Consumer Exposure to Nanomaterials: Lot's of Questions Few Answers

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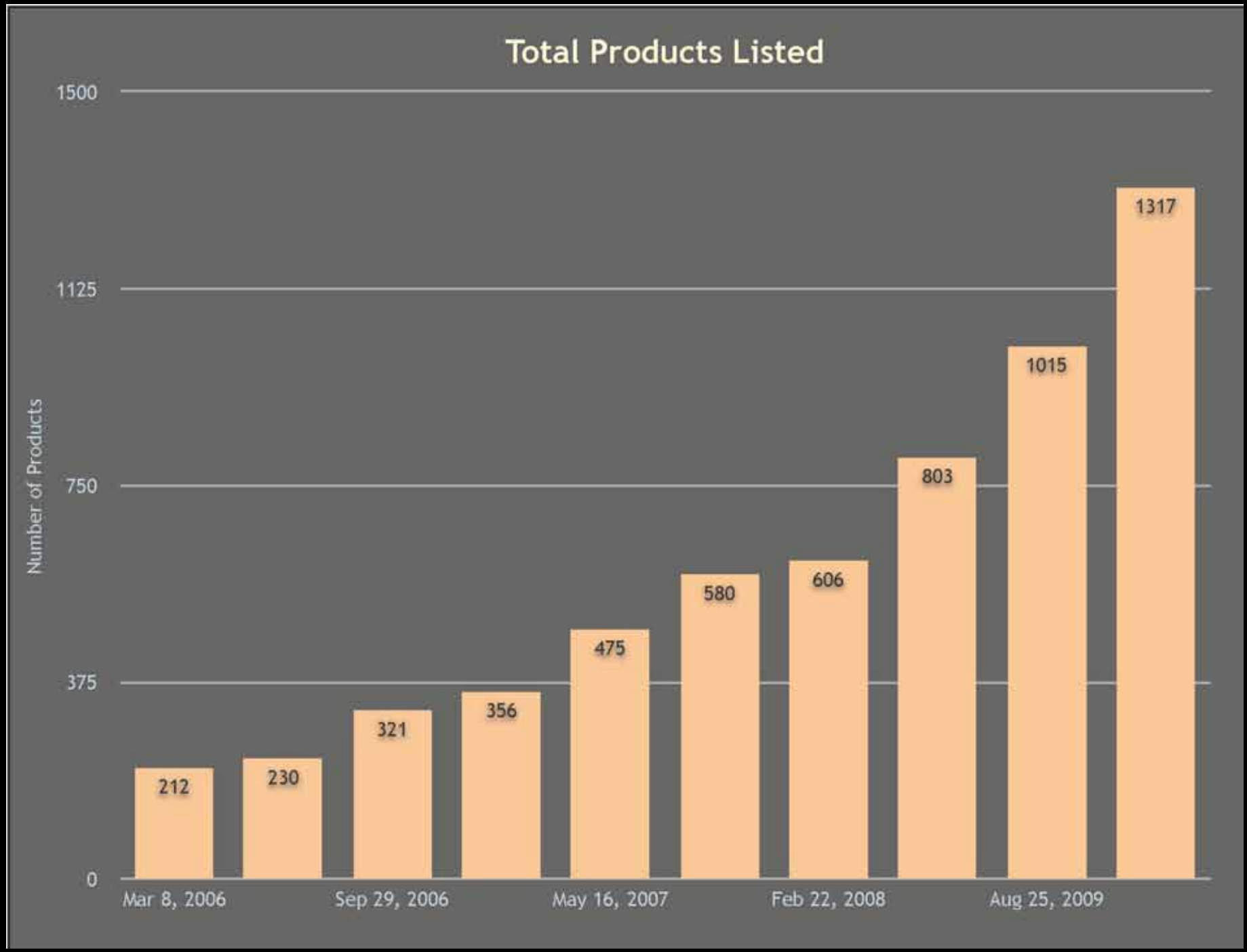
