



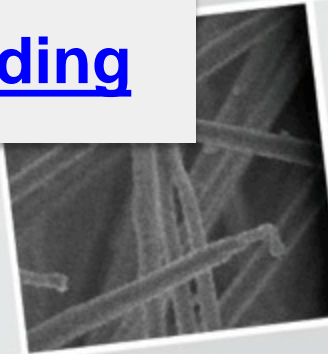
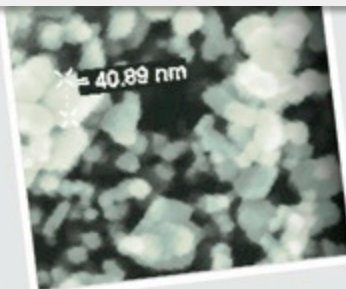
Building College-University
Partnerships for Nanotechnology
Workforce Development

NCI
Southwest

**The National Nanotechnology Initiative
with a focus on Resources for Educators**

Friday, September 16, 2016

[Click here to watch the webinar recording](#)



The National Nanotechnology Initiative

with a focus on Resources for Educators

Lisa E. Friedersdorf, PhD

**Deputy Director,
National Nanotechnology Coordination Office**

September 16, 2016

NACK Network Webinar

Poll #1

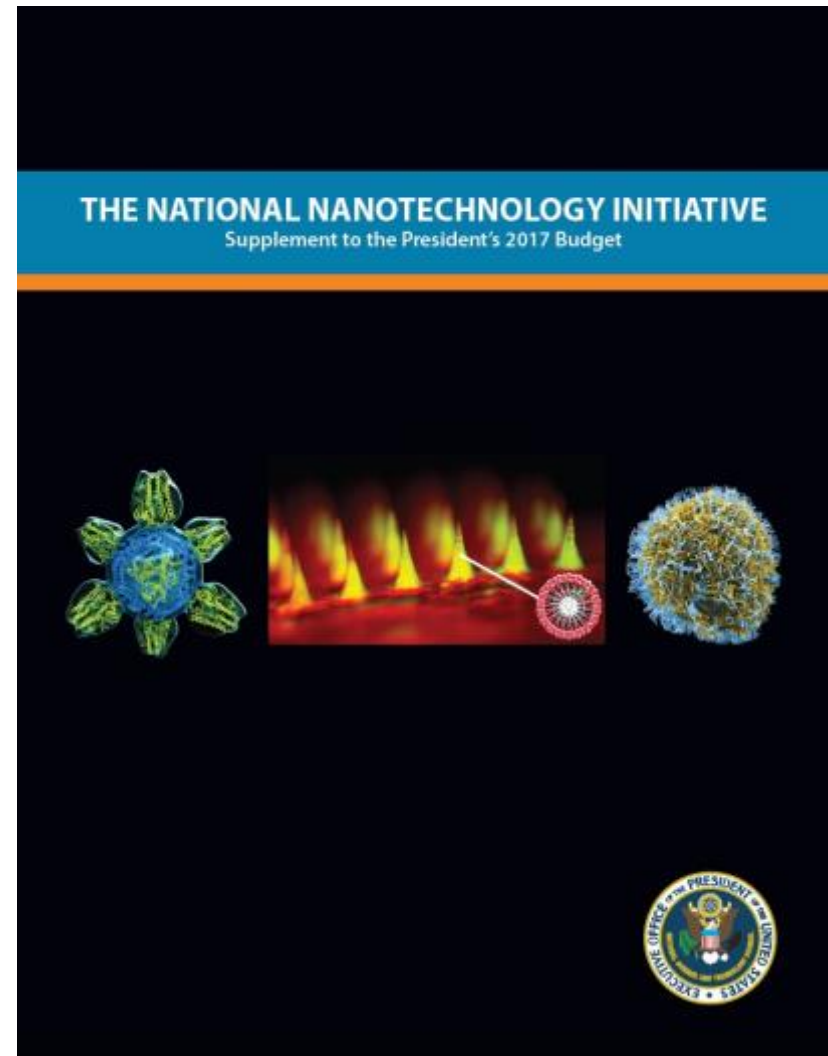
How familiar are you with the National Nanotechnology Initiative?

- a. Very familiar
- b. Somewhat familiar
- c. Unfamiliar, tell me more

National Nanotechnology Initiative (NNI)

- Launched in 2000
- Collaborative R&D to advance understanding and control of matter at the nanoscale
- 20 Federal Departments and Independent Agencies
- 2017 budget: \$1.4 billion
 - Cumulative ~\$24 billion investment since 2001

A coordinated initiative, NOT a distinct funding program.



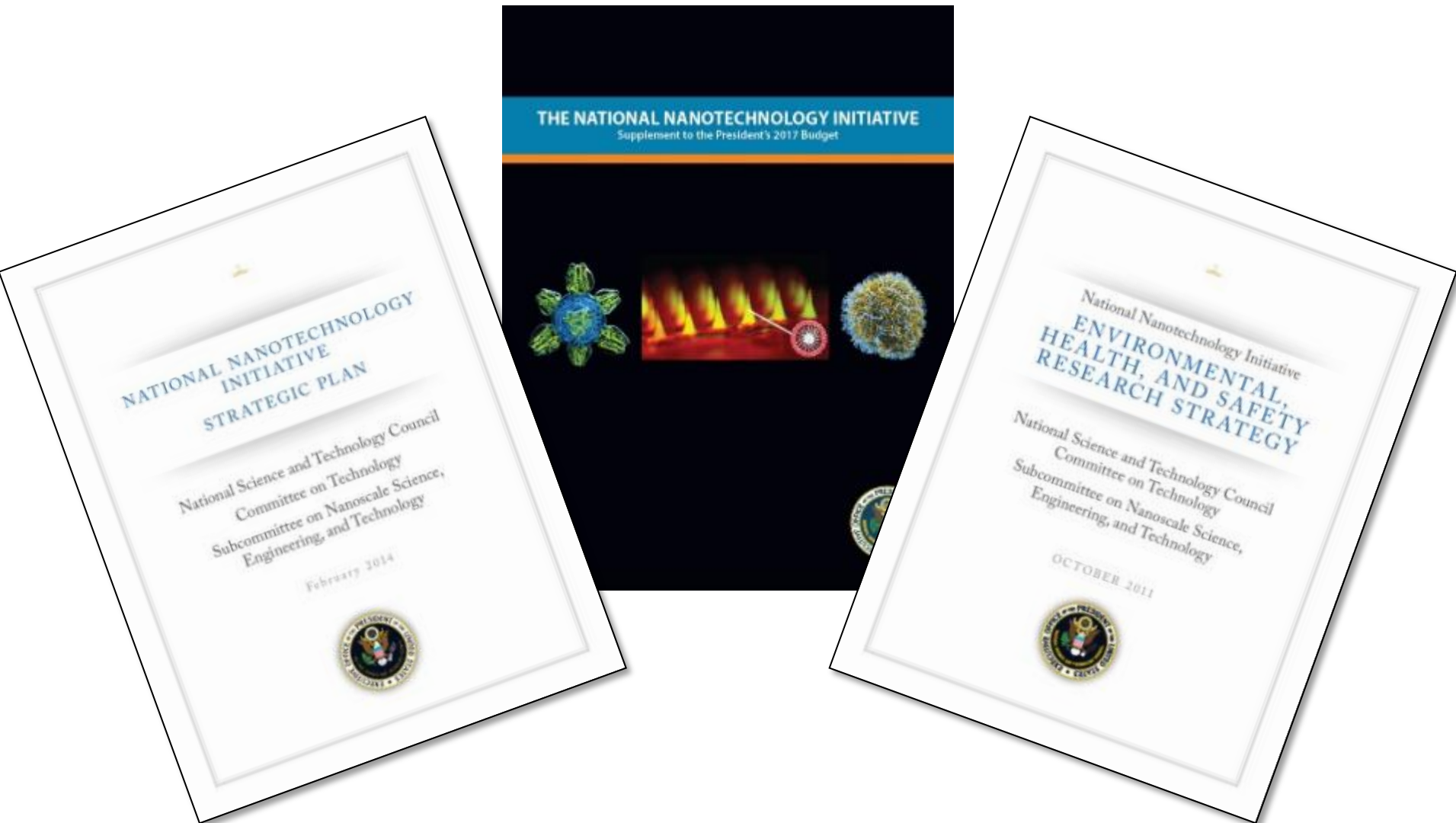
National Nanotechnology Initiative

Vision: A future in which the ability to understand and control matter on the nanoscale leads to a revolution in technology and industry that benefits society.

