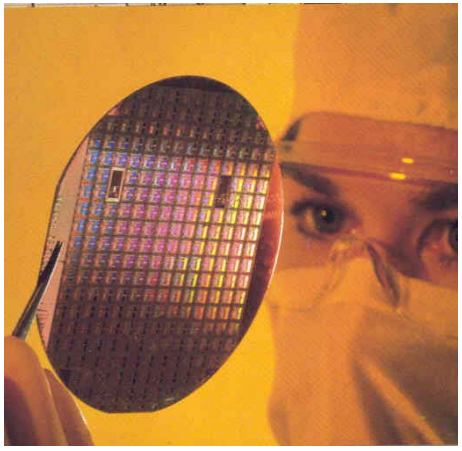
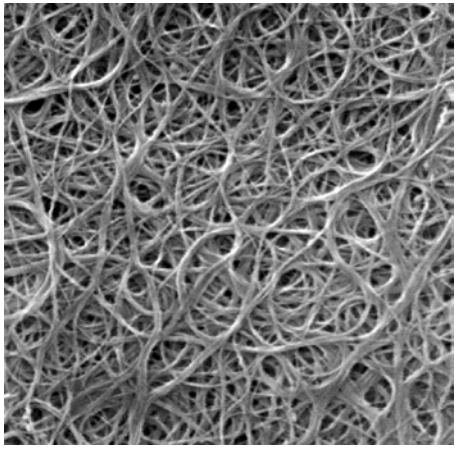
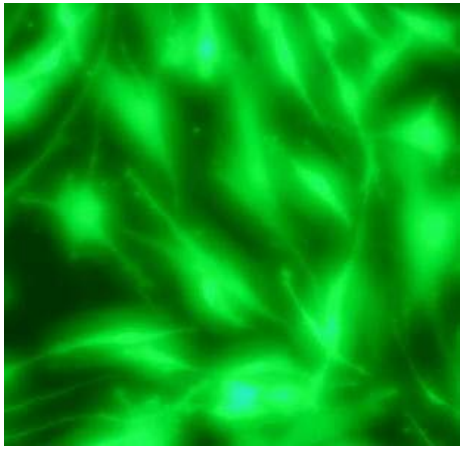
The GoodNanoGuide

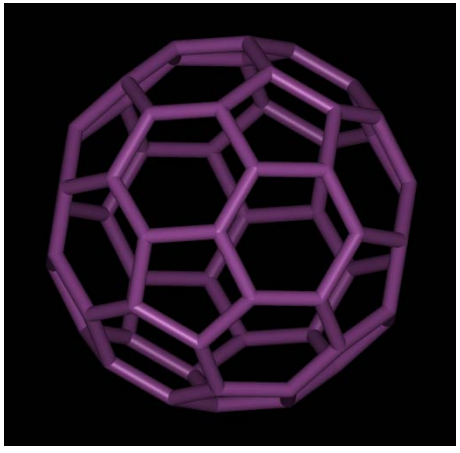
A new tool for collaboration on workplace safety

