

Lawrence Berkeley National Laboratory



EHS 0356

Nano Safety for Crafts and Technical Workers

About this document

This document is to raise your awareness of the exposure hazards that may result from working with or near engineered nano particles in the course of your work. The course also explains methods used to minimize exposure.

If you have any questions that are not covered in this document, please be sure to contact the EHS Division nano materials SME. You can identify this contact by using the EHS Division program support subject matter listings directory.

<http://www2.lbl.gov/ehs/directory/>

After you read this document you will need to log into Berkeley Lab Training to receive credit. At that time you will be asked to acknowledge that you have read and understand the information presented.

What is a nano particle?

Nano particles are between 1 and 100 nanometers (nm). A nanometer is 1 billionth of a meter.



Currently there are many consumer products that contain nano particles.

Examples include:

- nano titanium dioxide used in cosmetics and sun-block
- nano silica used in dental amalgams
- nano whiskers used in coat textile fibers to create stain and wrinkle free clothing.

Most of our daily exposure to nano particles comes from the following:

Cigarette smoke



Diesel exhaust



Volcano ash in the atmosphere



Welding fumes



Smoke from cooking



Exposure to photocopier toner



These “natural” nano particles are likely to be among some of the most toxic. Factors such as where we live have a great impact on our exposures to nano particles everyday.

Where are nano particles likely to be found at LBNL?



Nano particles are engineered or in use in various research labs at Berkeley lab. The Molecular Foundry is one example where researchers perform work involving free unbound nano particles in fume hoods or glove boxes.

Additionally, nano particles can be found in chambers for example at the ALS.

If you perform maintenance or repairs on or around fume hoods, glove boxes, or chambers that contain nano particles you could become exposed.

How you can become exposed?

There are three primary routes of exposure to nano particles:

1. Inhaling nano particles

- breathing in nano particles is the most significant route of exposure and requires the greatest amount of protection. Nano particles may be inhaled and collected in all regions of the respiratory system.
- Carbon nanotubes may display the same toxic properties as asbestos.

2. Ingesting nano particles

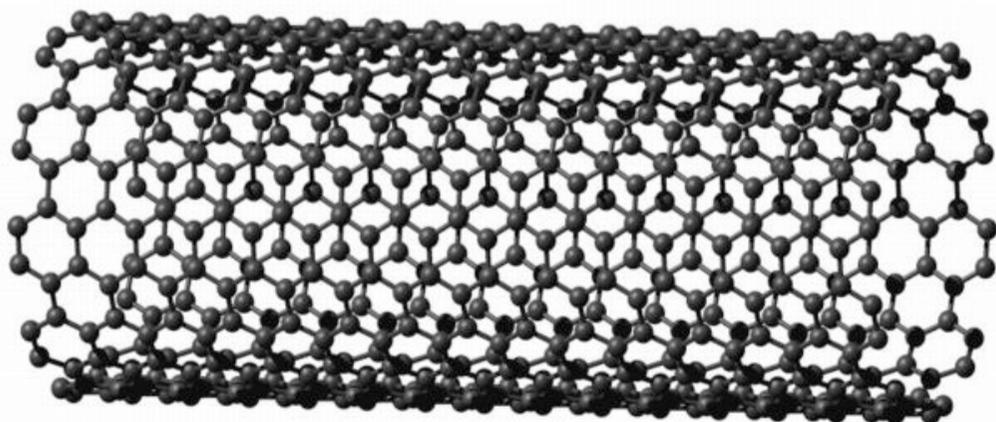
- ingesting nano particles could occur if you unintentionally touched nano materials, or contaminated surfaces, and then touched your mouth or touched and ate food using your hands without first washing your hands.
- Wearing protective gloves, and washing your hands directly after removing your gloves can prevent accidental ingestion.

3. Touching nano materials (skin contact)

- There is no evidence that concludes that nano particles can enter the skin if you were to make contact, however we assume it is possible.
- It is much more likely that nano particles could enter through cuts or mucous membranes.
- Wearing appropriate personal protective equipment helps to reduce this exposure

What are the possible health hazards?

The toxicology of nano particles is an emerging science. Some types of nano particles can be toxic.