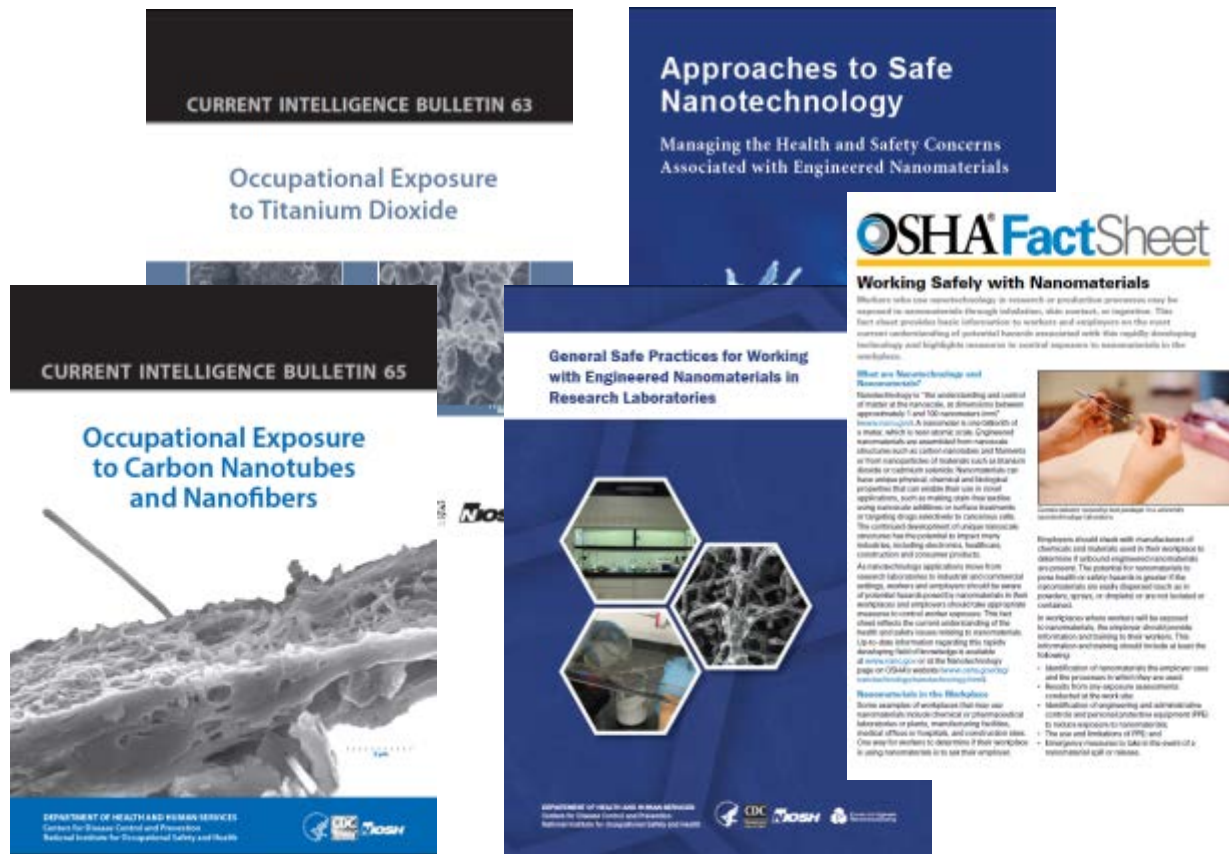
Goals:

- Advance world-class nanotechnology R&D
- Foster the transfer of new technologies into products
- Develop and sustain physical, cyber, and human infrastructure
- Support responsible development of nanotechnology.

Key NNI Documents



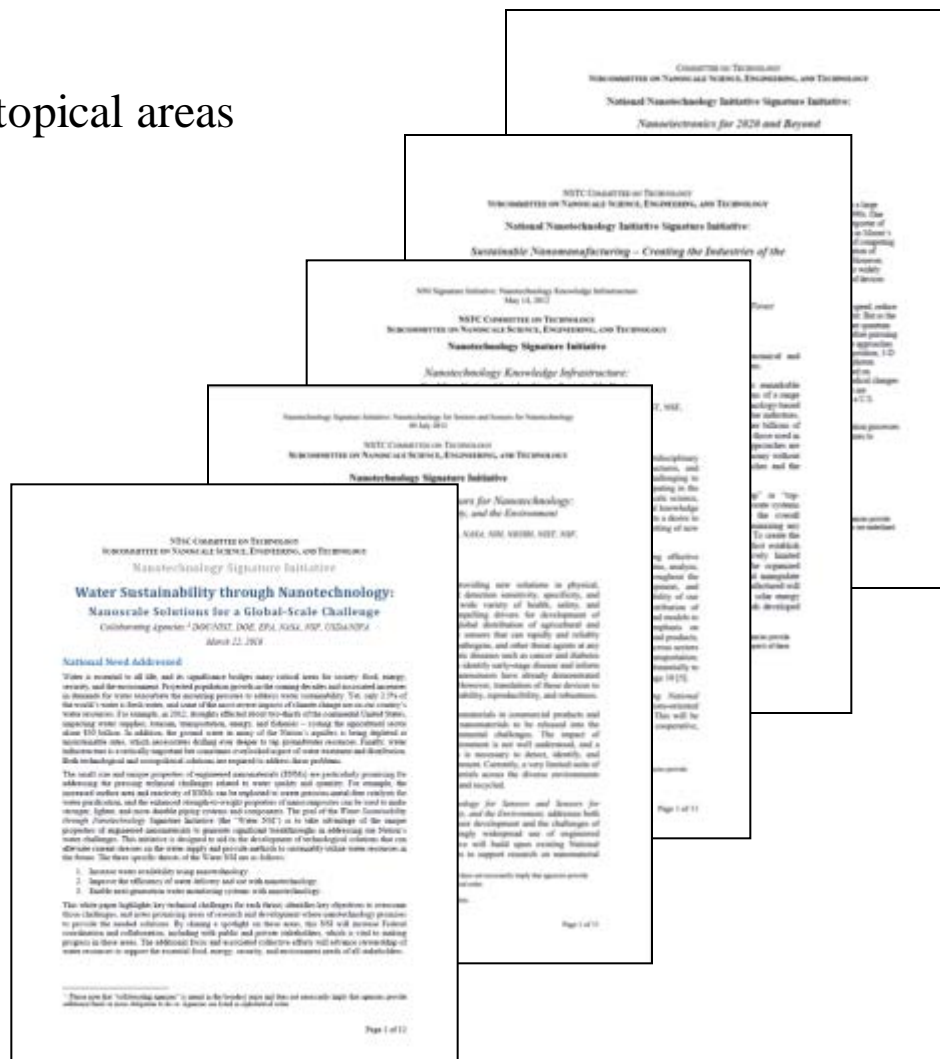
Guidance Documents on the Safe Use of Nanotechnologies



Examples of Guidance Documents Developed by NNI Agencies

The NNI's Nanotechnology Signature Initiatives

Intended to be dynamic; topical areas rotate/evolve over time.