Kristen M. Kulinowski, PhD | kk@rice.edu







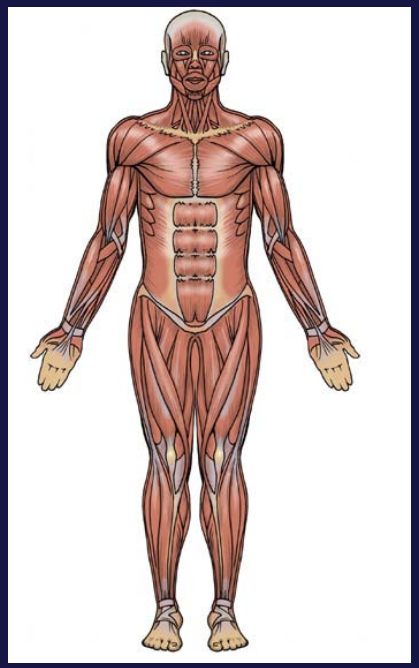


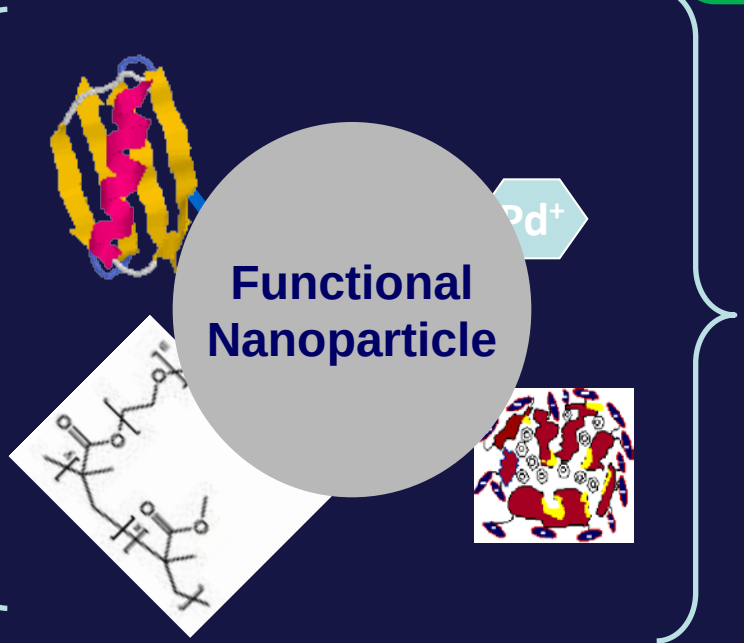
RICE

Unconventional Wisdom

Center for Biological & Environmental Nanotechnology

Research | **Education** | **Outreach**





Theme 2: Nanoparticles for Bioengineering

Theme 1: Nanoscience at the Wet/Dry Interface

Theme 3: Nanoparticles & Environmental Engineering

International Council on Nanotechnology

INCLUSIVE

Multistakeholder cooperation

GLOBAL

International perspective

TECHNICAL

Grounded in science

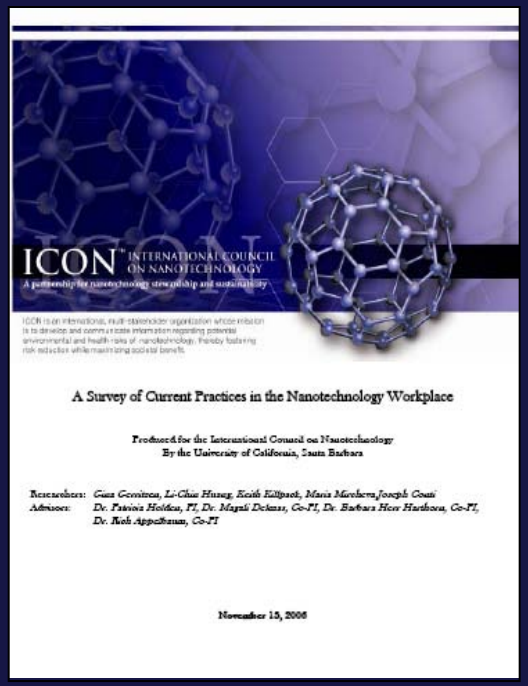
PROACTIVE

Stewards for sustainability

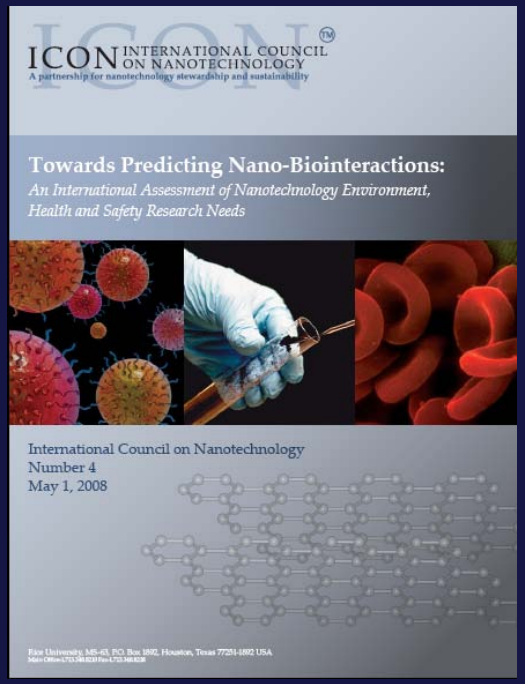
Developing and communicating information regarding potential environmental and health risks of nanotechnology to foster risk reduction and maximize societal benefit.

ICON is Information…

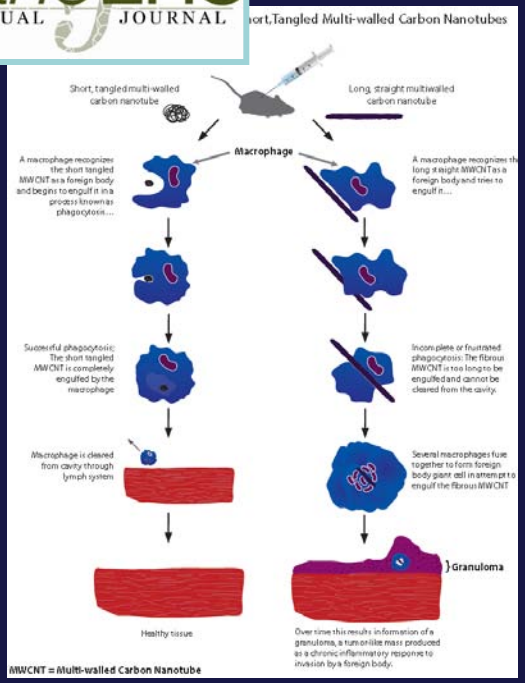
Knowledge Base



Survey



Reports



Backgrounders

The GoodNanoGuide

Virtual Journal of NanoEHS

Database of citations to peer-reviewed nanoEHS papers


nanoEHS
VIRTUAL JOURNAL

The Virtual Journal of Nanotechnology Environment, Health and Safety

HOT PAPER: "Nucleation of protein fibrillation by nanoparticles," Linse, S., C. Cabaleiro-Lago, Xue, W.-F., Lynch, I., Lindman, S., Thulin, E., Radford, S. E., Dawson, K. A. (2007). Proceedings of the National Academy of Sciences of the United States of America XXX(XXX): XXX.

This work explores the role that nanoparticles play in accelerating the rate of a process called protein fibrillation, which has been linked to amyloid diseases. Amyloid diseases are a broad class of ailments that result when amyloid proteins misfold and form insoluble fibrous plaques (fibrils) that deposit in the tissues of the body. Linse et al. noted an increased rate of protein fibrillation when beta 2-microglobulin, an amyloid protein associated with complications from kidney dialysis, was put into solution with nanoparticles. Four different types of nanoparticles (copolymer particles of N-iso-propylacrylamide (NIPAM) and N-tert-butylacrylamide (BAM), cerium oxide particles, CdSe or CdSe/ZnS quantum dots and multi-walled carbon nanotubes) each accelerated the production of small seeds upon which fibrils form most effectively. However this study did not determine that nanoparticles can cause human disease.

For a general overview on nanoparticles and amyloid diseases, see here.

For questions and answers about nanoparticles and amyloid diseases, see here.

More Information.

Recent Additions See the full issue

NEW ZnO – nanostructures, defects and devices
Schmidt-Mende L, MacManus-Driscoll JL
Materials Today
Materials Today, 2007, 10 (5): 40-48.