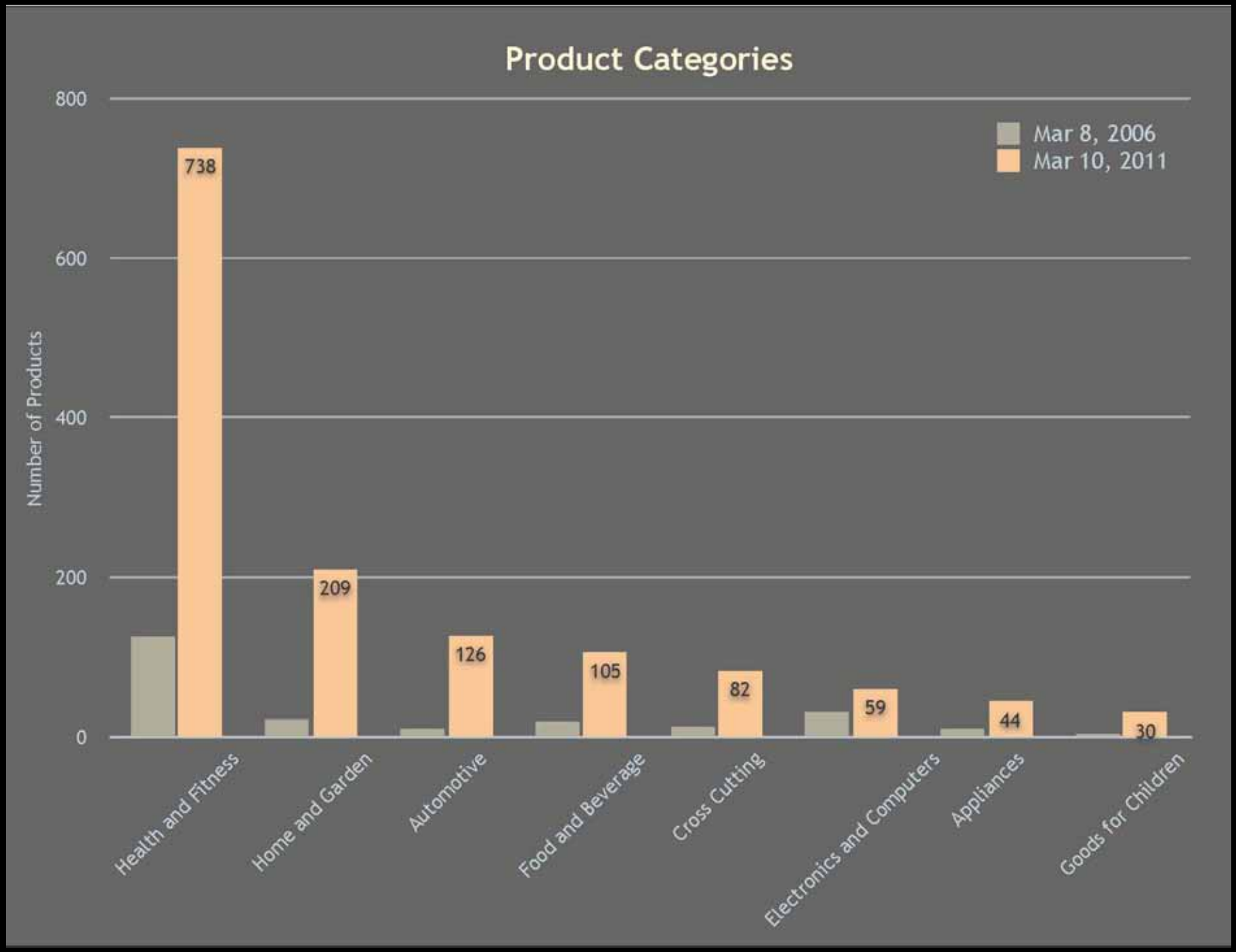
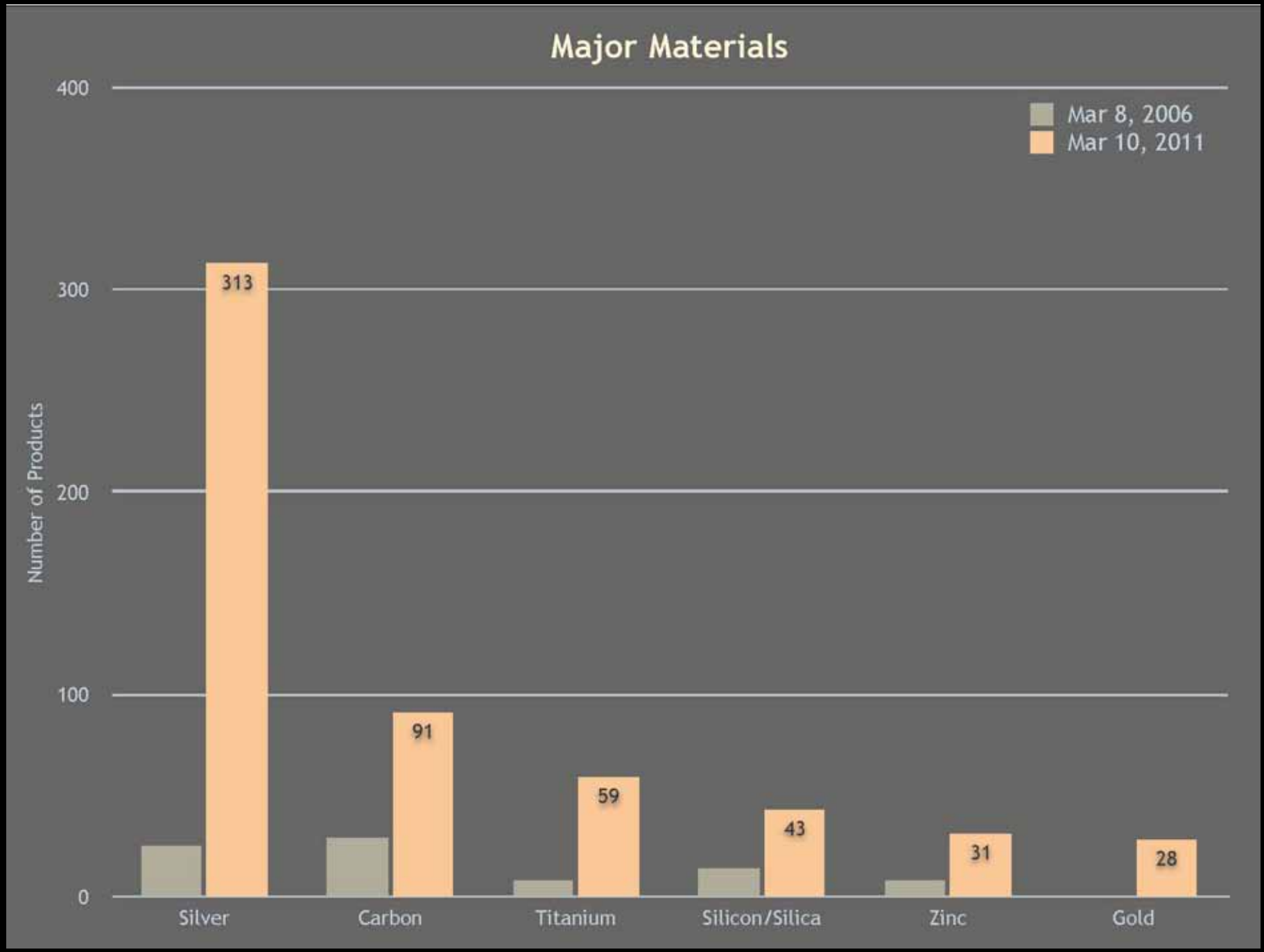
Nano Market Size