For example, carbon nanotubes may display some of the same toxic properties as asbestos. Many studies have conflicting conclusions regarding the health hazards associated with nano particles. Because of this we want err on the side of safety.

Unlike historical research and development activities where it is assumed a material was safe until proven hazardous, with nano particles, we recognize the potential for human harm and we are constructing our procedures based upon assumption that the materials could pose a significant health threat.

How to protect your self (Protective Measures)

Determine what safety controls are needed when working on equipment where nano work is performed or when working in areas where nano work is performed.



When you receive a work request the necessary controls will either be specified in the work order or verbally communicated to you by your line management when performing work near or with nano particles. **It is your responsibility to implement those controls to keep you safe.**

Notify Equipment owner before performing any work.

Before you start your work, you must contact the owner of the equipment you will work on. You need to do this so that you can understand the extent of potential contamination by engineered nanoparticles. You should also inform the people who are working in the area what you will be doing and how it may impact their work.

Be aware of areas where nano work is performed (Designated Area)

Designated Area

This area is designated for the chemicals listed below. Use of these materials in this area is limited to personnel who understand the physical and health hazards associated with the chemicals and the control procedures necessary to minimize personal exposure and area contamination. Designated areas for engineered nanomaterials shall be cleaned (e.g., wet wiped) at the end of the work day when these materials are used.

Point of Contact: Jane Myers Phone: 7502 Bldg.: 67 Room: 1212

Check All That Apply

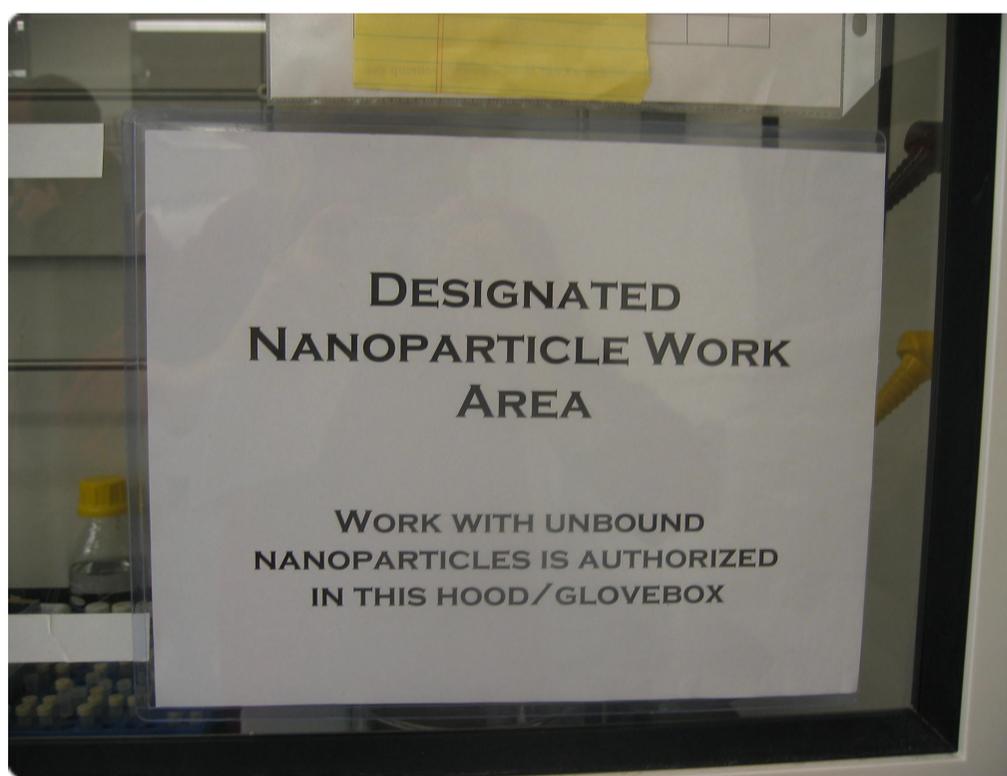
<input checked="" type="checkbox"/> Acutely Toxic Chemicals	Others – List below
<input type="checkbox"/> Sensitizers	
<input type="checkbox"/> Carcinogens	
<input checked="" type="checkbox"/> Reproductive Toxins	
<input checked="" type="checkbox"/> Engineered Nanomaterials	

Once you have entered a room containing nano particles, the location where researchers are performing work with the nano particles will be labeled with a "Designated Area" posting, or with the <100 nm sign as shown below.

