

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 explore the following ideas:

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.
5. Values shape technologies.
6. Technologies affect social relationships.
7. Technologies work because they're part of systems.

NISE Network content map main ideas:

- 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.
- 3. Nanoscience, nanotechnology, and nanoengineering lead to new knowledge and innovations that weren't possible before.
- 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

K-4: Science and technology in local challenges

5-8: Risks and benefits

5-8: Science and technology in society

9-12: Personal and community health

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. They 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 shared with visitors 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 and ethical 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 by a facilitator, on their own 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 posters use provocative questions and images, because they were designed to challenge visitors to think about emerging technologies in a different way.

Several of the posters also have an accompanying reference sheet available for visitors to take home. These sheets 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 and programs in the NISE Net catalog.

What would you do if you had an invisibility cloak?

This poster explores the ways that technologies affect our social relationships. It may be successfully paired with the following activity:

- Exploring Nano & Society—Space Elevator (NanoDays 2013)
- Exploring Nano & Society—You Decide! (NanoDays 2013)

What if we could take an elevator into space?

This poster offers an opportunity to consider how our values affect the technologies that we develop and adopt. It may be successfully paired with the following activity:

- Exploring Nano & Society—Space Elevator (NanoDays 2013)
- Exploring Nano & Society—You Decide! (NanoDays 2013)

Will nanobots take over the world?

This poster explores how our values shape the technologies that we develop and adopt. It may be successfully paired with the following programs:

- Exploring Nano & Society—You Decide! (NanoDays 2013)
- People & Robots
- Shrinking Robots!

Why don't we have flying cars?

This poster explores the idea that technologies work because they're part of bigger systems. It may be successfully paired with the following activity:

- Exploring Nano & Society—Flying Cars

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 programs:

- Exploring Materials—Thin Films (NanoDays 2011 and 2012)
- Tiny Solutions to our Big Energy Problem
- Energy Challenges, Nanotech Solutions?

What's hidden in *your* sunblock?

This poster and related handout focuses on titanium dioxide nanoparticles found in consumer sunblocks. It 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 and 2012)

Are you being tracked?

This poster and related handout focuses on how new nano-sized surveillance tags may affect individual privacy. It may be successfully paired with the following activity:

- Privacy, Civil Liberties and Nanotechnology

Does nanotechnology belong in toys?

This poster and related handout focuses on nanosilver particles, which are commonly 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, and 2010)
- Surface Area (Cart Demo)
- Surface Area (Stage Presentation)
- Nanosilver: Breakthrough or Biohazard?

Will nanotechnology improve living conditions around the world?

This poster and related handout focuses on how nanotechnology may provide safe drinking water around the world. It may be successfully paired with the following activity:

- Exploring Size—Ball Sorter (NanoDays 2012)
- Cleaning Our Water with Nanotechnology

Would you use a dangerous technology?

This poster and related handout focuses on the risks and benefits of nanotechnologies and how they 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)
- Would You Buy That?
- Nanotech and 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:

- 1. Repeat and reinforce main ideas and concepts
- 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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