

# MEMS Microfabrication Cleanroom Orientation

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## 1. Cleanroom Classifications

Cleanrooms are environments designed to prevent contamination of products manufactured within them. There are sterile and non-sterile environments for many uses. Ours is a non-sterile, class 1000 facility.

The following chart describes the maximum allowed number and size of particles allowed in a cubic foot of air in a given class of cleanroom. These particles include liquids, fibers, and solids. Our facility is currently a class 1000 room. In every cubic foot of air, there are less than 1000 particles per cubic foot that are smaller than  $0.5\mu\text{m}$ , and less than 7 particles between  $0.5\mu\text{m}$  and  $5.0\mu\text{m}$  in size.

		Particles				
		0.1 $\mu\text{m}$	0.2 $\mu\text{m}$	0.3 $\mu\text{m}$	0.5 $\mu\text{m}$	5.0 $\mu\text{m}$
Class #	1	35	7.5	3	1	0
	10	350	75	30	10	0
	100	N/A	750	300	100	0
	1,000	N/A	N/A	N/A	1,000	7
	10,000	N/A	N/A	N/A	10,000	70
	100,000	N/A	N/A	N/A	100,000	700

## **2. Cleanroom Supplies**

There are many items supplied to you as a cleanroom user that are covered in your user fee. The following list includes such items, anything beyond this list will have to be covered by the user.

<u>Garments</u>	<u>Lab Supplies</u>	<u>Chemicals</u>
Cleanroom Suits	Tape	HMDS
Shoe Covers	Swabs	AZ 5214
		AZ 400K
Head Covers	Microscope Slides	Developer
Face Masks	Photolith Glass	SU8 2010
Gloves	Aluminum Foil	SU8 2025
Safety Goggles		SU8 Developer
		Remover PG
		Omnicoat
		ProTEK B3 Primer
		ProTEK B3-25
		Acetone
		Isopropanol
		BOE
		Aluminum
		Etchant
		Gold Etchant
		Chrome Etchant
		Hydrogen Peroxide

Note: Any supply that is not on this list will not be provided to the user. The user must purchase the supply with their own means & get approval by the cleanroom manager before taking it into the cleanroom.

## **3. Chemical Safety and Disposal**

Know location of the phone, safety shower/eyewash, first-aid kit, fire extinguishers and circuit breaker panel.

All chemical containers to be brought into the cleanroom must be decontaminated before entering the cleanroom.

Disposal of chemicals will be in accordance to WSU policies. All waste will be disposed of into approved containers, with no mixing between acids, bases, and organics. Your disposal containers must be sealed and clearly marked as waste and placed in the location for waste pick up.

Do not pour chemicals back into their source containers once dispensed; this can contaminate your source chemical. If you dispense too much product, do not put

it back, dispose of it properly. This facility does have chemical storage if you need it. All chemicals need to have **proper safety labels** with a full list of their contents. **The users name, phone number, e-mail and department along with the date** the container is placed in use should be clearly shown on the container. There will be no storage of chemicals, tools, supplies, or apparatus within the cleanroom itself without the permission of the cleanroom manager. Supply the manager with a copy of the MSDS for all materials you use in the cleanroom and be familiar with the MSDS and all pertinent safety precautions relating to them. If special safety precautions are necessary, inform the manager.

No food or drink are allowed in the cleanroom. This includes drinking water, chewing gum, candy, and tobacco products.

No contact lenses should be worn in the cleanroom. Contact lenses can absorb many hazardous chemicals and hold them in contact with your eyes. If you require corrective lenses and do not have glasses, please get them before using the cleanroom.

#### **4. Items Not Permitted in the Cleanroom**

- paper, cardboard, or other paper products
- wood pencils
- mechanical pencils
- wood or wood products
- makeup, this includes: powder, foundation, eye shadow, nail polish, mascara, lipstick, lip balm, hairspray, alcohol based perfumes or colognes
- cloth products, unless cleanroom specific with permission of manager
- personal items, including coats, jackets, book bags, books, notepaper, notepads, lab books, hats, scarves
- shorts, sleeveless shirts, open shoes, sandals
- cloth furniture
- food or drink
- chewing gum or candy
- **guests without permission**
- uncleaned objects, tools, containers, materials

#### **5. Cleaning of Items to be brought into the Cleanroom**

These steps should be performed before you suit up to enter the cleanroom.

All tools, chemical containers, waste containers, materials and supplies need have their exteriors cleaned before they are brought into the cleanroom. The

only exceptions are wafers or plates that are already in a clean container. The exterior of the container should still be cleaned.

All of your items should be relatively clean before you bring them down to the cleanroom. Clean them first in your own lab.

Each item should be wiped down with IPA while in a relatively clean area like the gowning room. Use at least one IPA saturated kimwipe for each item. Wipe in straight lines, top to bottom, overlapping each pass. Do not forget the bottom of the items.

Once your items have been cleaned, they should not be touched with bare hands. This will contaminate them again and require further cleaning.

You should not leave the gowning area while wearing your clean suit. If you have forgotten something, you need to remove your suit, shoe covers, head cover, gloves and facemask retrieve it and then regown.

## **6. Gowning Procedures**

If you have a coat or jacket, hang it up in the gowning room.

If your shoes have mud on them, do not enter the gowning room until you have cleaned them off.

Leave your personal items in your locker in the gowning room.

Clean all tools, materials, and containers before gowning and bring them into the gowning room with you and place them on the table provided. Handle these items only with gloved hands.

Do not touch the inner clean room door without gloves on.

Our current gowning procedures are posted in the gowning room.

1. Put on shoe covers.
2. Put on a head covering and use one of the nets if you have long hair.
3. Put on the facemask, first bending the metal strip to conform to your nose, make sure the smooth plastic side is to the outside.
4. Put on your coveralls; mark your coveralls with your name. Handle the coveralls only by the inside, taking care to not allow the sleeves to drag the floor. Do not zip it up yet.
5. Put on safety glasses if you will be working with hazardous chemicals or if anyone is already in the cleanroom working with hazardous chemicals.
6. Put on gloves, taking care to handle them only by the cuffs. Make sure you do not touch your skin to the outside surface of the gloves.
7. Now zip up the coveralls, taking care to not touch your clothing or skin.

When you exit the cleanroom, reverse this procedure.  
Gloves, hairnets, shoe covers and facemasks are disposed of after each use.  
Reuse your coveralls until you feel they need to be replaced.

## **7. Cleanroom Behavior**

Cleanrooms are sensitive environments, and everything you do will affect the air and surface quality.

Do not touch anything in the cleanroom with bare skin.

Do not touch your skin, face, or hair with your gloved hand. If you do so, immediately exit the cleanroom and reglove.

If your gloves or coveralls are pierced, cut, or torn, immediately exit the cleanroom and change.

Minimize your movements; every movement causes you and your clothing to shed particles into your coverall and air movement can release these particles into the cleanroom.

If you handle any hazardous materials, you must use the appropriate gloves in addition to the nitrile gloves. Remember the first layer is to protect the environment from you.