Details

Recent Virtual Journal Issues:
April 2007
March 2007
February 2007
January 2007
December 2006
November 2006
October 2006
September 2006
August 2006
July 2006
June 2006
May 2006

Other Issue: Go

- Monthly updates
- Over 3500 records
- Backgrounders on key literature

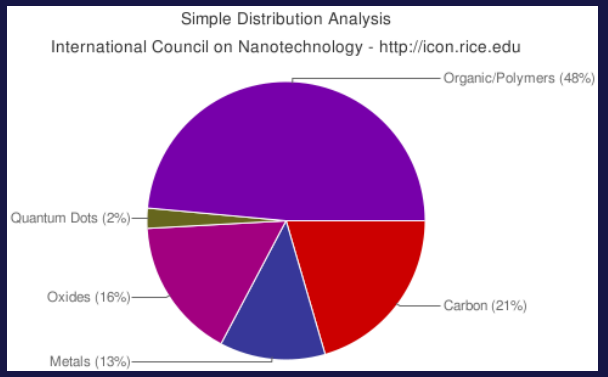
★★★★ [out of five]
"This paper makes a major contribution to the literature …"

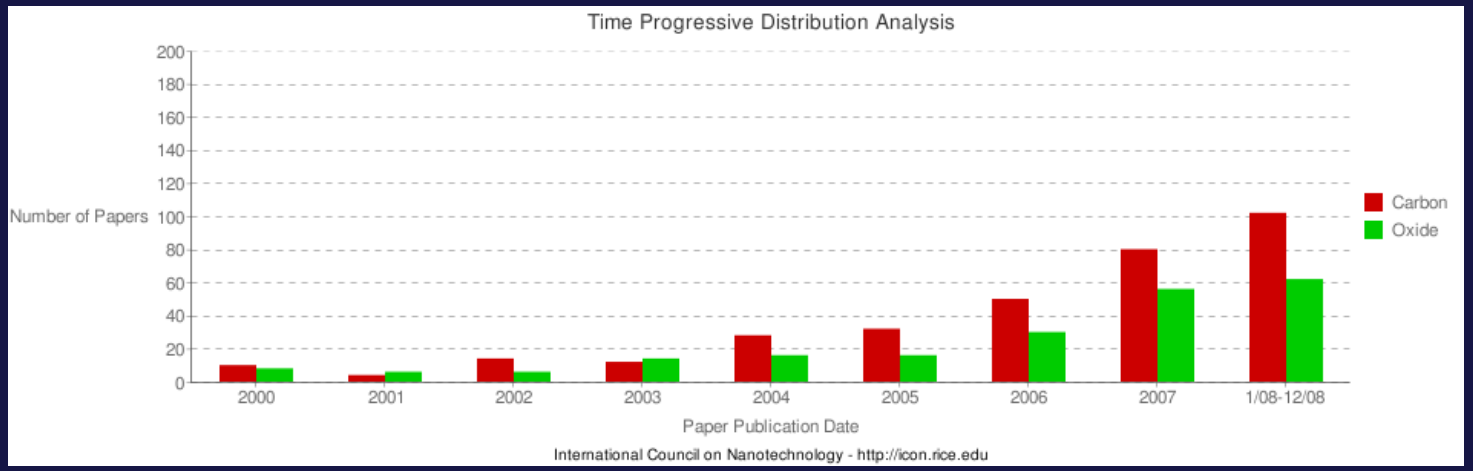
http://icon.rice.edu/virtualjournal.cfm

Analyze the NanoEHS Research

Enabling real-time analyses of the NanoEHS literature

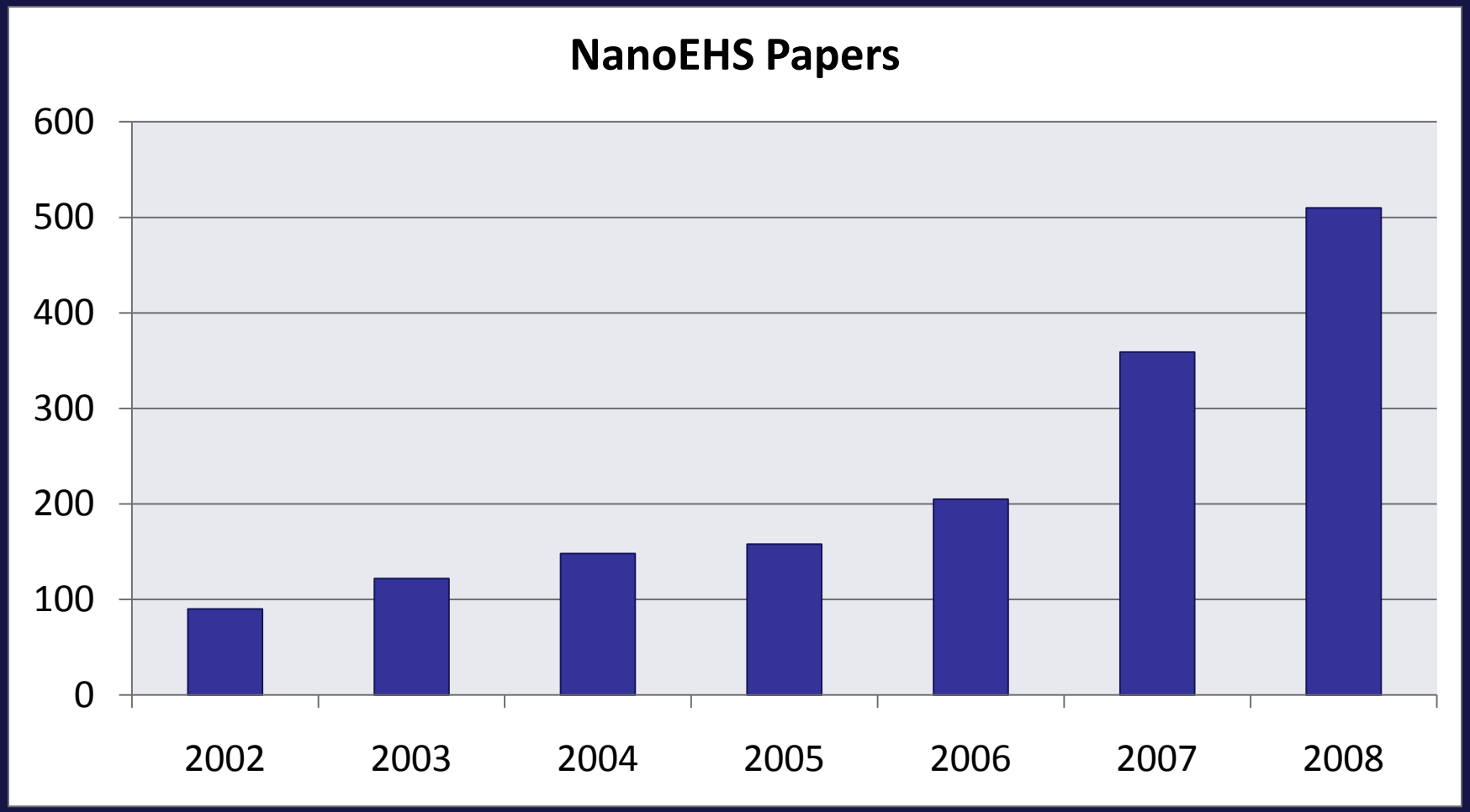
- Track trends
- Generate custom reports
- Hyperlinked publication list
- Flash animation tutorial





