EPA STAR Grantees – Second Nanotechnology Conference

Nora Savage, PhD

US EPA,
Office of Research & Development
National Center for Environmental Research
Environmental Engineering Research Division
Workshop Abstracts

U.S. EPA 2004 Nanotechnology Science To Achieve Results (STAR) Progress Review Workshop — Nanotechnology and the Environment II

August 18 – 20, 2004
Philadelphia, PA
NNI NANOTECHNOLOGY FUNDING

Environmental
Societal and Educational
Health
TOTAL

2001 2004
Efforts of NNI on Nanotechnology - Health and the Environment

- EPA & NSF Research Grants on Health and Environmental Applications and Implications
- NIH Research on Effects of Nanoscale Materials in Body
- National Toxicology Program
  - Qnanotubes, quantum dots, titanium dioxide
- NSF, DOE Research Centers
Environment Protection Agency
Mission

To Protect Human Health and Safeguard the Natural Environment

Accordingly, EPA’s Research Targets:

- Pollution Prevention
- Detection & Remediation
- Effects of Various Substances/Compounds
- Potential Routes and Extent of Exposure
- Risk Assessment and Management
Office of Research and Development Labs and Centers

- National Center for Environmental Assessment
  - Human health and ecological risk assessment

- National Exposure Research Laboratory
  - Human and ecosystem exposure to pollutants

- National Risk Management Research Lab
  - Preventing and reducing risks to humans and the environment

- National Health and Environmental Effects Research Lab
  - Effects of contaminants on human health and ecosystems

NCER
Extramural grants in all research areas
NCER’s Role in ORD

- ORD provides the leadership in science and conducts most of EPA’s research and development.
- NCER is one of two Centers that, together with three National Laboratories, comprise the Office of Research and Development.
- ORD is the principal scientific and research arm of the EPA and fosters the use of science and technology in fulfillment of EPA’s mission.
- NCER is ORD’s extramural research arm.
- ORD’s research budget is approximately $550 million.
- NCER’s research budget is approximately $80 million for competitive extramural grants and fellowships – Science To Achieve Results (STAR), plus 2.5% for Small Business Innovation Research (SBIR) contracts.
NCER High Priority Research Areas

• Science To Achieve Results (STAR)
  – Pollution Prevention and New Technologies
  – Nanotechnology
  – Economics and Decision Sciences
  – Particulate Matter
  – Drinking Water
  – Global Change
  – Ecological Risk
  – Human Health/Children’s Health
  – Endocrine Disruptors

• Small Business Innovation Research (SBIR)
EPA Organization

- Administrator
  - Deputy Administrator
    - Assistant Administrator for Administration and Resources Management
    - Assistant Administrator for Air and Radiation
    - Assistant Administrator for Enforcement and Compliance Assurance
      - Office of the Chief Financial Officer
      - Office of General Counsel
      - Office of Inspector General
        - Assistant Administrator for International Affairs
        - Assistant Administrator for Environmental Information
          - Assistant Administrator for Prevention, Pesticides, and Toxic Substances
            - Assistant Administrator for Research and Development
            - Assistant Administrator for Solid Waste and Emergency Response
            - Assistant Administrator for Water
              - Region 1 Boston
              - Region 2 New York
              - Region 3 Philadelphia
              - Region 4 Atlanta
              - Region 5 Chicago
                - Region 6 Dallas
                - Region 7 Kansas City
                - Region 8 Denver
                - Region 9 San Francisco
                - Region 10 Seattle
The Toxic Substances Control Act (TSCA) of 1976
(15 U.S.Code, Chapter 53)

Gives EPA the ability to list industrial chemicals currently produced or imported into the United States. There are currently over 81,000 chemical substances on the TSCA Inventory. Based on available data for these chemicals EPA may:

A. Take no action if unable to make a risk or exposure based finding regarding a chemical’s effect on the environment or human health

B. Require reporting or testing of those that may pose an environmental or human-health hazard

C. Ban or limit the manufacture and import of those chemicals that pose an unreasonable risk.
EPA’s Regulatory Responsibility

The Toxic Substances Control Act (TSCA) of 1976
(15 U.S.Code, Chapter 53)