- Revenue involving nanotechnologies is predicted to reach $2.5 trillion by 2015
- Two trillion of which will be directly attributable to nano-enabled products. (Lux Research, 2009)

“Past experience has demonstrated that successful introduction of a new technology occurs more readily if it is precipitated by a robust appreciation for any inherent risks associated with the technology.” (Thomas et al. 2009)

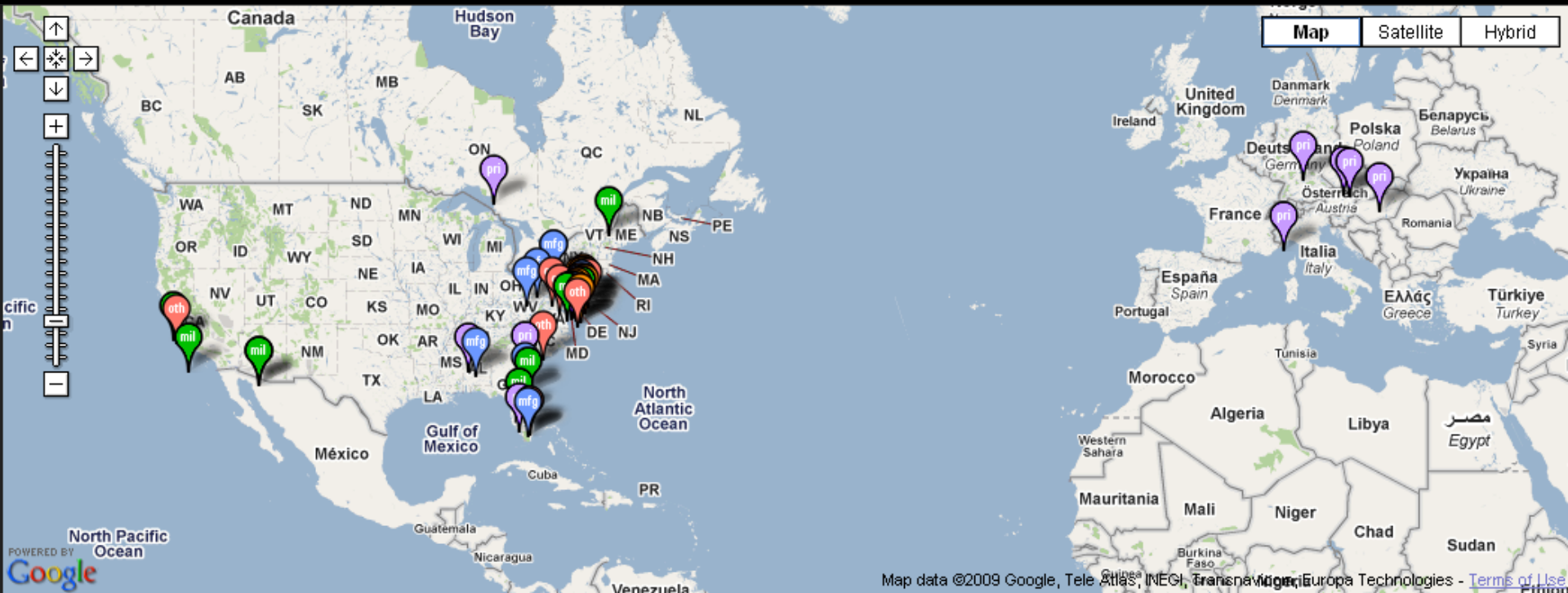

Total Products Listed
1500
1125
750
375
0
Number of Products
212
230
321
356
475
580
606
803
1015
1317
Mar 8, 2006
Sep 29, 2006
May 16, 2007
Feb 22, 2008
Aug 25, 2009


Product Categories
800
600
400
200
0
Number of Products
Mar 8, 2006
Mar 10, 2011
738
209
126
105
82
59
44
30
Health and Fitness
Home and Garden
Automotive
Food and Beverage
Cross Cutting
Electronics and Computers
Appliances
Goods for Children


Major Materials
400
300
200
100
0
Number of Products
Mar 8, 2006
Mar 10, 2011
313
91
59
43
31
28
Silver
Carbon
Titanium
Silicon/Silica
Zinc
Gold

Nano for remediation

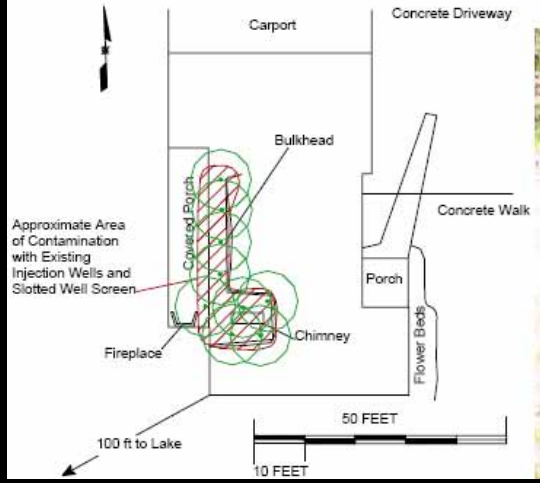
- There are over 60 sites across the globe that have utilized nanomaterials to clean up hazardous waste sites
- Nanoparticles are injected directly into the ground via wells