http://icon.rice.edu/research.cfm

EHS Publication Pace is Increasing



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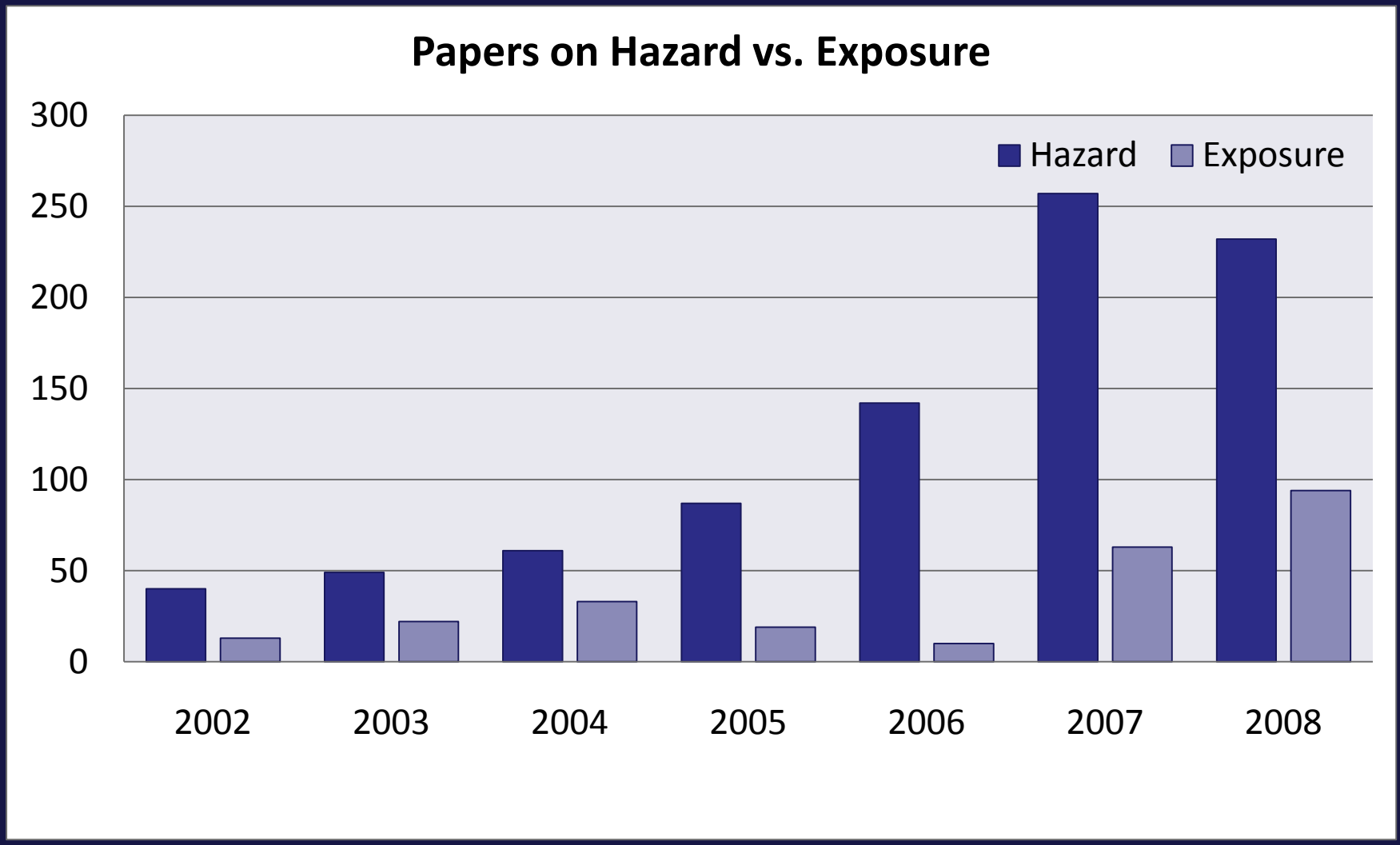
Hazard Data Outstrip Exposure Data