Be aware of specific work areas (equipment) designated for nano work



All nano contaminated equipment will be labeled with signage like what is shown below. Depending on the work location, you may see different signs used to communicate nano particles are in use in the area. The <100 nm sign is a very common sign is used to communicate the presence of nano particles. The sign below is an example of an other type of posting that you may see placed in areas where nano particles are in use.



Have EHS perform an exposure assessment (prior to starting your work)

If your work request involves working on nano contaminated equipment such as a fume hoods, you must contact the EHS Industrial Hygiene Group for an Exposure Assessment. This work assessment will determine the necessary controls to keep you safe. Do not begin work without having the IH group perform an Exposure Assessment. Speak to your point of contact (Activity Lead, supervisor, etc) if you are not sure whether an exposure assessment has been performed.

Wear the appropriate Personal Protective Equipment



Prior to entering a room to perform work you must contact the Responsible Individual of the room and let them know what work you will be performing.

Make sure to wear the minimum PPE specified on both your work order system and/or as specified by an Industrial Hygienist. Minimum PPE requirements are posted on entrance placards to technical areas.

Air purifying respirators are **NOT** usually necessary unless they are specified by the EHS Industrial Hygienist Exposure Assessment.

It is the responsibility of your division to provide you with the necessary PPE for the work you will be performing. You are responsible to carry the necessary PPE with you to the work site and wear it while performing work.

What to do when you have completed your work.



When you complete your work, you must dispose of potentially contaminated items as hazardous waste. Hazardous waste bins are located in marked Satellite Accumulation Areas (SAAs). Contact the person who is responsible for the SAA to let them know that you will be disposing your items into their waste container.

SAA
Satellite Accumulation Area
For Hazardous Waste
Responsible Party:

NAME	John Smith
BLDG/ROOM	85/118
EXTENSION	x 5877
TYPE OF WASTE	Acids, solvents, oil, Nano Material

DO NOT ADD WASTE TO THIS SAA WITHOUT PRIOR AUTHORIZATION FROM THE RESPONSIBLE PARTY

(Questions: Call your Generator Assistance specialist)

The owner of the SA will be listed on the SAA sign, as shown

You must dispose of your contaminated items in the same room you performed your work, or in an adjacent room. You are NOT allowed to leave the room without properly disposing of potentially contaminated items.

What specifically should be disposed as hazardous waste?

Potentially contaminated items include:

- PPE such as your disposable lab coat, gloves, safety glasses with side shields
 - Put your disposable lab coat into the hazardous waste bin in the SAA in your work area
 - Clean your safety glasses with kimwipes and dispose of kimwipes as hazardous waste
- Your tools used to perform the work
 - Clean your tools with kimwipes. Dispose the kimwipes as hazardous waste
- Building material removed during demolition can be contaminated including items such as ductwork.
 - Contaminated building materials need to be disposed as hazardous waste
 - Contact your Waste Generator Assistant for guidance and direction

What to do if there is a spill

If nano material has spilled it will require special equipment to clean up safely. For example, a HEPA vacuum that is designated ONLY for nano materials must be used. EHS has this type of HEPA vacuum.

The bottom line is, if you have not been trained and are not skilled and experience cleaning up spills you should contact 6-999 and/or EHS for support and guidance.

Thank you for your time and attention

If you have any questions about this information or would like to speak to someone to discuss working safely with or near nano materials please contact the EHS subject matter expert using the EHS directory

Course Credit

Click "GET CREDIT" to log into Berkeley Lab Training for course credit:

[GET CREDIT](#)

You can also copy and paste the following URL Into your browser.

<https://blt.lbl.gov/course/courselogin.aspx?cid=516>

If you need assistance, please contact EHS Training

email: training@lbl.gov

call: xt 2228