Boomsnub Site, USEPA
http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/boomrv

Completed Project-Home Heating Oil Remediation - Medford, New Jersey

Property had been excavated extensively including under the house. Contamination still existed under the Chimney and the porch on the side of the house toward the lake.



(Continental Remediation, LLC)

gitechnano

Material Safety Data Sheet

nanoPeroxide Slurry

Effective Date: February 2009

1. CHEMICAL AND COMPANY IDENTIFICATION

Acute Health. . . 2
Fire. 0
Reactivity. 2

HMIS Hazard Rating
Least=0 Slight=1 Moderate=2 High=3 Extreme=4

gitech nano, llc
92 Sharps Lane
Trenton, NJ 08610

EMERGENGY TELEPHONE NUMBER: For emergency involving spill, leak, fire, exposure or accident, call 609-213-3979

PRODUCT NAME:
nanoPeroxide Slurry

For Medical Emergencies involving this product call:
609-213-3979

CAS NUMBER: 1305-79-9
GENERAL USE: Environmental Applications

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Formula	Wt. %	CAS #
calcium peroxide	CaO_2	>30	1305-79-9
other inorganic ingredients		<70	

ALL MATERIALS ARE FOOD GRADE PRODUCTS

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS
EYE CONTACT: Causes eye irritation on direct contact.
SKIN CONTACT: May cause skin irritation on prolonged or repeated contact.
INGESTION: May be harmful if swallowed in large quantities.
INHALATION: No adverse effects expected.

4. FIRST AID MEASURES

EYE CONTACT: Flush eyes with large amounts of water for 15 minutes.
SKIN CONTACT: Rinse area with plenty of water. Get medical attention if irritation persists.
INGESTION: Drink plenty of water. Get Medical attention immediately.
INHALATION: Not Applicable.

5. FIRE FIGHTING MEASURE

Flash Point (Method): Not Applicable
Extinguishing Media: Water spray, all-purpose dry chemical, CO_2.

6. ACCIDENTAL RELEASE MEASURES

Cover with inert, absorbent material and remove to disposal container. Spill area may be slippery. Flush with plenty of water.

7. HANDLING AND STORAGE

Freezing Point: -5° C
Store in a tightly closed container in a cool, dry, well-ventilated area.
Storage Temperature 4°C to 25°C
Recommend Shelf Life: 30 days

8. EXPOSURE CONTROL/PERSONAL PROTECTION

GENERAL CONTROLS: Avoid eye and skin contact.
PROTECTIVE CLOTHING: The use of safety goggles and protective gloves is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and odor: Viscous liquid. Pale yellow to white.
pH: 11 - 13

10. STABILITY AND REACTIVITY

GENERAL: This product is stable.
INCOMPATIBLE MATERIALS: None Known
HAZARDOUS DECOMPOSITION: None Known

11. TOXICOLOGICAL INFORMATION

This product has not been tested as a whole. However, this formula is determined to be safe for its intended use. This review has taken into consideration available safety-related information including information on individual ingredients, similar ingredients, similar formulas and potential ingredient interactions. This review is a component of the hazard determination used to prepare the statements in Section 3 of this MSDS.

12. ECOLOGICAL INFORMATION

Not Available

13. DISPOSAL CONSIDERATIONS

Any disposal practice must be in compliance with local, state, and federal laws and regulations (contact local or state environmental agency for specific rules).