Grand Challenges

Create a new type of computer that can proactively interpret and learn from data, solve unfamiliar problems using what it has learned, and operate with the energy efficiency of the human brain

A Federal Vision for Future Computing: A Nanotechnology-Inspired Grand Challenge

Collaborating Agencies: Department of Energy (DOE), National Science Foundation (NSF), Department of Defense (DOD), National Institute of Standards and Technology (NIST), Intelligence Community (IC)

Introduction

This white paper presents a collective vision from the collaborating federal agencies of the emerging and innovative solutions needed to realize the Nanotechnology-Inspired Grand Challenge for Future Computing. It describes the technical priorities shared by multiple federal agencies, highlights the challenges and opportunities associated with these priorities, and presents a guiding vision for the research and development needed to achieve key near-, mid-, and long-term technical goals. By coordinating and collaborating across multiple levels of government, industry, academia, and nonprofit organizations, the nanotechnology and computer science communities can look beyond the decades-old approach to computing based on the von Neumann architecture and chart a new path that will continue the rapid pace of innovation beyond the next decade.

Background

On October 20, 2015, the White House announced "A Nanotechnology-Inspired Grand Challenge" to develop transformational computing capabilities by combining innovations in multiple scientific disciplines. The Grand Challenge addresses three Administration priorities—the National Nanotechnology Initiative (NNI),¹ the National Strategic Computing Initiative (NSCI),² and the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative³ to:

Create a new type of computer that can proactively interpret and learn from data, solve unfamiliar problems using what it has learned, and operate with the energy efficiency of the human brain.*

While it continues to be a national priority to advance conventional digital computing—which has been the engine of the information technology revolution—current technology falls far short of the human brain in terms of both the brain's sensing and problem-solving abilities and its low power consumption. Many experts predict that fundamental physical limitations will prevent transistor technology from ever matching these characteristics.

Call for a Coordinated Approach

In the announcement, the White House challenged the nanotechnology and computer science communities to look beyond the decades-old approach to computing based on the von Neumann architecture and chart a new path that will continue the rapid pace of innovation in information technology beyond the next decade. There are growing problems facing the Nation that the new computing capabilities envisioned in this challenge might address, from delivering individualized



Nanotechnology-Inspired Grand Challenges

Grand challenges are an element of the President's Strategy for American Innovation that help catalyze breakthroughs needed to advance national priorities. A nanotechnology-inspired grand challenge is an ambitious but achievable goal that harnesses nanoscience, nanotechnology, and innovation to solve important national or global problems and has the potential to capture the public's imagination.

In an October 2014 assessment of the NNI, the President's Council of Advisors on Science and Technology (PCAST) recommended that agencies engage research, development, and industrial stakeholders in the identification and selection of grand challenges in order to focus and amplify the impact of Federal nanotechnology activities.

In June 2015, OSTP, working with the Federal agencies that participate in the NNI, issued a Request for Information seeking suggestions from the public for nanotechnology-inspired grand challenges. After considering over 100 responses, on October 20, 2015, OSTP announced the first such grand challenge—one that addresses three Administration priorities: the National Nanotechnology Initiative, the National Strategic Computing Initiative (NSCI), and the BRAIN initiative.

Related Resources

[A Federal Vision for Future Computing: A Nanotechnology-Inspired Grand Challenge \(White Paper\)](#)

[A Nanotechnology-Inspired Grand Challenge for Future Computing \(OSTP Blog\)](#)

[A Call for Nanotechnology-Inspired Grand Challenges \(OSTP Blog\)](#)

[White House 21st Century Grand Challenges](#)

[National Strategic Computing Initiative](#)

[BRAIN Initiative](#)

A Nanotechnology-Inspired Grand Challenge for Future Computing:

Create a new type of computer that can proactively interpret and learn from data, solve unfamiliar problems using what it has learned, and operate with the energy efficiency of the human brain.

While it continues to be a national priority to advance conventional digital computing—which has been the engine of the information technology revolution—current technology falls far short of the human brain in terms of both the brain's sensing and problem-solving abilities and its low power consumption. Many experts predict that fundamental physical limitations will prevent transistor technology from ever matching these characteristics. This grand challenge will bring together scientists and engineers from many disciplines to look beyond the decades-old approach to computing based on the von Neumann architecture as implemented with transistor-based processors, and chart a new path that will continue the rapid pace of innovation beyond the next decade. [Read more](#)



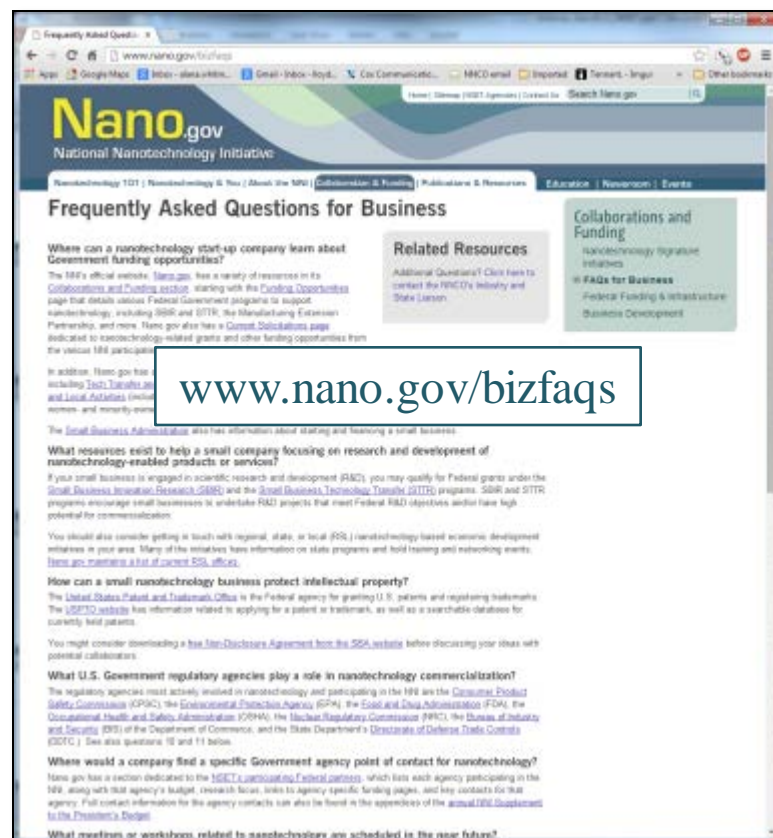
This challenge will look beyond conventional computing based on the von Neumann architecture.

Read more about:

- [A Federal Vision for Future Computing: A Nanotechnology-Inspired Grand Challenge \(White Paper\)](#)
- [Statements of support for this challenge from Federal agencies \(DoD, DOE, IARPA, NIST, NSF\)](#)
- [Statements of support for this challenge from other organizations \(CCC, Moore Foundation, IBM, IEEE, Kavli Foundation, SRC\)](#)
- [Workshop reports and white papers relevant to this challenge](#)
- [Meetings and workshops relevant to this challenge](#)
- [Funding opportunities relevant to this challenge](#)
- [Frequently asked programmatic and technical questions about this challenge](#)

