

Nano & Society Posters Guide



Organization: Museum of Life + Science

Contact person: Brad Herring

Contact information: bradh@ncmls.org

General Description

The NISE Network, in collaboration with the Center for Nanotechnology in Society at Arizona State University, developed this series of posters and related reference sheets to engage adults and older youth in informal educational experiences related to the societal and ethical implications of nanoscale science, engineering, and technology. The posters are intended to initiate conversations exploring the relationship between nanotechnology and society. They can be presented as a stand-alone exhibit, or paired with suggested activities as an educator-facilitated experience.

Program Objectives

Big idea:

Nanotechnology is relevant to everyone's lives, and has important societal and ethical implications.

Learning goals:

Visitors will learn that:

1. Nanoscience and nanotechnology lead to new applications.
2. Like any technology, nanotechnology has risks and benefits.
3. Because nanotechnology has new applications, including innovative applications for known materials, we need to evaluate and reevaluate risks and benefits carefully.
4. It is important for scientists, engineers, government officials, and citizens to carefully assess the risks related to nanotechnology, and to implement safeguards protecting the environment, people who work with these technologies, and people in the broader community.

NISE Network content map main ideas:

- [x] 1. Nanometer-sized things are very small, and often behave differently than larger things do.
- [] 2. Scientists and engineers have formed the interdisciplinary field of nanotechnology by investigating properties and manipulating matter at the nanoscale.
- [x] 3. Nanoscience, nanotechnology, and nanoengineering lead to new knowledge and innovations that weren't possible before.
- [x] 4. Nanotechnologies have costs, risks, and benefits that affect our lives in ways we cannot always predict.

National Science Education Standards:

Personal and Social Perspectives

- 5-8: Personal health
- 5-8: Populations, resources, and environments
- 5-8: Natural hazards
- 5-8: Risks and benefits
- 5-8: Science and technology in society
- 9-12: Personal and community health
- 9-12: Population growth
- 9-12: Natural resources
- 9-12: Environmental quality
- 9-12: Natural and human-induced hazards
- 9-12: Science and technology in local, national, and global challenges

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Introduction

The promise of nanoscale science is that it will dramatically improve our lives, bringing great advances in applications as diverse as medicine, energy, electrical and chemical engineering, and materials. At the same time, nanotechnology's potential negative impacts also touch on a broad range of societal concerns, including environmental pollution, toxicity, and privacy violations.

The rapid, ongoing development of nanotechnology raises a number of concerns for all of us. Nanoscale particles often are familiar materials, but with new properties. The small size, unique structures, and novel behavior of such particles have experts concerned with possible health and environmental risks. But how do we go about setting policy or regulating materials for which there is very little information? Moreover, what ethical issues are raised by the new applications imagined for nanotechnology? And what are the economic, labor market, and political implications of winning or losing the worldwide race for leadership in this emerging field?

Scientists, engineers, policy makers, advocacy groups, and social scientists are involved in a range of discussions about the societal, ethical and environmental issues raised by the continuous advances in nanotechnology, and new government policies are likely to be developed soon. Meanwhile, around the world, science centers are exploring new models for engaging adults and older youth in these same issues.

The NISE Network, in collaboration with the Center for Nanotechnology in Society at Arizona State University, developed this series of posters and related reference sheets to engage adults and older youth in informal educational experiences related to the societal and ethical implications of nanoscale science, engineering, and technology. The posters are intended to establish the relevance of nanotechnology to the public, by allowing them to explore the societal and ethical implications of existing and future nanotechnologies.

These posters can provide an opportunity for adult audiences in your community to learn about current science and technology, and to consider their relationship to society. These posters can appeal to all ages, but many of the issues raised on the posters and accompanying reference sheets are targeted for older youth and adults.

Program Delivery

The Nano & Society Posters can be presented in many different ways. They can be presented as a stand-alone exhibit, or paired with suggested activities (see below) as educator-facilitated experiences.

If used as a stand-alone exhibit, you may wish to try some of the following examples. If possible, make the associated reference sheets accessible for viewing and available as handouts for people to take home after reading the posters.

- Set up the posters near an existing nano exhibit or program, as a way of introducing societal issues to your audiences.
- Place the posters near the entrance to a NanoDays venue as a way to attract visitors.
- Use the posters to fill in a blank wall in an exhibit hall or other common area.
- Contact your local library to see if they would be interested in hanging up one or more of the posters.
- Contact your local transit authority to see about hanging them up at bus stops, subway stations, or the airport.
- Contact your local community center or Boys & Girls Club to inquire about displaying the posters in a common area.

The posters can also be presented on their own by a facilitator or together with related consumer products or demonstrations. If facilitated, the objective of the facilitator should be to encourage participants to discuss the questions raised on the posters, encouraging them to think about how nanotechnology might affect society. The stance of the posters may seem negative, but keep in mind that they were designed to challenge visitors to think about emerging technologies in a different way! Be sure to have the accompanying reference sheet available for visitors to take home as they provide additional information and resources on each topic.

Some of the posters were also designed to provide a source of additional richness around the societal and ethical issues surrounding nanotechnology to existing programs in the NISE Net catalog and/or the NanoDays kit. Some educators prefer to do a hands-on nano activity first then present the associated poster. Others have found it useful to engage the children in the hands-on activity and then discuss the poster information with their parents.

