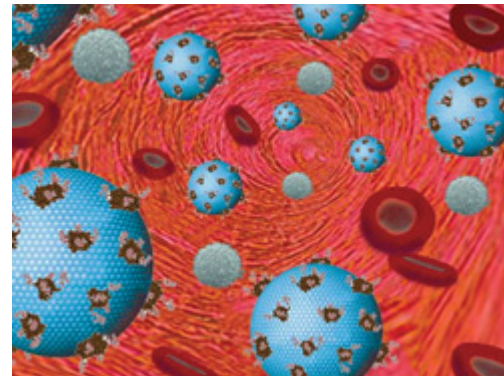


NANOPARTICLE SAFETY

SAFETY CONCERNS

A nanoparticle is any material that has at least one dimension that is less than 100 nanometers. They exhibit unique properties because of their small size and large comparative surface area. NIOSH has studied in great detail the toxicity of incidental exposures to nanoparticles generated from processes involving combustion, welding, or diesel engines. However, less is known about nanoparticles that are intentionally produced (engineered) with diameters smaller than 100 nanometers and uncertainties exist as to whether they pose occupational health risks. These uncertainties arise because of gaps in knowledge about potential routes of exposure, movement of nanomaterials once they enter the body, and the interaction of the materials with the body's biological systems.



Results from existing studies in animals and humans on exposure to incidental nanoscale and other respirable particles provide preliminary information on the possible adverse health effects from exposures to similar engineered nanomaterials.

CONTROL MEASURES

Engineering Controls:

For personnel and environmental protection, all manipulations with nanomaterials must be performed in either:

- A chemical fume hood. (The hood MUST be annually certified by EH&S) [**Preferred**]
- A local exhaust ventilation (LEV) system with High Efficiency Particulate Air (HEPA) filtration. (The system MUST be annually certified by EH&S)

Note: It is NEVER permitted to use an uncertified hood or ventilation system. To schedule certification testing or to inquire about a system's certification status, contact Jeffrey Harris of EH&S at 412.268.7501.

Work Practice Controls:

For personnel and environmental protection, the following work practice controls must be performed:

- Standard Operating Procedures (SOPs) must be developed, implemented and readily accessible to all personnel, detailing safe practices when preparing and using nanomaterials.
- All protocols involving the *in vivo* use of nanomaterials must be discussed with the Biological Safety Officer, Andrew Lawson, well in advance of the anticipated start date.
- Hand washing is required before and after working with nanomaterials, when removing PPE, and before leaving the lab area.
- All protocols involving the use of Particularly Hazardous Substances (PHS) must be reviewed by EH&S prior to the initiation of experiments involving nanomaterials.
- An eyewash station shall be provided in the laboratory and a safety shower shall be located in close proximity. The safety shower/eyewash shall comply with ANSI Z358.1. To obtain the requirements of this standard, contact Andrew Lawson of EH&S at (412)268-8405 or at alawson@andrew.cmu.edu.
- Clean all lab work areas using a HEPA-filtered vacuum cleaner or using a wet-method (wetting a cloth or sponge and wiping down all surfaces with this wet cloth or sponge) after the completion of work.
- No eating, drinking, applying cosmetics or lip balm, smoking, or handling contact lenses in the nanomaterials use area.

Personal Protective Equipment

For personnel and environmental protection, the following types of personal protective equipment (PPE) shall be used:

- Gowns or laboratory coats must be worn at all times in the nanomaterial use area. Lab coat laundering is available through the University's housing services. Contact Andrew Lawson at 8-8405 to obtain further information.
- Protective gloves that are compatible with the chemical(s) in use must be worn at all times in the nanomaterial use area. Gloves should cover the hands and wrists completely and should overlap with the sleeves of the lab coat or gown.
- Closed-toed shoes must always be worn in the nanomaterial use area.
- Minimize wearing personal protective equipment such as lab coats and gowns outside of the nanomaterial use areas to avoid potential exposure problems for persons outside of the nanomaterial use area.
- N-95 filtering face pieces (including "dust masks") or a more protective respirator must be worn when engineering controls are not adequate or not available. ***This need will be determined by EH&S.***



Note: All persons who wear any type of respirator, must be enrolled in Carnegie Mellon University's Respiratory Protection Program! To enroll in the program contact Mark Banister at 8-1493 or Andrew Lawson at 8-8405.

- Eye and face protection must be worn when the potential for exposure from splashes, splatters, or airborne nanoparticles exists. Safety glasses should be considered minimal eye protection and are worn to prevent injury from projectiles, or contact of contaminated hands with eyes. Goggles and/or face shields should be used when performing tasks with hazardous liquids or gases. **Please note** that personnel must follow any posted Personal Protective Equipment (PPE) requirements for their department or center!

TRAINING

All relevant and required safety training must be completed by all personnel prior to the initiation of experiments involving nanomaterials. As a minimum, all persons working with nanomaterials must attend Carnegie Mellon's Lab Safety and Hazardous Waste Generator training.

LABORATORY INSPECTIONS

Laboratories **MUST** be inspected by EH&S prior to the initiation of experiments involving nanomaterials. To have your laboratory inspected, contact Michael Fouch of EH&S at 412.268.3221 or at mfouch@andrew.cmu.edu

Our Mission:

Environmental Health & Safety (EH&S) is committed to providing health and safety services that protect the University community and the environment.