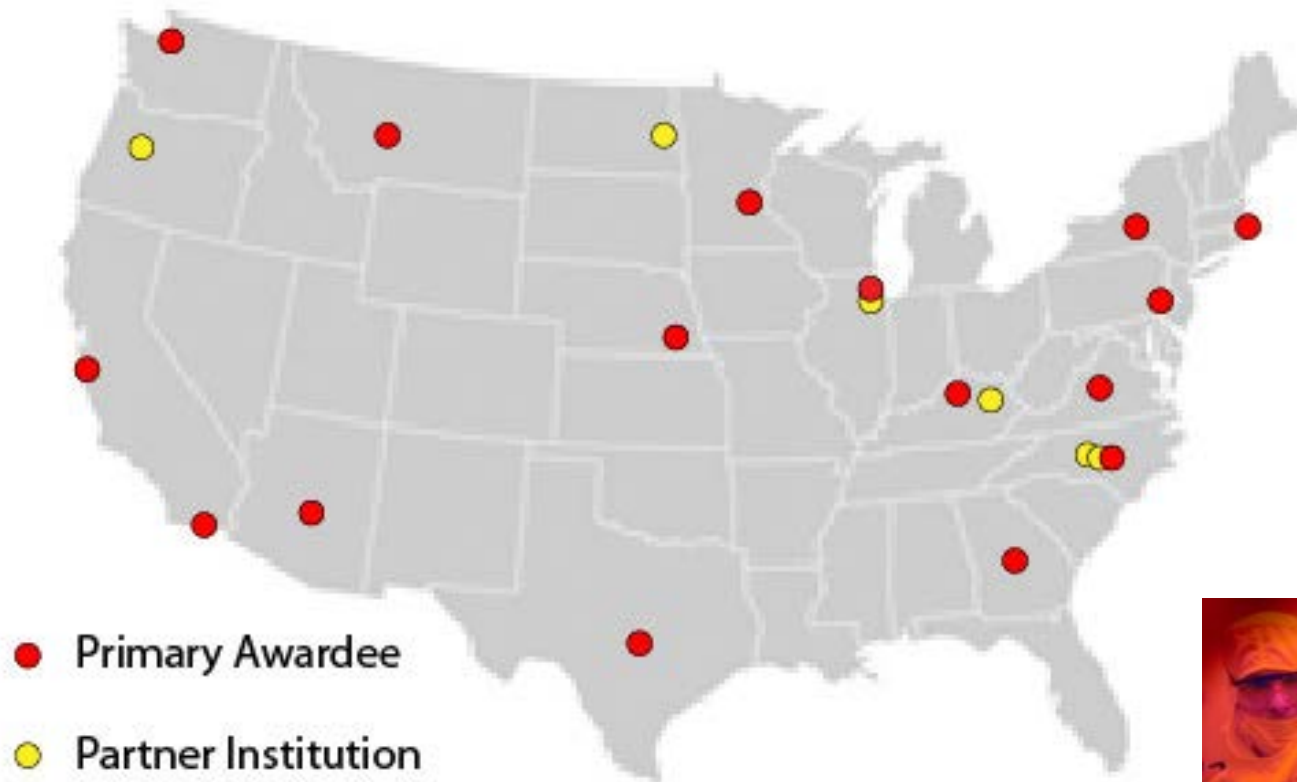
NNI Resources for Industrial Stakeholders

- The NNCO has a dedicated liaison,
Dr. Mike Kiley
mkiley@nnco.nano.gov



NSF User Facility Network

National Nanotechnology Coordinated Infrastructure (NNCI)



Dan Sears, the University of North Carolina at Chapel Hill



Unique research facilities *and* scientific expertise for ultra high-resolution characterization, synthesis, fabrication, theory and modeling of advanced materials

Lawrence Berkeley National Laboratory

- Advanced Light Source
- Molecular Foundry



Argonne National Laboratory

- Advanced Photon Source
- Center for Nanoscale Materials



Brookhaven National Laboratory

- Center for Functional Nanomaterials
- National Synchrotron Light Source-II



Sandia National Laboratories

- Core Facility for the Center for Integrated Nanotechnologies



SLAC National Accelerator Laboratory

- Linac Coherent Light Source
- Stanford Synchrotron Radiation Lightsource



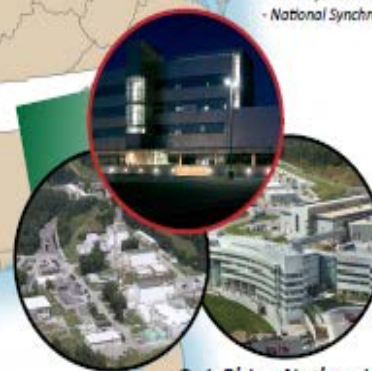
Los Alamos National Laboratory

- Gateway Facility for the Center for Integrated Nanotechnologies



Oak Ridge National Laboratory

- Center for Nanoscale Materials Sciences
- High Flux Isotope Reactor
- Spallation Neutron Source

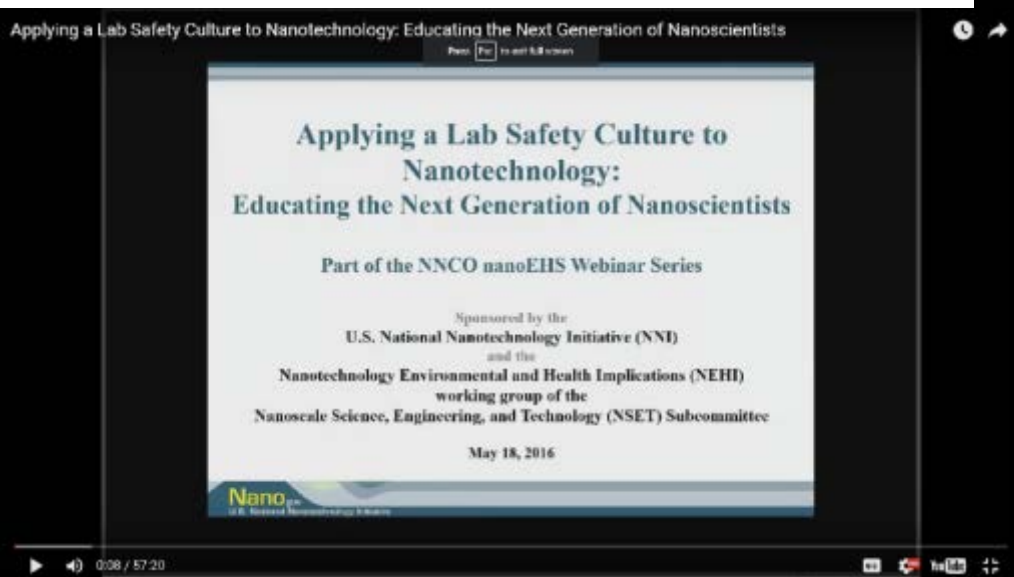


Engaging Community- Webinars



Small and Medium Sized Enterprise Series
best practices, insurance, etc.

Lab safety



<http://www.nano.gov/node/1620>

Education and Outreach

NNCO Outreach
Shared resources
Contests

- Image
- Video
- Superheroes!

Networks

- Teachers
- Students



Poll #2

At what level do you teach?

- a. Elementary
- b. Middle School
- c. High School
- d. Community College
- e. Undergraduate

Education and Outreach



SUGGESTED RESOURCES

Small is Big: Advancing Nanotechnology and Its Applications Teacher's Guide and Student Workbook
A classroom resource from Fairfax County Public Schools Department of Instructional Services

Chemistries: Small Science, Superheroes
National Science Foundation & the National Nanotechnology Initiative competition to create a nanotechnology-inspired superhero

Nanonline
Online magazine from project of the Cornell Nanoscale Facility and the National Nanotechnology Infrastructure Network

Nanotechnology Resources
Resources from Virginia's CTE Resource Center

National Nanotechnology Initiative Classroom Resources
Teacher resources from the United States National Nanotechnology Initiative

NISE Network



Webcast: November 24, 2015
For Students in Grades 5-8

• Watch On Demand

• Watch Video Segments

• Watch on Fairfax Network YouTube Channel

• Order a DVD

How small is small? How can nanoscale matter improve our lives? **Innovation Workshop: Nanotechnology** explores the cutting-edge science and engineering of nanoscale matter. Nanotechnology involves manipulating and controlling matter from one nanometer to 100 nanometers. From airplanes to baseball bats, nanomaterials offer a variety of desirable properties such as strength and conductivity. Graphene and carbon nanotubes are wonder materials made entirely from carbon atoms. **Innovation Workshop** explores their structure of matter and how engineers can build with these new materials.



