

# Microelectronics Clean Room Notes

Clean room access: It is very difficult to keep the clean room “Clean”. Please wear clean room garments at all times when entering the clean room. Follow the rules listed below. Do not bring in dirty equipment, clean off the dust first. *Never, ever touch anything in the clean room without gloves on.* One small fingerprint can contaminate a lot of parts. Just running into the clean room for a moment without gowning up must be avoided. Persistent violations will result in canceling of your card access account.

Kindergarten rules: There is a famous book titled something like “Everything I Needed To Know In Life I Learned In Kindergarten”. Just like in kindergarten, we follow some very simple rules in the clean room. If you take something, put it back when you are finished. Ask before using something you are not sure of. If you break something, tell the clean room manager. We share, there are a lot of students and faculty using the clean room, be considerate of others needs. If you use the last of something, replace it from stock or tell the lab manager so he can reorder. If you change the settings on equipment, return the settings to their original position when you are done. Clean up after yourself (dry labware and return to the proper places). Keep the area neat and tidy. Everything should be returned to its proper place at the end of the day. When working on a project only occasionally during the week, please return all tools at the end of your work period. There is a clipboard hanging near the clean room door. Write down needed chemicals, parts, labware, etc. on this clipboard.

Clean room Garments: Damaged, dirty, or badly worn tyvek coveralls, hair covers, and shoe covers should be put in the tyvek recycling bins. While it is important to try and get maximum usage from these garments it is not necessary to use these indefinitely and you may replace them as needed.

Clean room shoe covers: If your shoe covers are leaving a dirty mark on the tacky mat inside the clean room, replace them. The gray recycled covers will be replaced with the white ones with nonskid soles as soon as the gray ones are depleted. The white ones will need to be reused until they start marking the tacky mat or are damaged.

Clean room hair covers: Hair covers are, as the name implies, intended to cover the head and all hair. They are not hats to be worn on top of the head. Proper usage is to have all hair and the ears covered.

Face masks and clean room gloves: Face masks and clean room gloves should be disposed of in the trash after each use. Gloves should be checked and replaced if they get discolored during use. The face mask has a metal band imbedded in the top. This band should be formed around the nose for proper fit. The face mask must cover the nose. The face mask prevents you from breathing contaminants on to your parts. The white side of the face mask should face out.

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Tacky mats: If the tacky mats in the garment change room are excessively dirty replace by pulling up the dirty layer. Layers are numbered in one corner, be careful to pull up only one at a time. If only layer #1 remains, the last layer, notify the clean room manager. The tacky mat inside the clean room should always be fairly clean. See “Shoe covers”. Replace as necessary.

Items removed from the clean room: Any items removed from the clean room are considered contaminated and must be thoroughly cleaned before re-introduction into the clean room. Wafer carriers, tweezers, wafer boxes, masks, wash bottles, labware, etc. should not be removed from the clean room.

DI Water: Remember to shut off the DI water rinse tanks when you are finished. Do not leave parts to rinse over night. The DI water polishers have a finite life and cost almost \$400 to replace. A rinse tank running continuously can deplete a DI water polisher quickly. Especially check the cascade rinse tanks because it is difficult to tell if the water is running or not. Normally the DI water system is shut down at night and turned on again in the morning. If you are working late remember to shut down the DI water system when you are done.

House nitrogen: Operating and purge gases are nitrogen. Currently it is supplied by two liquid nitrogen tanks in the service bay. These tanks can barely keep up with demand and will shortly be replaced by a much larger tank located outside the building. Until that tank is on line it is important to shut off vent operations as soon as they are complete. The nitrogen line has a small leak somewhere in the section that supplies the “yellow rooms”. The valve that supplies nitrogen to the “yellow rooms” is located just above the liquid nitrogen tanks and should be shut off at night. Minimum pressure to operate nitrogen dependent tools is 30 psi.

Tweezers: Wafer tweezers are to be used only at the designated workstations to eliminate cross contamination. Wafer tweezers are color coded and should not be moved from workstation to workstation. It is especially important that the wafer tweezers in the photolithography room and metal thin films room not be moved due to their high chance of contaminating other areas.

Wafer Carriers: These individual wafer carriers are expensive and difficult to keep in stock. Please use these sparingly and return all unneeded ones to stock or to be cleaned if they have been removed from the clean room. Periodically purge your experiments of old or unusable samples and return the wafer carriers to be reused.

Clean room towels: These towels are specially made for use in the clean room and are expensive. Please use these sparingly. Remember to thoroughly rinse with DI water any towels used to mop up chemicals before throwing into the trash.

Broken wafers: Broken wafers are extremely sharp and can cause nasty cuts. All broken pieces of wafer must be put in the broken glass container located near the service bay. Do

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not put any broken wafers, glass, or quartz in the normal trash. Injury has resulted when the trash bags are replaced.

Empty chemical bottles: Empty chemical bottles should be rinsed thoroughly with DI water and put, without the lid, by the trash just outside the clean room. The lid should be thrown in the trash. Do not return the empty bottle to the chemical cabinet.

Aluminum foil: Aluminum is a dopant of silicon. It should never be used to wrap any parts that may come in contact with substrates. It probably should never be used in the clean room. Plastic bags are available to store cleaned parts.

Parts cleaning and etching: Often tool parts, especially from the MBE and evaporators need to be cleaned. Since these parts almost always contain metals that can contaminate substrates they should never be cleaned anywhere near the substrate cleaning workstation in the clean room. Metal particles have been found in the rinse tanks long after parts have been cleaned. The fume hood in the MBE room is operational and all parts should be cleaned in these sinks. Aqua regia (HCL and Nitric acid), while a good cleaning etch is a very nasty combination of acids that causes heavy acid fumes and severe etching. It should be used only as a last resort and only in the fume hood in the MBE room. A container should be setup to contain the used acid. The safety office should be called to dispose of all used chemicals.

Process gas lines: Because we have many donated tools we also have many different types of plumbing and gas lines to deal with. Many threads and connections look the same but may not be and should not be used together. Do not try to accommodate mismatched threads or fittings by using Teflon tape. Metal to metal connections should seal without tape. When in doubt about what fittings to use or how to use the existing fittings contact the clean room manager. All connections must be checked for leaks, preferably with inert nitrogen before use. No process gas can be introduced into the clean room without an MSDS and approval of the clean room manager.