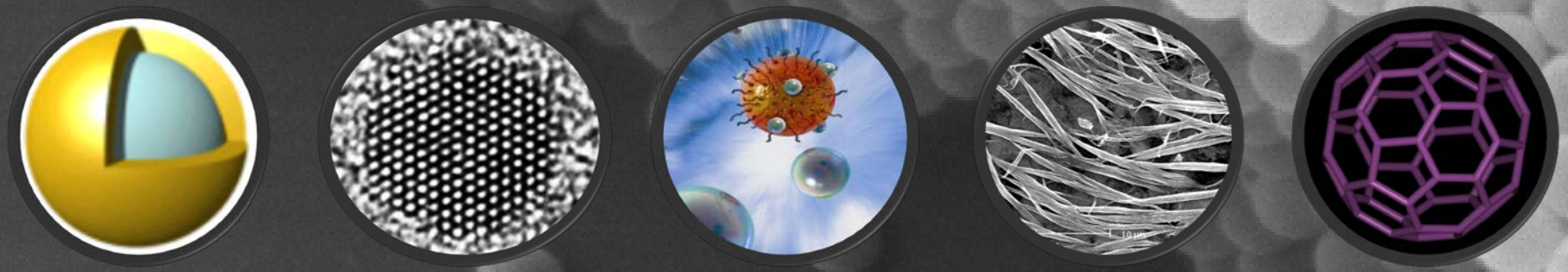
American Chemical Society
Science and the Congress Project

Nanomaterial Safety: Do We Have the Right Tools?



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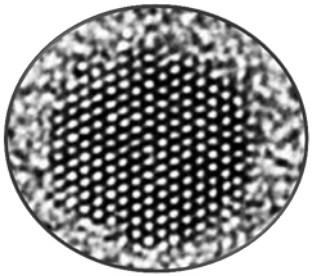
IDA-Science and Technology Policy Institute

Nanotechnology in a Nutshell

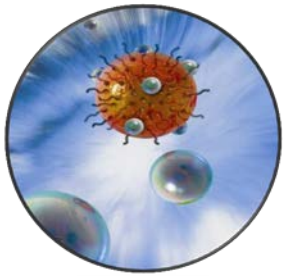
Nanotechnology is the understanding and control of **matter** at dimensions between approximately **1 and 100 nanometers**, where **unique phenomena** enable novel applications. *--nano.gov*

A **nanomaterial** is an object with 1 or more dimensions between 1-100 nm.