Below is a list of suggested pairings for the posters with activities in the NanoDays Kit and other educational products in the NISE Net catalog.

Will nanotechnology solve our energy crisis?

This poster focuses on how energy related nanotechnologies could deliver world-altering changes in the ways we create, transmit, store and use energy. It may be successfully paired with the following activities:

Exploring Materials—Thin Films (NanoDays 2011)

[http://www.nisenet.org/catalog/programs/exploring_materials - thin films nanodays 2011](http://www.nisenet.org/catalog/programs/exploring_materials_-_thin_films_nanodays_2011)

Tiny Solutions to our Big Energy Problem

<http://www.nisenet.org/catalog/programs/energy-nanotechnology>

Energy Challenges, Nanotech Solutions?

<http://www.nisenet.org/catalog/forums/energy-challenges-nanotech-solutions>

What's hidden in *your* sunblock?

This poster focuses on issues related to titanium dioxide nanoparticles found in consumer sunscreens and raises issues around their regulation, labeling and potential effect on the environment. It may be successfully paired with the following activity:

Exploring Products—Sunblock (NanoDays 2011)

[http://www.nisenet.org/catalog/programs/exploring_products - sunblock nanodays 2011](http://www.nisenet.org/catalog/programs/exploring_products_-_sunblock_nanodays_2011)

Are you being tracked?

This poster focuses on how new nanosized surveillance tags may affect individual privacy. It may be successfully paired with the following activity:

Privacy, Civil Liberties and Nanotechnology

http://www.nisenet.org/catalog/forums/privacy_civil_liberties_nanotechnology

Does nanotechnology belong in toys?

This poster focuses on issues related to nanosilver particles used as antimicrobial agents in consumer products. It raises issues around regulation, labeling of consumer products and its potential effects on the environment. It may be successfully paired with the following activities:

Exploring Properties—Surface Area (NanoDays 2008, 2009, 2010)

[http://www.nisenet.org/catalog/programs/exploring_properties - surface area nanodays 08 09 10](http://www.nisenet.org/catalog/programs/exploring_properties_-_surface_area_nanodays_08_09_10)

Surface Area (Cart Demo)

[http://www.nisenet.org/catalog/programs/surface_area - cart demo](http://www.nisenet.org/catalog/programs/surface_area_-_cart_demo)

Surface Area (Stage Presentation)

[http://www.nisenet.org/catalog/programs/surface_area - stage presentation](http://www.nisenet.org/catalog/programs/surface_area_-_stage_presentation)

Nanosilver: Breakthrough or Biohazard?

[http://www.nisenet.org/catalog/programs/nanosilver breakthrough or biohazard](http://www.nisenet.org/catalog/programs/nanosilver_breakthrough_or_biohazard)

Will nanotechnology improve living conditions around the world?

This poster focuses on how nanotechnology may provide safe drinking water for those in need in a safe and relatively inexpensive way. It may be successfully paired with the following activity:

Exploring Size—Ball Sorter (NanoDays 2012)

[http://www.nisenet.org/catalog/programs/exploring_size - ball sorter nanodays 2012](http://www.nisenet.org/catalog/programs/exploring_size_-_ball_sorter_nanodays_2012)

Cleaning Our Water with Nanotechnology

[http://www.nisenet.org/catalog/programs/cleaning_our_water nanotechnology](http://www.nisenet.org/catalog/programs/cleaning_our_water_nanotechnology)

Would you use a dangerous technology?

This poster is the most general of all the posters focusing primarily on the risks and benefits of nanotechnology and how it can be used safely if properly regulated. This poster could potentially work with almost any program or shown beside one of the other Nano & Society Posters.

Nanotechnology—Small Science, Big Impact! (Cart Demo)

[http://www.nisenet.org/catalog/programs/nanotechnology small science big impact](http://www.nisenet.org/catalog/programs/nanotechnology_small_science_big_impact)

Would You Buy That?

[http://www.nisenet.org/catalog/programs/would you buy](http://www.nisenet.org/catalog/programs/would_you_buy)

Nanotech and Consumer Products

http://www.nisenet.org/catalog/programs/nanotech_consumer_products

More Information

The following websites offer additional information:

The NISE Network—public website

www.whatisnano.org

Nano and Society FAQ

<http://cns.asu.edu/nanoquestions>

nano & me: Nanotechnology in our lives

<http://www.nanoandme.org/home/>

Nanotechnology-based consumer products

www.nanotechproject.org/inventories/consumer

The Responsible Nano Forum

www.responsiblenanoforum.org

Universal Design

These materials have been designed to be inclusive of visitors, including visitors of different ages, backgrounds, and different physical and cognitive abilities.

The following features of the program's design make it accessible:

- [x] 1. Repeat and reinforce main ideas and concepts
- [x] 2. Provide multiple entry points and multiple ways of engagement
- [] 3. Provide physical and sensory access to all aspects of the program

Credits and Rights

The Nano & Society posters were created jointly by the Nanoscale Informal Science Education Network (NISE Net) and the Center for Nanotechnology in Society at Arizona State University (CNS-ASU).



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