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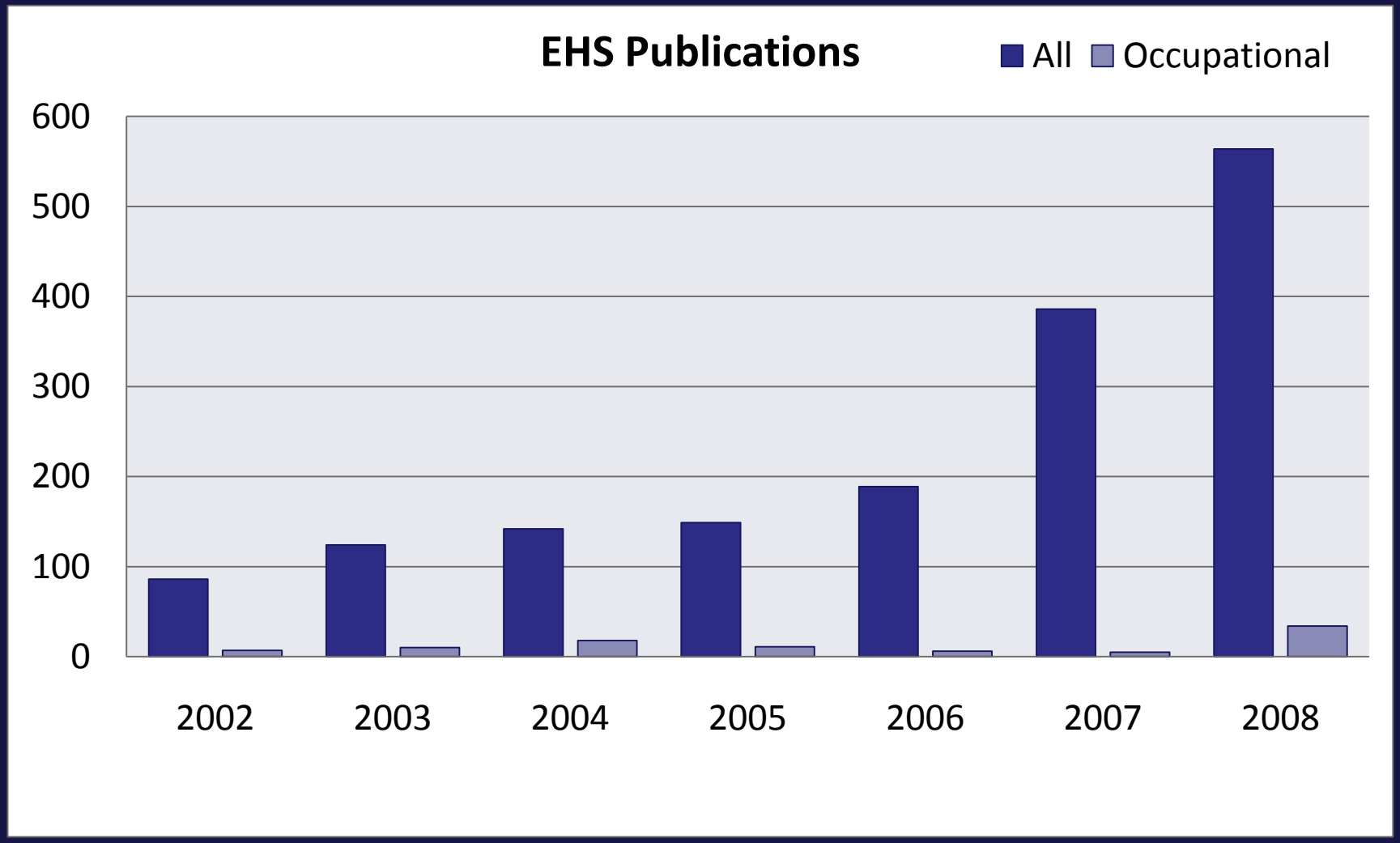
Occupational Research Limited



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

Key Questions for People Working with Nanomaterials

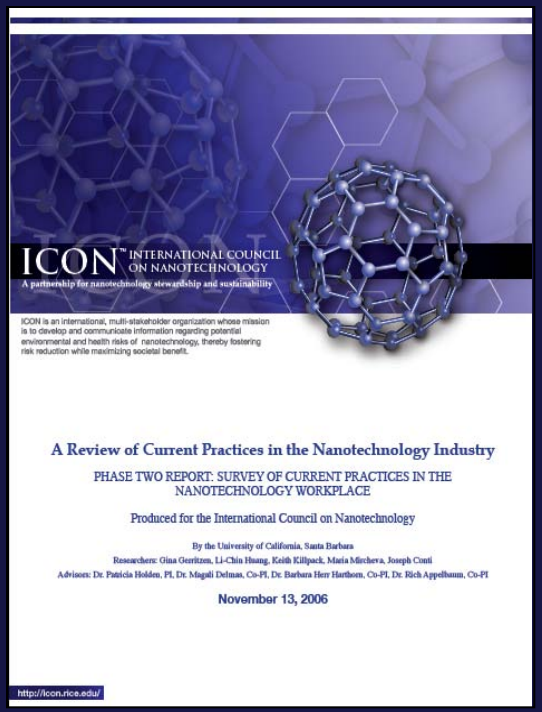
- What are you doing now?
- What do you need to know to do the best job?
- Where are you going for information?

Workers: Survey of Current Handling Practices

First comprehensive, international survey of handling practices in the nanotech workplace

Key findings

- Nano-specific EHS programs and training are widely reported
- Actual practices do not depart from conventional chemical safety practices
- Active interest in additional information
- Main impediment: Lack of information and guidance



http://tinyurl.com/ICONSurvey
and
Environ. Sci. Technol. 2008, *42*, 3155-3162

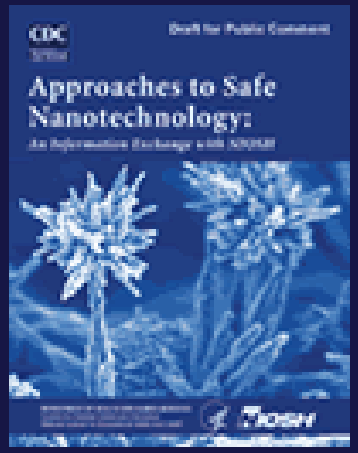
NIOSH

UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Some Resources for Handling Nano