Students will learn about moving atoms, electron clouds, and how temperature effects matter from Joseph Strosio at the **National Institute for Standards and Technology**. **Innovation Workshop** student reporter takes students into the National Institute for Standards and Technology's **Nanofab** where scientists work in a clean room to build highly structured nanoelectronic circuits. Nanoelectronics is a field of study where researchers are still creating new methods to build.

Nanotechnology is an innovation with big potential even though it's small in size. So small, it can't be seen with the human eye or even your school's microscope. In 1981, the scanning tunneling microscope (STM) launched the age of nanotechnology. It can see individual atoms and even move them to create advanced nanostructures.

Scientists use physical and chemical properties to describe and classify matter. Things like color, shape or texture can tell us about the matter and how that matter behaves. Well, nanotechnology isn't just existing because it's small but also because of the new properties that emerge.

Nanotechnology is more than just one innovation, it's a movement that's revolutionizing the materials we build with and showcases how humans push for new ways of thinking and doing.

Standards of Learning

The content for **Innovation Workshop: Nanotechnology** was guided by National Institute of Standards and Technology staff, National Nanotechnology Coordination Office staff, FCPIS curriculum specialists, and FCPIS Information Technology staff.



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Free Resources > Nanotechnology: Super Small Science

Nanotechnology: Super Small Science

When Nature Strikes: Science of Natural Hazards

Mysteries of the Brain

Make It Memorable

Science of the NFL

Chemistry Now

Writers Speak to Kids

Science of Golf

Science of Innovation

Finishing the Dream

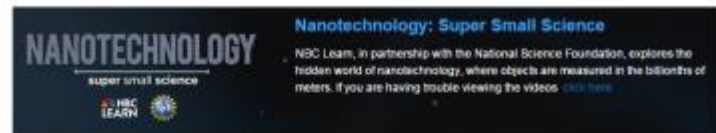
Parent Toolkit

Parent Toolkit on Español

Science of NHL Hockey

Science of the Summer Olympics

Science and Engineering of the 2014 Olympic Winter Games



Nanotechnology: Super Small Science

Showing 1-6 of 6



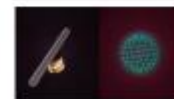
Nanotechnology: Nanotechnology at the Surface



Nanotechnology: Nanoelectronics



Nanotechnology: Nanoarchitecture



Nanotechnology: Nano-Enabled Sensors and Nanoparticles



Nanotechnology: A Powerful Solution



Nanotechnology: Harnessing the Nanoscale

Showing 1-6 of 6



1

Resources for Teachers and Students



Education

A highly skilled and motivated workforce with increasingly more knowledge of science, technology, engineering, and mathematics (STEM) will be required to ensure America's global competitiveness. Over the past 15 years, the Federal government has invested over \$20 billion in R&D under the auspices of the **National Nanotechnology Initiative (NNI)** to understand and control matter at the nanoscale and develop applications that benefit society. As these nanotechnology-enabled applications become a part of everyday life, it is important for students to have a basic understanding of material behavior at the nanoscale, and some states have even incorporated nanotechnology concepts into their K-12 science standards. Furthermore, application of the novel properties that exist at the nanoscale, from gecko-inspired climbing gloves and invisibility cloaks, to water repellent coatings on clothes or cellphones, can spark students' excitement about STEM fields.

The educational efforts of the NNI span from pre-K to grey with information ranging from that for the general public to formal lesson plans and degree programs. This section of Nano.gov provides resources for students and teachers; information about nanotechnology programs from community colleges to PhD's; a description of the growing Nano and Emerging Technologies Student Network; and links to multimedia contests, videos, and animations.

Additionally, a searchable database of nanotechnology education resources can be found at nanoHUB.org.



For K-12 Students

From workbooks to online games, this section for students provides new and exciting ways to learn about nanotechnology.



For K-12 Teachers

From classroom resources to continuing education, this section is for teachers who want to know more about nanotechnology.



U.S. Nano and Emerging Technologies Student Network

Connecting student groups devoted to raising awareness of emerging technology and promoting opportunities for students interested in research, innovation, and entrepreneurship.



Teaching Nano and Emerging Technologies Network

Connecting K-12 teachers who are or want to teach nano and emerging technologies to their students in order to excite them about STEM and prepare them for the future.



College, Grad School, and Post Doc Opportunities

From a minor in nanotechnology to a PhD, this section has a list of the higher education programs available across the country.



Associate Degrees, Certificates, & Job Info

New jobs and training programs are being created to meet the market's demands. Find 2-year degrees, training programs, and career resources here.



Resources for Nanotechnology Laboratory Safety

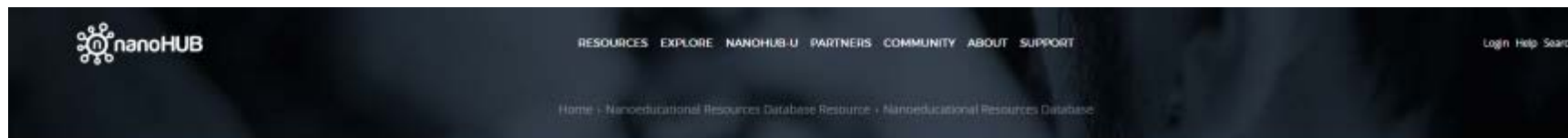
Tools to facilitate an effective culture of safety in the research laboratory.



Multimedia Resources and Contests

Cool images, animations, and videos to learn more about nanotechnology. Also includes links to NNI multimedia contests to give you the opportunity to tell your nanotechnology story!

Resources for Instructors



Nanoeducational Resources Database

Download | Fullscreen | Clear Filters | X No-Map

Show 10 entries First Previous 2 3 4 5 Next Last Search

Activity	Source	Source URL	Core Discipline	Grade	STEM Focus	Inquiry Learning	ResourceType	Mapped to Framework	NS1	NS2	NS3	NS4	NS5	NS6	NS7	NS8	NS9
Activity	Source	Source URL	Core Discipline	Grade	STEM Focus	Inquiry Learning	ResourceType	Mapped to Framework	NS1	NS2	NS3	NS4	NS5	NS6	NS7	NS8	NS9
A Brief History of Nanotechnology	Nano4me (PSU)	Modules_new UF	-	-	-	-	Teaching Aid	-	NS1	NS2	-	-	-	-	NS7	-	NS9
A NanoLeap Into the Atomic Force Microscope	McREL NanoLeap	videos UF	-	-	-	-	Video, Teaching Aid	-	-	-	-	-	-	-	NS7	-	-
A Snapshot of Nanotechnology Today	Nano4me (PSU)	Modules_new UF	-	-	-	-	Teaching Aid	-	-	NS2	NS3	-	-	-	-	-	NS9
Amorphous Metal	Univ Wisc	curriculum UF	Physics	5 6 7 8 9 10 11 12	-	Yes	Lab, Teaching Aid	-	-	-	-	-	-	-	-	-	NS9
Applications Activity: "Smart" Paper	Univ Wisc	curriculum UF	Chem Physics	7 8 9	-	-	Lab, Teaching Aid	-	-	-	-	-	-	-	-	NS8	-
Applications Activity: Liquid Crystal Sensors	Univ Wisc	curriculum UF	Chem	7 8 9	-	-	Lab, Teaching Aid	-	-	NS2	-	-	-	-	-	-	NS9
Applications Activity: Nano-Tex	Univ Wisc	curriculum UF	Chem	7 8 9	-	-	Lab, Teaching Aid	-	-	-	-	-	-	-	-	-	NS9

<https://nanohub.org/publications/118>

Teaching Nano and Emerging Technologies Network

Are you using nano and emerging technologies to excite your students about STEM?



The network connects teachers so they can

- Share best practices;
- Exchange ideas for activities and examples;
- Promote local area events; and
- Connect with like-minded teachers from across the country



Nano Education Resource Portal nanohub.org/publications/118



Search database by

Source organization

Inquiry-based learning

Standards mapping

Topic

“The Big Ideas of Nanoscale Sci & Eng”

Grade level

Core discipline

Type of resource (video, lab, etc.)