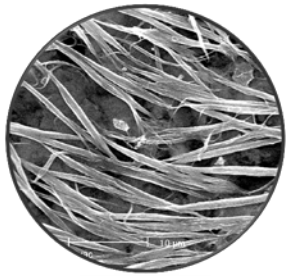
cancer therapy



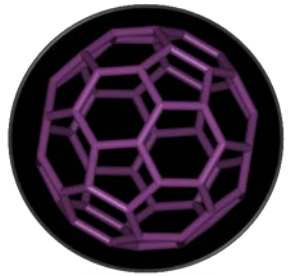
disease diagnosis



water treatment



energy transmission



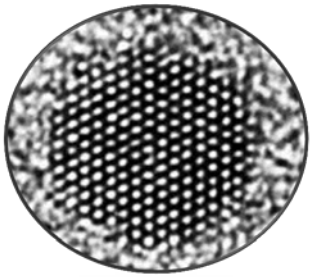
drug delivery

Image credit: Rice University

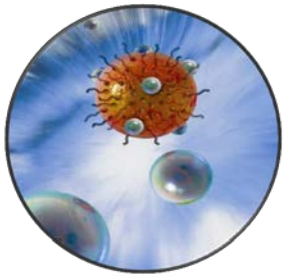
Nanomaterial Diversity

Different chemical substances

Gold,
Silicon dioxide



Cadmium
selenide



Iron oxide

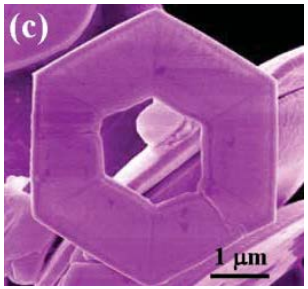
Carbon

Carbon

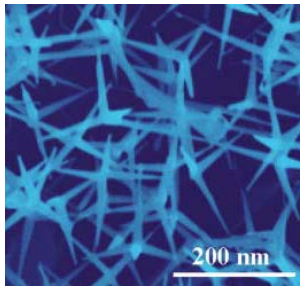
Image credit: Rice University

Nanomaterial Diversity

Different shapes and structures

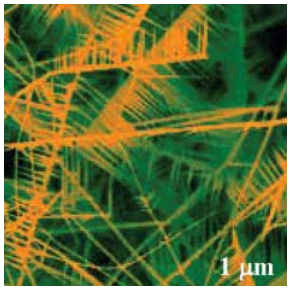


Zinc Oxide

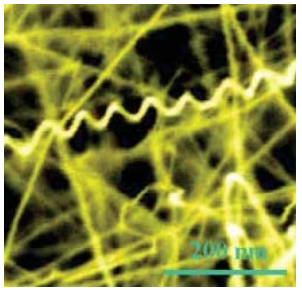


Zinc Oxide

Zinc Oxide



Zinc Oxide



Zinc Oxide

Image credit: Zhong Lin Wang

Nanomaterial Diversity

Size-dependent properties

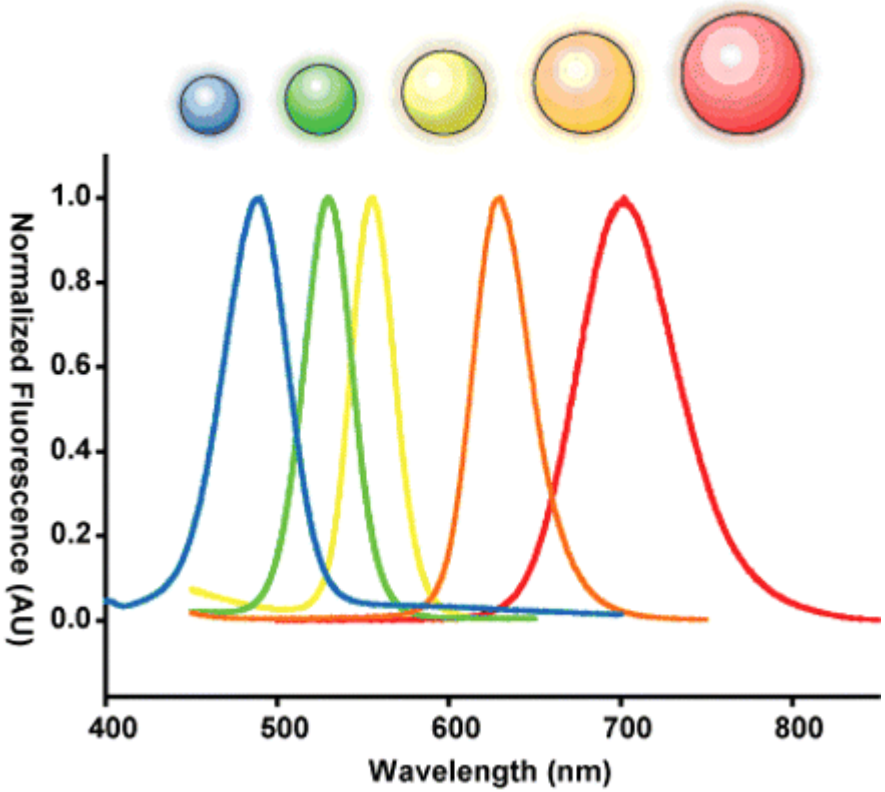


Image credit: http://asheducationbook.hematologylibrary.org/content/2009/1/701.full