- TSCA Inventory is available in paper form as well as on computer tape, diskettes, or CD-ROM.
- TSCA Inventory in paper form last updated in 1990, additions to the Inventory since then not reflected.
- Electronic Inventories updated every 6 months.
- Many public & corporate libraries have copies. Inventory is also available at federal depository libraries.
- Available online at the Cornell University website:
  http://msds.pdc.cornell.edu/tscasrch.asp
**EPA’s Regulatory Responsibility**

The Toxic Substances Control Act (TSCA) of 1976

(15 U.S.Code, chapter 53)

- EPA classifies chemical substances as either "existing" chemicals or "new" chemicals.
- New chemicals are those not listed on TSCA Inventory.
- New chemicals can be added to the Inventory after completion of PMN review.
**EPA’s Regulatory Responsibility**

The Toxic Substances Control Act (TSCA) of 1976

(15 U.S.Code, chapter 53)

- If a substance is "new", it can be manufactured* for a commercial purpose only if it has completed Premanufacture Notice (PMN) review, is subject to an exemption from PMN reporting (i.e., low volume (<10,000Kg/yr), or a TSCA reporting exclusion (naturally-occurring or R&D material)

- In considering use of an existing chemical, need to determine whether the substance is subject to other rules under TSCA.

*manufactured includes imported for purposes of requirement
Pre-Manufacture Notice (PMN)

TSCA

Required before a new chemical may be added To the TSCA Inventory

A. Notice sent from manufacturer to EPA
B. Screen at EPA:
   Structure-activity review - Assessment of physical and chemical properties (likelihood of toxicity)
   Exposure assessment - Review of exposure during manufacture, processing, or use
C. Response to manufacturer within 90 days
D. Most notices contain confidential business information
Currently

EPA is discussing internally:

- How nanomaterials should be approached under existing regulations
- Whether new regulations are needed
**Nanotechnology - Potential Environmental Benefits**

- Improved monitoring & detection capabilities
- **Ultra-Green** manufacturing and chemical processing - atom-by-atom construction
- Waste-minimization via designed-in pollution prevention at the source - less material to dispose of
- Reduced energy usage
- Commercially-viable alternative clean energy sources (fuel cells, solar)
- Inexpensive, rapid remediation and treatment technologies
Nanotechnology - Possibility for Environmental Harm

Human health & Ecosystem Implications:

- Potential toxicity of novel materials
- Harm to the environment and/or ecosystem through use, manufacture, and/or disposal
- Unknown transport, transformation and fate information of nanomaterials
- Potential bioaccumulation and biotransformation issues
# EPA Nanotechnology Activities

## BUILDING A GREEN NANOTECH COMMUNITY

### STAR

- **2001 RFA – Environmental Applications**
- **2002 RFA – Applications and Implications**
- **2003 & 2004 RFA – Health & Ecosystem Effects of Manufactured Nanomaterials**

### SBIR

- **Annual – Nanomaterials & Clean Technologies**

### Symposia


### Meetings

- **NSET, Internal EPA, Woodrow Wilson Center**

### Workshops

- **NNI Nanotechnology Grand Challenge in the Environment – May 8-10, 2003**
- **EPA Grantees’ Workshop I, August 28-29, 2002**
- **Interagency: Applications and Implications Conference w/ DOC, DOD, DOE, DOT, FDA, NIH, NSF, & USDA – September 15-16, 2003**
- **Societal Implications II - December 2003**
- **EPA Grantees’ Workshop II – August 18-20, 2004**
Nanotechnology Symposium
ACS 228th Annual Meeting
March 13 – 17, 2005    San Diego, CA

- Toxicology and Biointeractions of Nanomaterials
- Nanocatalysis for Greener Technologies
- Environmentally Benign Nanocomposites
- Natural Biogeochemical Nanoprocesses
- Nanotech-Enabled Green Energy
- Nanotech-Enabled Sensors for Substances of Environmental Interest
- Treatment/Remediation using Nanotechnology
- Nomenclature, Measurement, and Standards for Nanosized Materials
- Fate/Transport of Nanostructured Materials
- Environmentally Benign Nanomanufacturing
Sunday, March 13, 2005

Panel featuring representatives from several NGOs, including:

- ETC
- Environmental Defense
- Greenpeace
- World Wildlife Fund
Thanks for your attention!