US

DOE NSRC

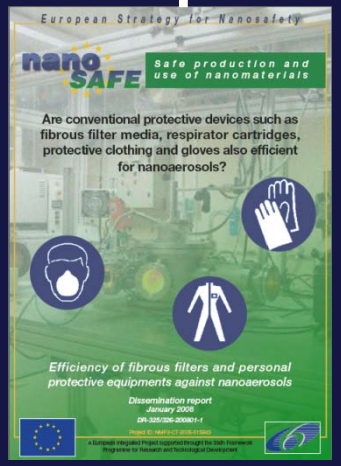


NIOSH

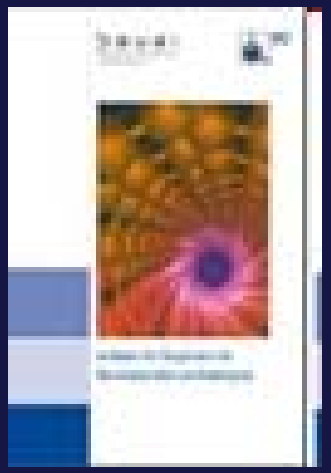
Canada

IRSST

Europe



NanoSafe2



BAUA

ASTM INTERNATIONAL

E2535-07

ISO International Organization for Standardization

ISO/TR 12885

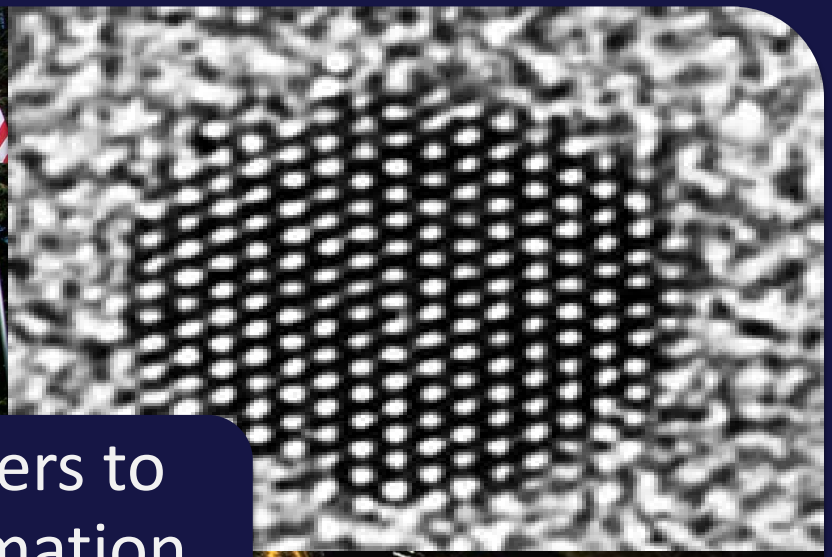
BSi

PD 6699-2:2007

Common Messages

- Nanomaterial behavior may differ from that of non-nanoscale analogs
- Some nanomaterials may pose health risks if exposure is present
- Hazard and exposure data do not yet provide a clear picture of risk

MINIMIZING EXPOSURE IS PRUDENT



Barriers to Information Sharing

How do we get

Timely

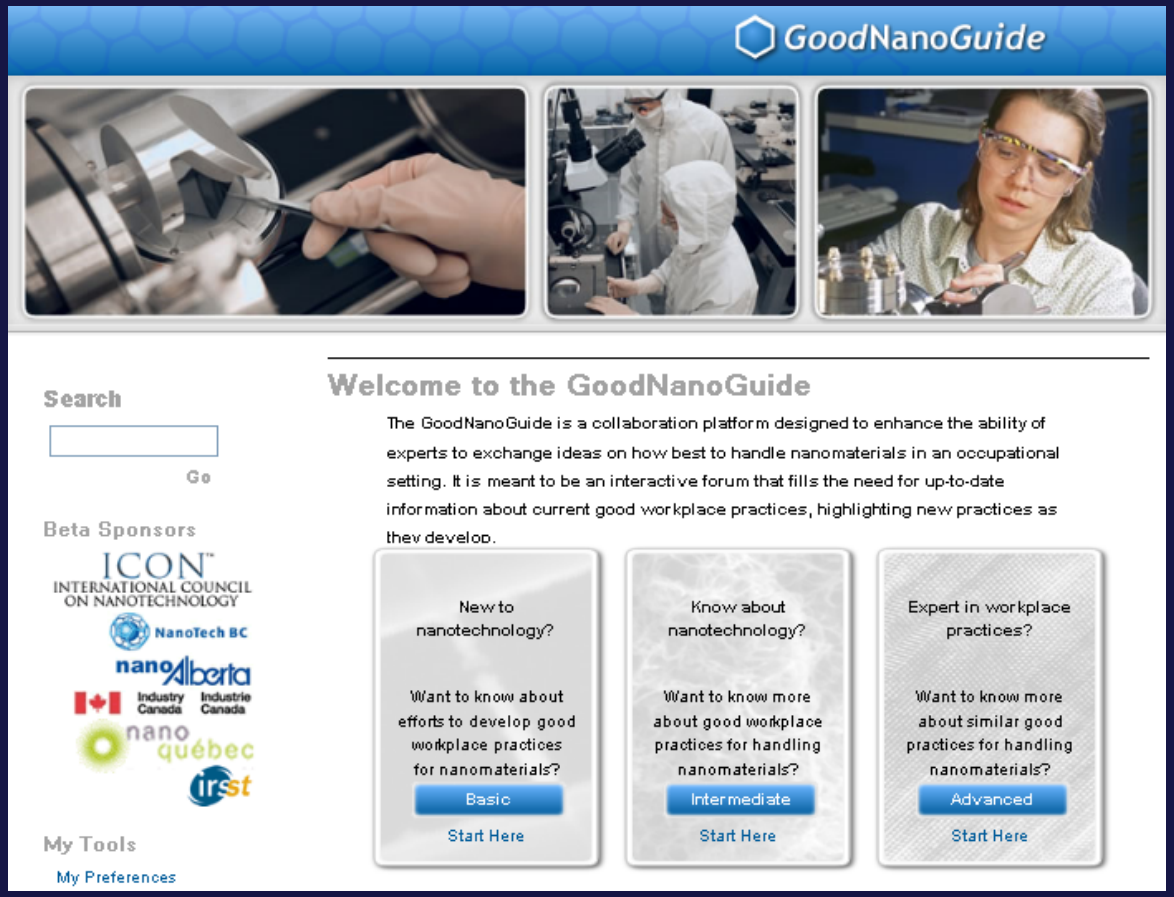
Practical

High-quality

information out

to ALL the target populations?