Nanomaterial Diversity

Different surface chemistry

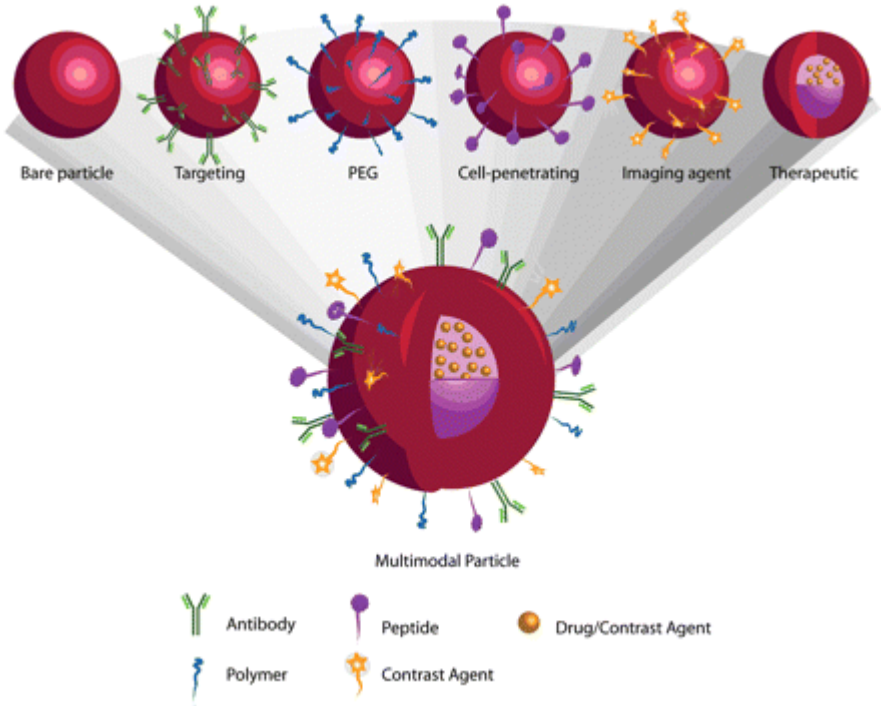
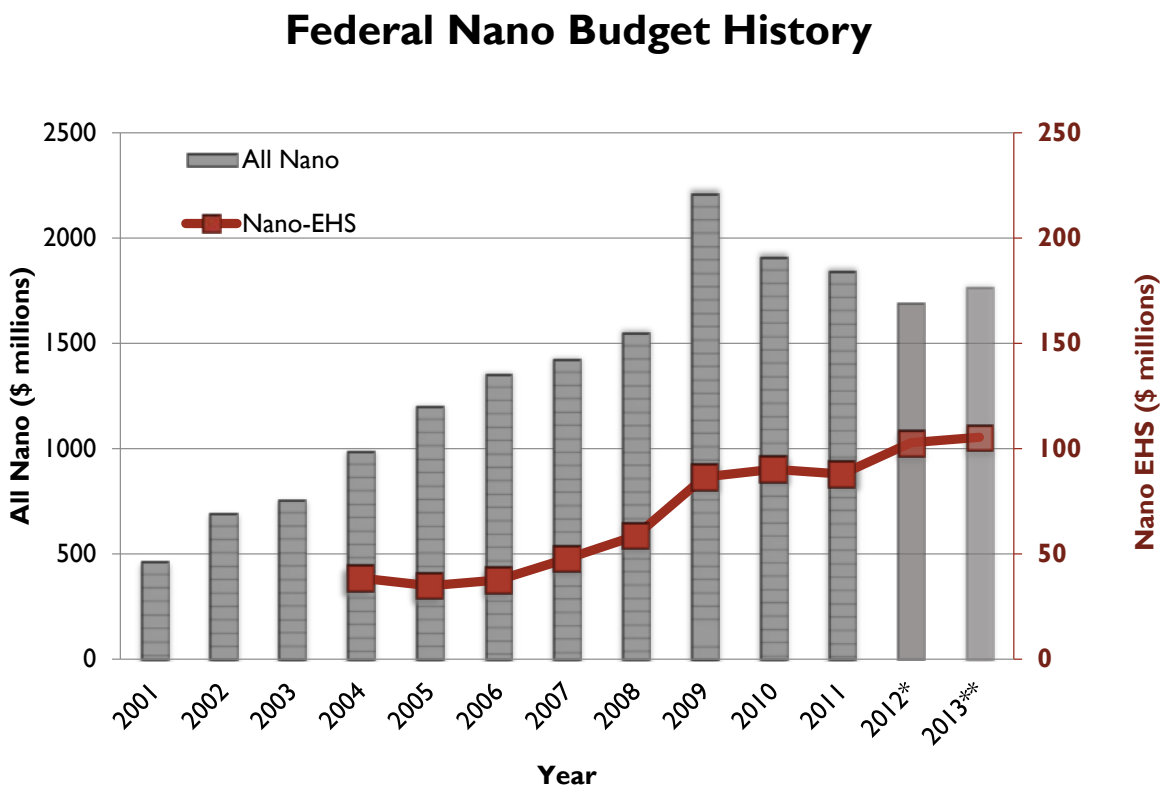


Image credit: http://asheducationbook.hematologylibrary.org/content/2009/1/701.full