14. TRANSPORTAION

Oxidizer

15. REGULATORY INFORMATION

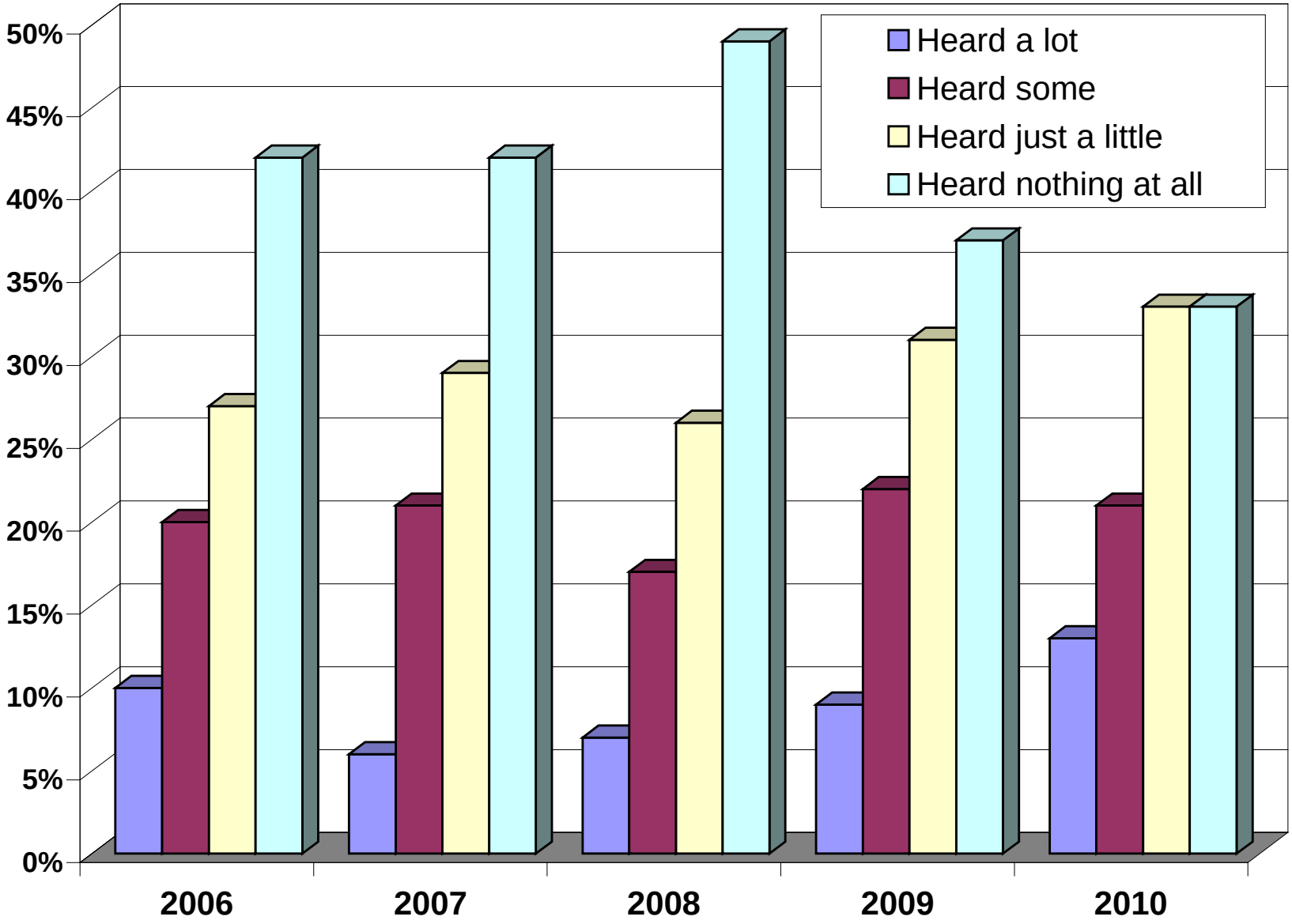
RCRA (40 CFR 261, Subpart D): Not Applicable
CLEAN WATER ACT: Not Applicable
SARA: Sections 301-304 (Threshold planning quantity – TPQ) 40 CFR 355: Not Applicable
Section 313 (Toxic chemical release reporting) 40 CFR 372: The following chemicals must be reported under SARA 313: Not Applicable
CERCLA: Section 102 (Reportable Quantity – RQ) 40 CFR 302: Not Applicable