The GoodNanoGuide



- Protected Internet site on occupational practices for the safe handling of nanomaterials
- Multiple stakeholders contribute, share and discuss information
- Modern, interactive, up-to-date
- Launched 1 June 2009

http://GoodNanoGuide.org

What is a Wiki?

A Wiki is central, shared repository of online information

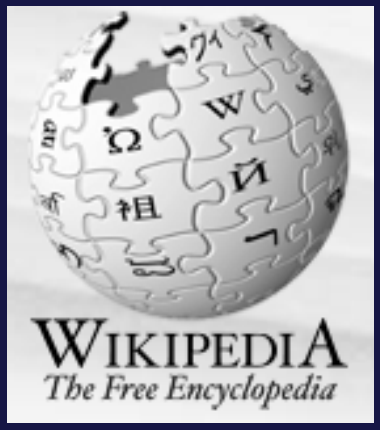
Anyone can edit the pages

Wikis for Dummies

Editing is easy and requires no special tools

Formatting is simple

Changes are easily tracked



Why a Wiki for Nano Handling Practices?

Features	Guidance Document	Research Paper	Wiki Entry
Describes a specific practice	No	Maybe	YES
Written by practitioners	Maybe	Maybe	YES
Written for practitioners	Maybe	No	YES
Engages global community	No	Maybe	YES
Provides a forum for dialog	No	No	YES
Easily accessed	YES	No	YES