Balancing the Benefits and Risks

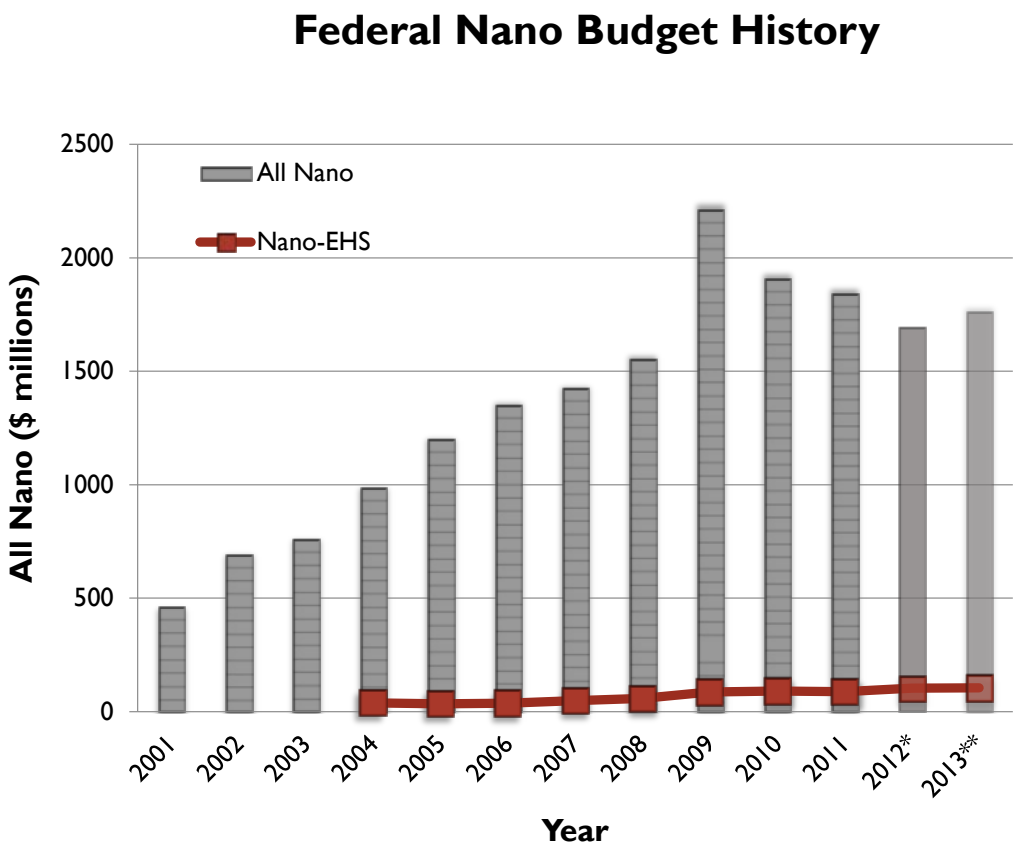
Nanomaterials' special physical and chemical properties may lead to unexpected interactions with biological and environmental systems.

Federal Investment in NanoEHS Research



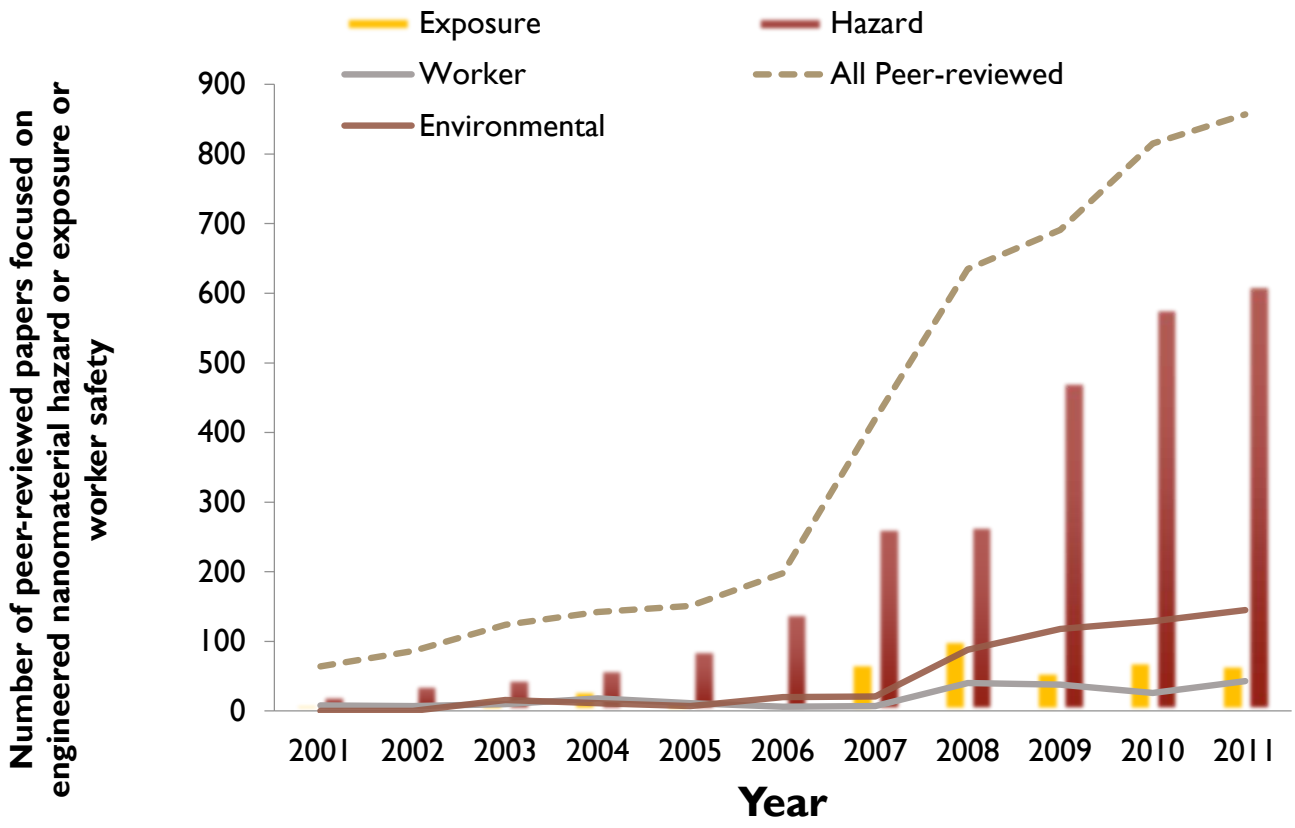
Environmental, Health and Safety (EHS) research has made up 3-7% of the federal nanotechnology budget