NEW JERSEY RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST: This product contains the following components subject to reporting requirements: None
PENNSYLVANIA HAZARDOUS SUBSTANCE LIST: This product contains the following components subject to reporting requirements: None
MASSACHUSETTS SUBSTANCE LIST: This product contains the following components subject to reporting requirements: None
CANADA: Workplace Hazardous materials Information systems (WHMIS)-listed material
This product contains the following components subject to reporting requirements: None

16. OTHER INFORMATION

Effective date: January 2009

Public Perception of Nano



Public Does Have Clear Expectations

When asked “How can public confidence in nanotechnologies be improved?” people converge around three recommendations:

1. **Greater transparency and disclosure**
2. **Pre-market testing**
3. **Third-party testing and research**

Consumer Exposure

- Exposures can range from short-term to life-time depending on the product
- Products can potentially release nanomaterials into the environment during the manufacturing process, use/misuse, and disposal
- The exposed population will change over the product lifecycle (Abbott and Maynard, 2010)

Answers are hard to come by….

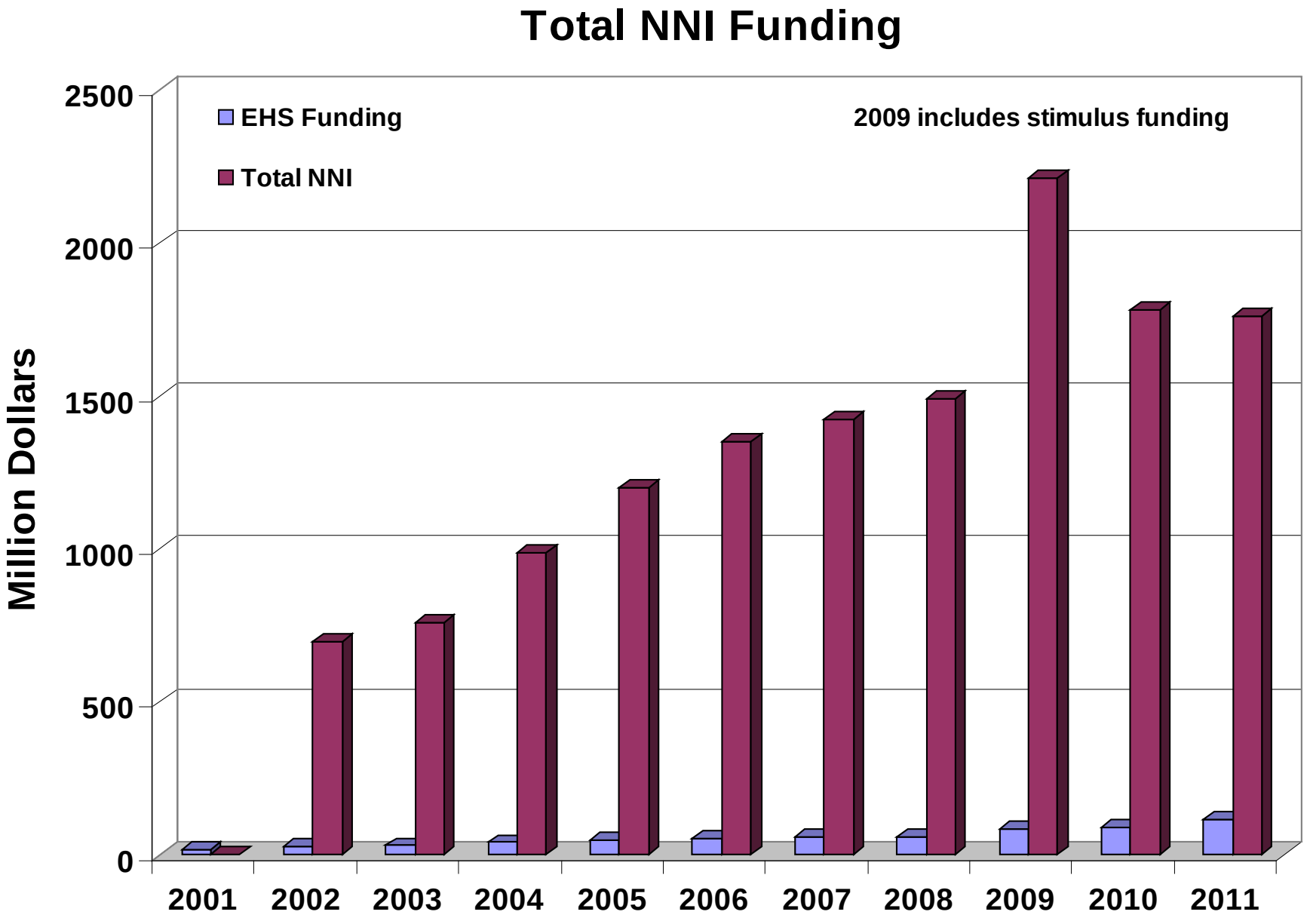
- No widely accepted systematic approach for evaluating potential consumer risks has been developed (Thomas et al. 2009)
- The potential for human exposure under realistic exposure and use scenarios is not well characterized (Thomas et al. 2009)
  - Likelihood of exposure?
  - Magnitude of exposure?
  - Relevant routes of entry into the body?
  - Populations that may be exposed?
- The paucity of exposure assessment studies and lack of monitoring are keeping risk assessors from conducting comprehensive studies of nanomaterials (Abbott and Maynard, 2010)
- A major challenge is the large and rapidly growing number of possible nanoparticles to be tested (Geraci and Castranova, 2010)