Interacting with the GoodNanoGuide

VIEW

No Registration Required

COMMENT

Register as a Community Member

CONTRIBUTE

Register as an Expert Provider

Implementation Committee

Dr. Michael Riediker
Institute for Work and Health

Mr. Bruce Stockmeier
Argonne National Lab

Dr. Kristen Kulinowski
Rice University

Gary Albach
nanoAlberta

Dr. Paul-Émile Boileau
IRSST

Mr. Steve Brown
Intel

Ms. Ilise Feitshans
International Labour Organization

Dr. Charles Geraci
NIOSH

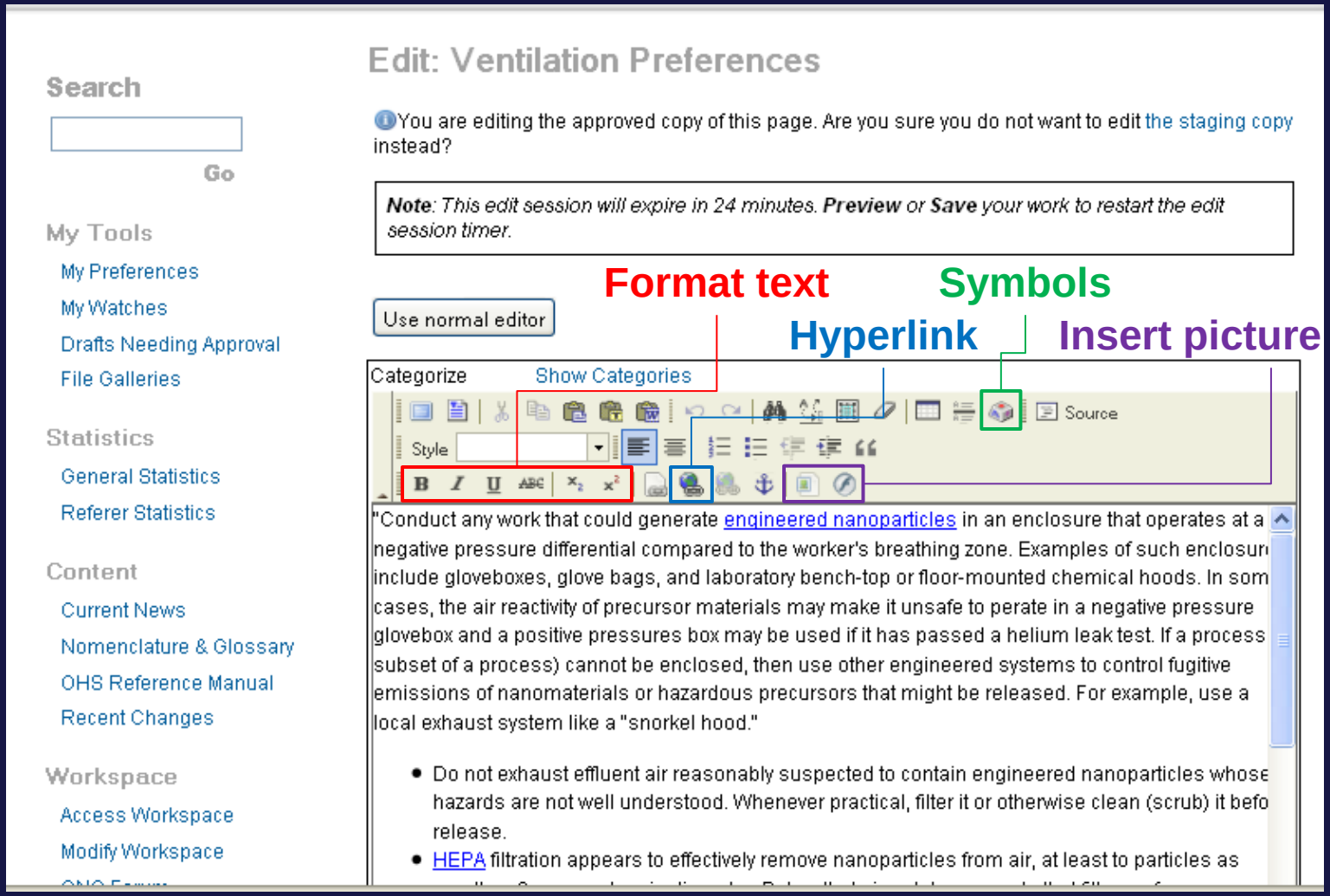
Dr. Steve Hankin
SafeNano

Dr. Mark Hoover
NIOSH

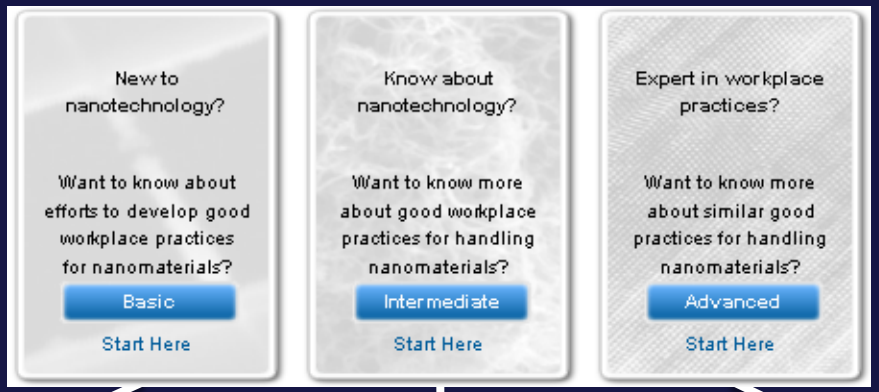
Mr. Matthew Jaffe
Crowell & Moring

Mr. Victor Jones
NanoTechBC

Contribute & Edit using Familiar Tools



How Content is Organized



Basic

- Introduction to Nanotechnology
- Nomenclature and Glossary

Intermediate

- OHS Reference Manual

Expert

- Expert Matrix
- Specific Protocols

OHS Reference Manual

OHS Reference Manual

The GoodNanoGuide provides both environmental, health and safety ("EHS") Protocols and an EHS Reference Manual. The EHS Reference Manual outlines the approaches taken by professionals using research about nanomaterials and other precedents to develop appropriate protocols and guidelines. The Manual is open for edit and comment and is organized into six sections sequenced to conform with general industrial processes employed by professionals who investigate risks and develop protocols for mitigating risks:

Section I - A Well-Defined Description of Work - This is the important description of the specific work and EHS environment.

Section II - Identify Hazard - This requires use of the main concepts of nanomaterial physico-chemical characteristics, toxicology, ecotoxicology, and hazard classifications and EHS concepts to inform the consideration of the materials and factors that may constitute potential exposure and EHS risk from nanomaterials.

Section III - Assess Potential Exposures - This analysis of the range of locations, types of person(s) and exposure routes allows the professional to recommend practices for qualitative and quantitative exposure assessment.

Section IV - Develop Risk Management Plan - This deals with the elements of the Plan based on the principles of controlling and managing exposure and how to apply good EHS and control practices.

Section V - Verify Control Measures - Key to any EHS process is the need for the tools to evaluate the exposures, effectiveness of control measures and verification of procedures.

Section VI - Periodically Re-Evaluate Good Practices - Outlines the rationale for periodic reviews of the EHS protocols and exposure risks to allow for amendments and quality improvement over time.

II. Identify Hazard

- Physicochemical Characteristics
  - Particle Size and Size Distribution
  - Surface Area
  - Surface Chemistry or Activity
  - Other Physicochemical Characteristics
- Toxicity Characteristics
- Ecotoxicity Characteristics
- Hazard Class Assignment
- Hazard Communication Plan

Intermediate

OHS Expert Matrix

Nanoparticles in: →	Dry Powder	Liquid Dispersion	Solid Polymer Matrix	Nonpolymer Matrix

Assessment should

- **Look at the form of the nanoparticle**
- **Consider the entire process**

Expert

Nanoparticles in: →	Dry Powder	Liquid Dispersion	Solid Polymer Matrix	Nonpolymer Matrix
First Step: Identify	Potential Hazard	Potential Hazard	Potential Hazard	Potential Hazard
Second and Third Steps: Risk Assessment and Management				
Material Unpacking	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
Synthesis	Exposure Potential	Exposure Potential		
	Controls	Controls		
Weighing and Measuring	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
Dispersing	Exposure Potential	Exposure Potential		
	Controls	Controls		
Mixing	Exposure Potential	Exposure Potential		
	Controls	Controls		
Spraying	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
Machining	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
Packing	Exposure Potential	Exposure Potential	Exposure Potential?	Exposure Potential?
	Controls	Controls	Controls	Controls
Process Equipment Cleaning	Exposure Potential?	Exposure Potential?	Exposure Potential?	Exposure Potential?
	Controls	Controls	Controls	Controls
Workspace Cleaning	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
Spill Cleanup	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
Waste Management	Exposure Potential?	Exposure Potential?	Exposure Potential?	Exposure Potential?
	Controls	Controls	Controls	Controls
	Environmental Procedures	Environmental Procedures	Environmental Procedures	Environmental Procedures
Reasonably Foreseeable Emergencies	Exposure Potential	Exposure Potential	Exposure Potential	Exposure Potential
	Controls	Controls	Controls	Controls
	Environmental Procedures	Environmental Procedures	Environmental Procedures	Environmental Procedures

Please click here to access the OHS Reference Manual

Conclusions

- Nanomaterials pose many complex challenges to the occupational safety professional
- There are good resources out there already
- New knowledge is evolving rapidly and from many corners of the globe

Let’s pool our knowledge for the benefit of all

GoodNanoGuide Sponsors

NIOSH National Institute for Occupational Safety and Health

NanoTech BC

nanoAlberta

Industry Canada Industrie Canada
Canada

nano québec
l'avenir des nanos est ici
nanotech's future is here

irsst

Now available at http://goodnanoguide.org

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