Federal Investment in NanoEHS Research



Environmental, Health and Safety (EHS) research has made up 3-7% of the federal nanotechnology budget

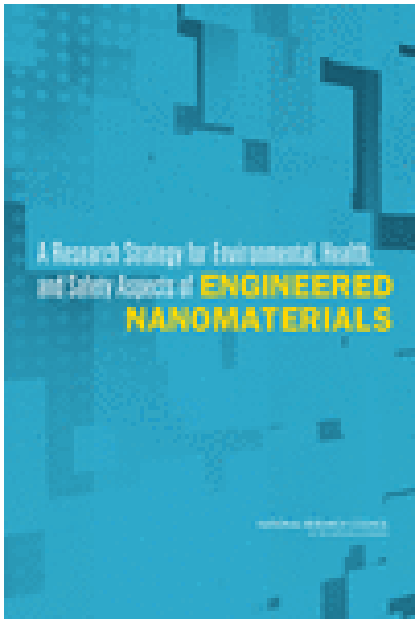
Where are the Knowledge Gaps?



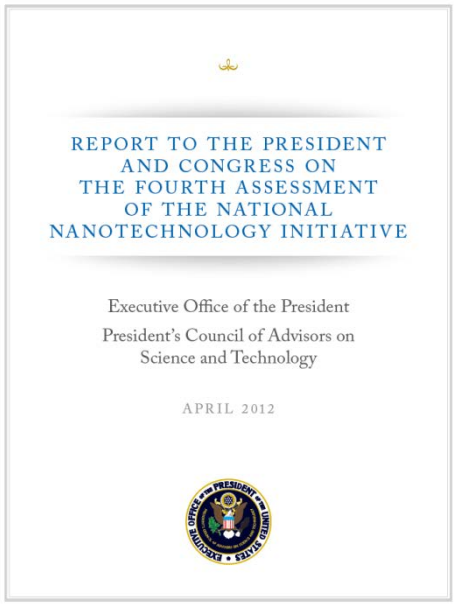
RESULT: Research knowledge base has little practical application to human health

Source: http://icon.rice.edu/report.cfm

Guidance Documents Call for Regulator-Ready Research



National Research Council



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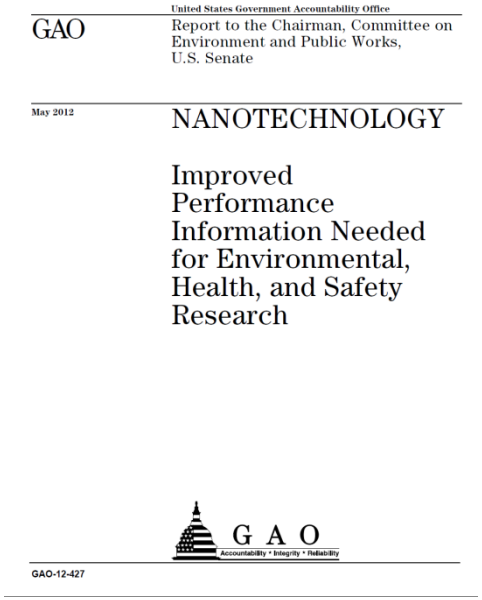

GAO