STEM Focus



U.S. Nano and Emerging Technologies Student Network



Networked student groups

- raise awareness of current research;
- build an interdisciplinary community;
- facilitates connections between students, faculty, and industry;
- and enable each club to leverage resources and activities

Student Leaders Conference

- Showcase student groups and research
- Share best practices
- Opportunity to network with experts from industry, government, and academia

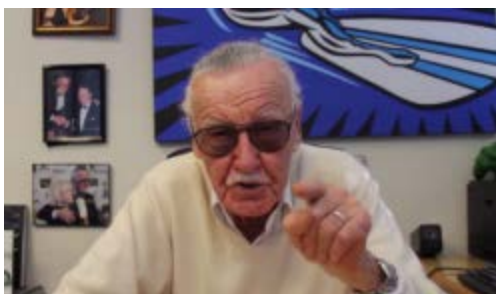


nanoed@nnco.nano.gov

NSF AND NNI PRESENT A COMPETITION:

GENERATION
NANO

SMALL SCIENCE, SUPERHEROES





Follow the Competition at: #GenNano

Nano.gov
National Nanotechnology Initiative



Who	High school students
What	A written entry, a 90 sec video, and 2-3 page comic strip introducing the superhero and the student's nanotechnology-enabled mission
When	October 5, 2016 – January 31, 2017, EST
Where	nsf.gov/GenNano
Why	To promote early interest in science, technology, engineering and mathematics (STEM) and nanotechnology and win cash prizes
More questions?	Contact the Generation Nano Team at gennano@nsf.gov

Poll#3

What is your favorite application of nanotechnology to highlight with your students?

- a) Electronics (smart phones, displays/TVs)
- b) Medicine (drug delivery, detection, tissue regeneration)
- c) Energy (photovoltaics, batteries/fuel cells, wind turbines)
- d) Environment (remediation, water treatment)
- e) Food and Agriculture (sensors, precision farming)

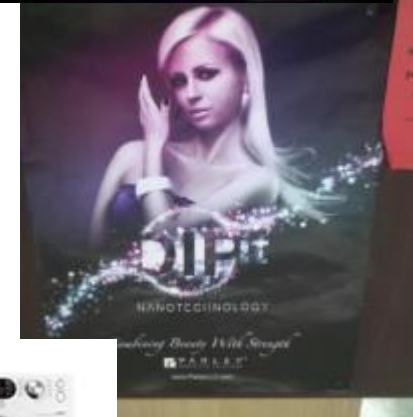
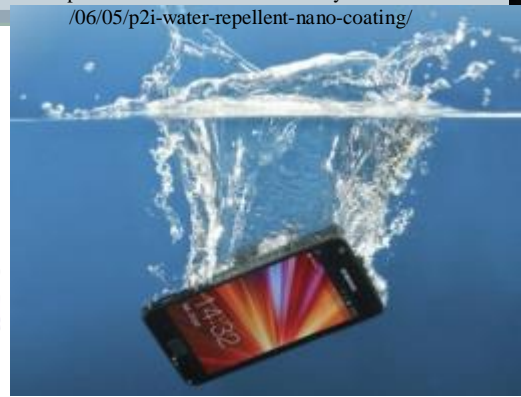
The Future is Here

<http://www.techandinnovationdaily.com/2013/06/05/p2i-water-repellent-nano-coating/>

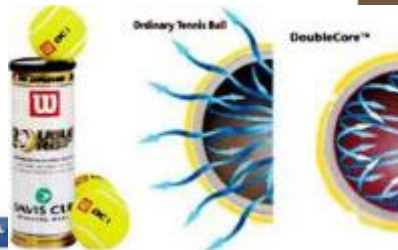
TiO₂ UV absorbers



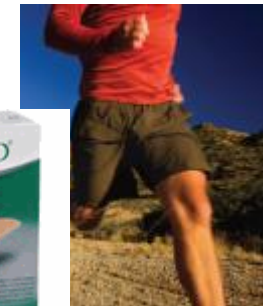
<http://www.bmc-racing.com>



<http://www.smt.sandvik.com/nanofl>
3X



nAg



UltraTech



Eddie Bauer NanoTex



Zyvex Marine

Nanofilm



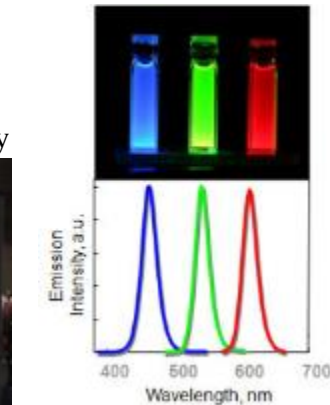
Nanoelectronics

Quantum Dots now in Mass Market Applications

Consumer electronics already 'nano'



QD Vision's Color IQ Technology



CdSe quantum dots

Nanosys



Sony Bravia LED TV



Samsung SUHD TV using Nanosys quantum dots



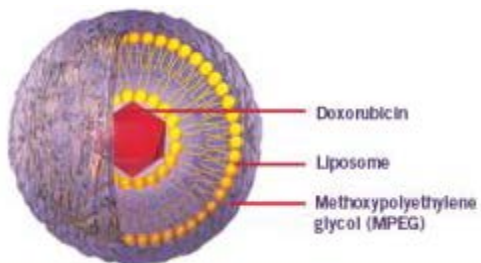
RipeSense.co.nz



timestrip.com



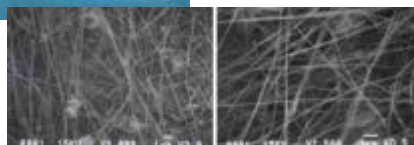
Acute lymphoblastic leukemia (ALL)
Sigma-Tau Pharmaceuticals



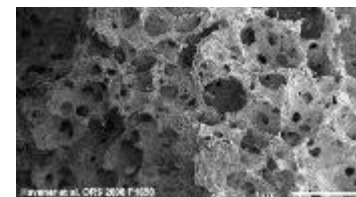
Caelyx



Nanofiber Wound Dressings
Bowlin, VCU
FASTCLOT



3M's FilTek® restorative dental



Stryker's Vitoss Bone Graft Substitute

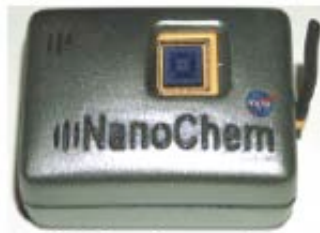


Nanosphere

Nanotechnology has made it into Space



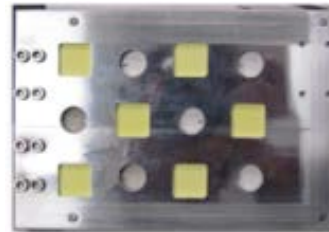
CNT Nanocomposites for Charge Dissipation



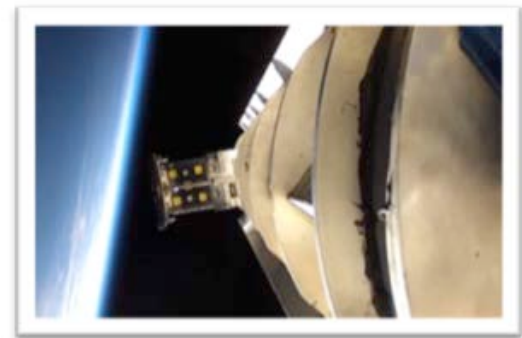
CNT “Electronic Nose”



Silica Aerogels



Polyimide Aerogels



Many of the current applications of nanotechnology improve existing products.

