
  - We know that NP can pass through normal skin and internal tissue barriers
  - Inhaled particles could migrant to any organ
- Reversing the harm from some NP would seem to be a daunting challenge

Are NP the Asbestos of the 21st Century?

- Similarities between asbestos and some nano materials are troublesome:
  - Very long latency period before discovery of damage
  - Ease of pulmonary entry
- A famous study on rats showed that Carbon Nanotubes in rat lungs produced mesothelioma, like asbestos
- No evidence of harm to humans in real life

“Because we know little about the toxic health hazards of NPs *in vivo* and *in vitro,* pharmacokinetic and toxicologic studies are mandatory before large-scale industrial production and use are implemented.”

-Gwinn & Vallyathan, Dec. 2006

Insurance Industry Medical Experts

- No strong concern or proposals for changing company policies from medical directors for insurers
- Loss control experts not offering new, sweeping risk management tactics
- Reinsurers cite NT as just one of many potential “emerging risks”

Regulatory Standards

- Currently, no regulations exist applying specifically to nanomaterials.
- Statutes most relevant to nanotechnology regulation
  - Toxic Substances Control Act41,
  - Occupational Safety and Health Act42
  - Food, Drug and Cosmetic Act 43
- OSHA standards for hazardous airborne particle are designed for “macro particles” and not suitable for NT
  - Given budget constraints, OSHA rule making will take years
- Some commentators call for a completely new regulatory regime, e.g., new federal regulatory agency
- In the private sector, ANSI and Int. Standards Org. are developing NT standards

Insurance Operations

- So far, no claims known
- Only one company announcing exclusion
  - which was recinded months after annoucement

Insurance Reactions

- Close underwriting
- Blanket exclusion
- Selling coverage under appropriately rated endorsement
- Claims made policy

Continental Western

- In September 2008, Continental Western Insurance Group announced it will not cover liability related to nanotechnology and nanotubes.
- endorsement CW 33 69 06 08, excluding "bodily injury, property damage, and personal and advertising injury related to the exposure of nanotubes or nanotechnology in any form." The exclusion applies to "the use of, consumption of, ingestion of, inhalation of, absorption of, contact with, existence of, presence of, proliferation of, discharge of, dispersal of, seepage of, migration of, release of, escape of, or exposure to nanotubes or nanotechnology."
- Company rescinded endorsement in summer 2009

Zurich: Embracing NT

"Zurich works closely with many of those corporations today, trying to understand the nanoparticles they're developing, and using the ZNEP™ tool to structure that knowledge-building process. Through this approach, the lag between discovery and insurability can be shortened dramatically…"

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Fascinating report at:

http://www.zurich.com/NR/rdonlyres/19B26BAF-B2AB-4CAA-B8D6-7A20A2A77B1A/0/Insight_Nano_webfinal3.pdf

Summary

- Massive growth in applications across many industries
- Health and environmental effects only partially understood
- Insurance reaction:
  - monitor risk carefully
  - be prepared to establish new underwriting and rating procedures

Select References

- Dec 2006 assessment of health risks by NIOSH experts, Gwinn&Vallyathan:
  http://www.ehponline.org/members/2006/8871/8871.pdf

- June 2009 Zurich report on risk and their underwriting tool-- ZNEP:

http://www.zurich.com/NR/rdonlyres/19B26BAF-B2AB-4CAA-B8D6-7A20A2A77B1A/0/Insight_Nano_webfinal3.pdf

- Comprehensive risk assessment by Swiss Re:

http://www.swissre.com/pws/research%20publications/risk%20and%20expertise/risk%20perception/nanotechnology_small_matter_many_unknowns_pdf_page.html