Current Regulatory Structure

- Manufactures are not required to report the use of ENMs
  - Except CNTs which EPA finalized in its SNUR in September 2010
- U.S. GAO concluded, “FDAs approach to regulating ENMs allows ENMs to enter the food supply as GRAS substances without FDAs knowledge”
- Beginning in 2010, CPSC staff will produce an annual report on the overall use of nanomaterials in the marketplace and the consumer product categories that contain nanomaterials.
- EPA just recently awarded $5.5 million in grants which “will help researchers determine whether certain nanomaterials can leach out of products…when they are used or disposed of and whether they could become toxic to people and the environment” (EPA, Feb 2011)

After 10 Years and Billions of Dollars How are we still at this point?

- Lack of measurement techniques
- Lack of validated measurement methods
- Lack of reference data
- Lack of standardized toxicity tests
- Lack of environmental and life cycle assessment studies
- Lack of answers to provide to the public


Total NNI Funding
EHS Funding
Total NNI
2009 includes stimulus funding
Million Dollars
2500
2000
1500
1000
500
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Securing the Promise of Nanotechnologies

Towards Transatlantic Regulatory Cooperation

Linda Breggin, Robert Falkner, Nico Jaspers,
John Pendergrass and Read Porter

September 2009

CHATHAM HOUSE

LSE

CHATHAM HOUSE briefing paper

Consumer Labelling of Nanomaterials in the EU and US: Convergence or Divergence?

Robert Falkner, Linda Breggin, Nico Jaspers, John Pendergrass and Read Porter

Energy, Environment and Resource Governance | October 2009 | EERG BP 2009/03

Summary points

- Consumer labelling of nanomaterials is set to become an important and potentially controversial issue on the transatlantic regulatory agenda.
- With an estimated 1,000 nano-enabled products already on the market, calls are rising for mandatory consumer labelling of nanomaterials.
- The US and EU currently do not have a general labelling requirement for nanomaterials, but certain product-specific labelling rules in the food and cosmetics area may apply to nanomaterials.
- While US authorities have to date failed to respond to calls for comprehensive nanomaterials labelling, draft versions of the EU's revised novel foods and cosmetics laws already contain such requirements.
- In the light of the potential divergence between US and EU approaches to consumer labelling of nanomaterials, governments should consider the implications of such a development for international trade and potential means of promoting the development of common approaches.

http://www.nanotechproject.org/events/archive/ec/

IDEA LAB

SCIENCE AND TECHNOLOGY INNOVATION PROGRAM

Project on
Emerging Nanotechnologies
at the Woodrow Wilson International Center for Scholars

www.nanotechproject.org

Woodrow Wilson International Center for Scholars

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