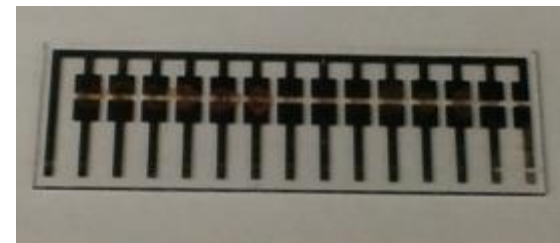


Easton Stealth CNT Bat

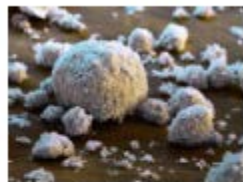
Future applications, however, will exploit the novel properties of nanomaterials and enable entirely new products.

Food & Agriculture

MIT



UV-blockers
(ZnO, TiO₂)



Antimicrobials
(AgNPs, MONPs)



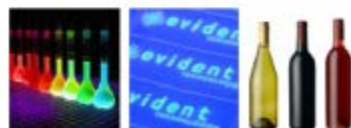
Sensing Applications
(QDs, AuNPs, etc.)



High Barrier Plastics
(Nanoclay, Graphite, etc.)



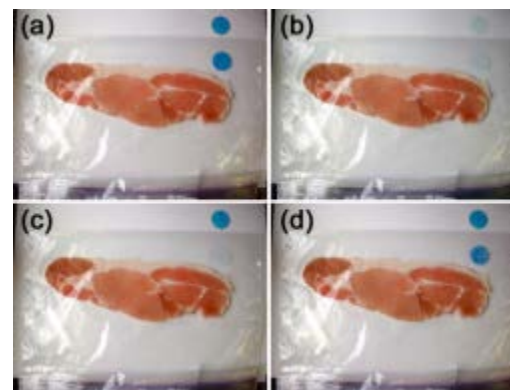
Anti-Counterfeiting Inks
(Semiconducting NPs)



Processing Aids
(TiN)

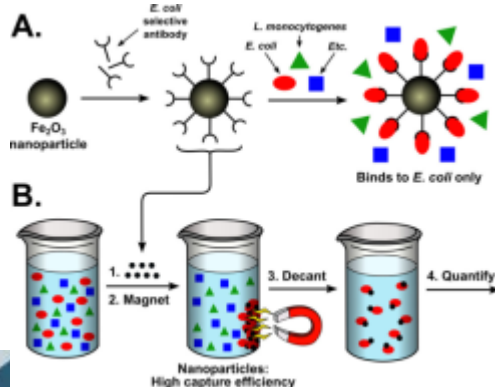


O₂ Sensing

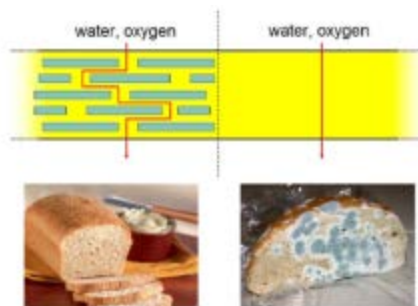


A. Mills, *Chem. Soc. Rev.* 34 (2005) 1003.

Nano-Immunomagnetic separation (IMS)

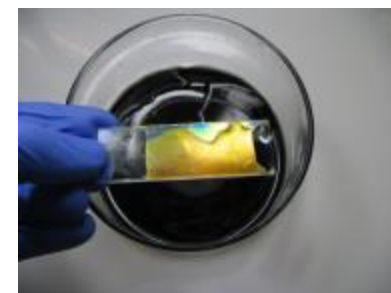


Courtesy of T. Duncan, FDA



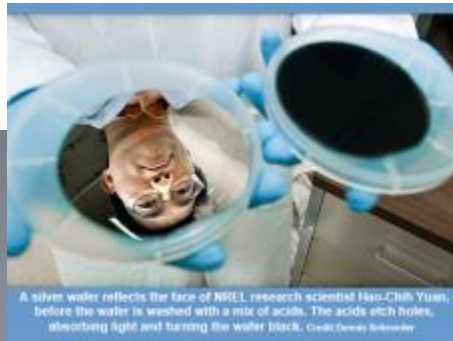
Duncan, *J. Colloid Interf. Sci.* 363 (2011) 1-24.

Photonic gel for smart packaging



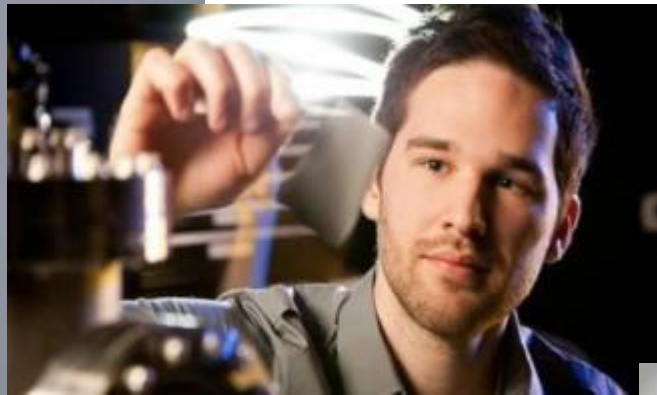
Rice & MIT

Energy

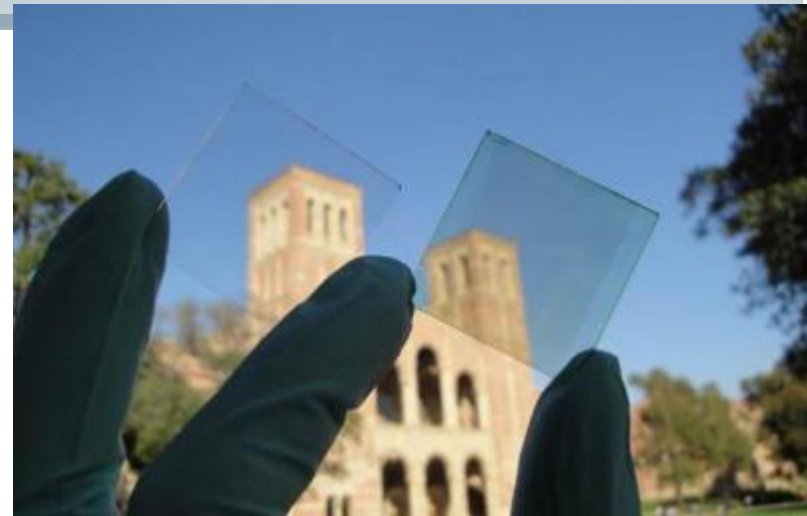


A silver water reflects the face of NREL research scientist Han-Chih Yuan, before the water is washed with a mix of acids. The acids etch holes, absorbing light and turning the water black. Credit: Gregory Heisler

Power Felt

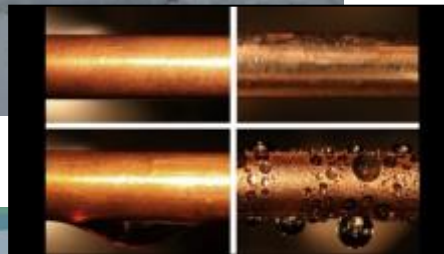


<http://news.wfu.edu/2012/02/22/power-felt-gives-a-charge/>



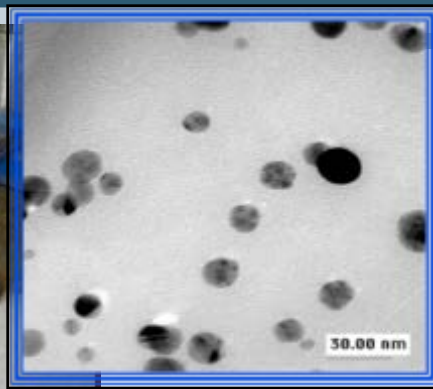
<http://www.complex.com/art-design/2012/07/ucla-researchers-develop-window-glass-that-collects-solar-energy>

Adaptive Textiles Technology with Active Cooling and Heating, ATTACH



<https://newsoffice.mit.edu/2015/graphene-coating-more-efficient-power-plants-0529>

Water



Point of Use Water Treatment



<http://spectrum.ieee.org/nanoclast/semiconductors/nanotechnology/nanoparticle-sensor-detects-mercury-at-levels-a-million-times-below-current-technology>



Smith, UVa



Bacterial Removal System Using CNT Clusters
University of Arkansas

<http://theinstitute.ieee.org/technology-focus/technology-topic/purifying-water-with-nanotech>



The Drinkable Book
Point of use water treatment.
http://pagedrinkingpaper.com/the_drinkable_book/



Rice
<http://www.youtube.com/watch?v=OCKyMn-2edo>

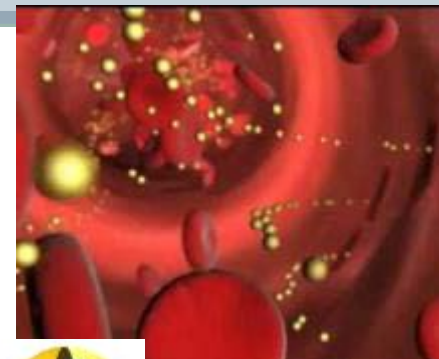
Nanosponges soak up oil again and again
<http://phys.org/news/2012-04-nanosponges-oil.html>

Medicine

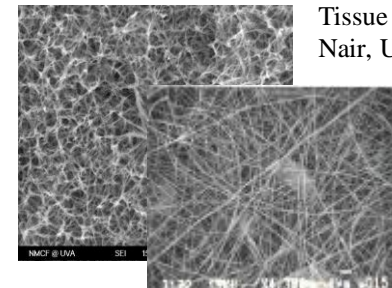


CNN: Will Nanotechnology Allow You to "Swallow the Doctor?"

<http://edition.cnn.com/2015/01/29/tech/mci-nanobots-eth/index.html>



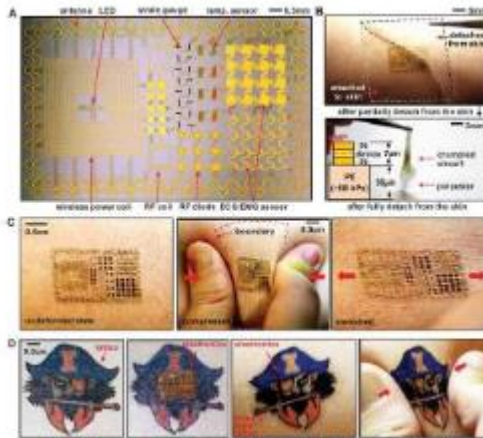
NanoSpectra Biosciences



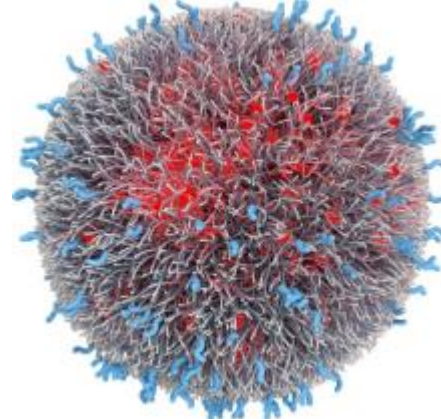
Tissue Scaffolds
Nair, UVA



Artificial ACL-
Northwestern



Targeted Drug Delivery



Bind Therapeutics

Nano Star Robots perform non invasive biopsies



<http://rogers.matse.illinois.edu/files/2011/eesscience.pdf>

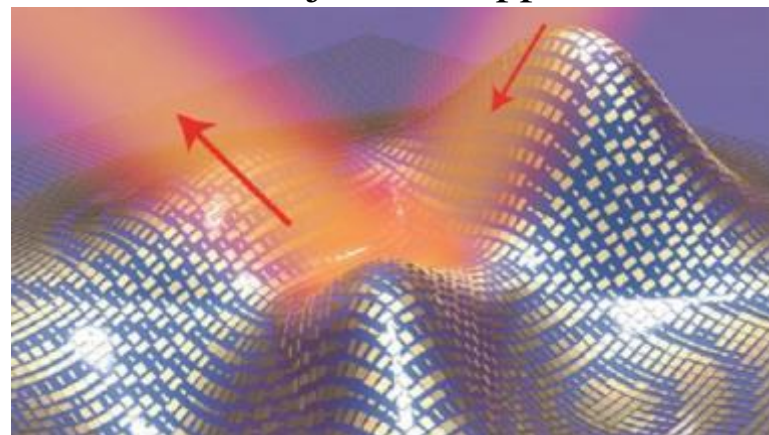
<http://techcrunch.com/2015/06/10/nanometer-sized-robots-can-now-take-colon-biopsies/>

Superheroes & magic enabled by nanotechnology



Stanford University

Nano-Thin Invisibility Cloak Makes
3D Objects Disappear



DOE Berkeley Lab and UC Berkeley

National Nanotechnology Day! October 9th



Nano.gov
National Nanotechnology Initiative

What Are **YOU** Doing for National Nanotechnology Day?

National Nanotechnology Day will feature a series of community-led events and activities on or around October 9th to help to raise awareness of nanotechnology, how it is currently used in products that enrich our daily lives, and the challenges and opportunities it holds for the future. This date, 10/9, pays homage to the nanometer scale, 10⁹ meters.

Planning for various events, activities, papers, and articles is underway at organizations around the country, and the list is growing! In addition, the National Nanotechnology Coordination Office is promoting activities, including the 100 Billion Nanometer Dash. How fast can you run 100 Billion Nanometers?

Do you have an event planned for National Nanotechnology Day?
Email us at info@nnco.nano.gov

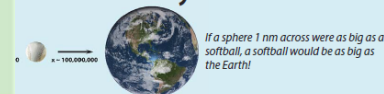
Tell us what you are doing for
National Nanotechnology Day!

How do YOU think nanotechnology benefits society?



Nano Nuggets are short videos featuring experts, visionaries, and artists sharing their thoughts on nanotechnology.

#NationalNanoDay is October 9th!



Science, engineering, and technology at the nanoscale impacts:

- Water
- Medicine
- Manufacturing
- Computing
- Smart Materials
- Nanomachines
- Superheroes
- And so much more!

Share your **Nano Nuggets**, too!

Send a link to info@nnco.nano.gov or
use #NationalNanoDay

Want to learn more? Go to Nano.gov



How fast can YOU run 100 BILLION NANOMETERS???



Upload a picture or
video of yourself running
#100BillionNanometers for
National Nanotechnology Day.

(There are 1 billion nanometers [1,000,000,000 nm] in 1 meter, so 100 billion nanometers = 100 meters)

#NationalNanoDay is October 9th!



What's the big deal about something so small?

Cool things happen at the nanoscale resulting in new materials and devices with amazing properties that are already changing our way of life.

Nanotechnology is already in:

- Phones that are really pocket-sized super computers
- Odor-resistant fabrics so our running and workout clothes don't stink
- Displays for our tablets and flat screen TVs with more vibrant pictures

Nanotechnology will soon be in:

- Metamaterials that can be turned into invisibility cloaks
- Better drugs to treat infectious diseases and cancer
- Gecko-inspired gloves so that you can literally climb walls

Want to learn more? Go to Nano.gov



#NationalNanoDay | #100BillionNanometers | #100BNM

NANO NUGGETS

are short videos featuring experts, visionaries, and artists sharing their thoughts on nanotechnology.

NNI 2.0 Depends on You

The promise of nanotechnology can only be achieved through community involvement. We want to hear from you.

How to engage?

- Webinars
- Workshops
- Respond to RFIs
- Contact NNCO

Thank you.

Lisa E. Friedersdorf, PhD
Deputy Director
National Nanotechnology Coordination Office

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Thank You!

Thank you for attending the
NACK Network & NCI-SW webinar

Please take a moment to complete our
survey