

**Lab Safety Sign-Off****To:****From:** Microelectronics Fabrication Center Management, Process Lab**Date:****Subject:** Safety , Cleanroom Procedures and Protocols

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In the course of wafer processing, the safety of the equipment operator and all personnel within the lab are always considered to be of utmost importance. Secondary to this, the integrity of the cleanroom environment and processing tools must be maintained. Lastly, the smooth operation of cleanroom processing insures maximum efficiency for all those using the facilities. To insure that all of these areas are properly addressed, the following cleanroom processing guidelines must be observed at all times:

**Non-compliance with these procedures may result in loss of cleanroom privileges and/or excessive charges being applied toward user's work in progress.**

1. All safety rules as outlined in safety manual must be observed at all times. This includes proper attire for entering the cleanroom and proper precautions for working with hazardous materials, such as use of personal protective gear.
2. Absolutely no smoking, eating, or drinking is allowed in the cleanroom at any time.
3. Any injuries sustained to cleanroom personnel are to be reported **immediately**, as outlined in safety manual.
4. Any equipment problems are to be reported to MFC management promptly for action. **No repairs or adjustments are to be attempted by unauthorized personnel.** Any potentially dangerous conditions that are observed are to be reported **immediately**, as outlined in the safety manual.
5. A complete set of approved travelers are to be submitted prior to **any** processing, containing the processor's name, advisor, and project name and date. **The origin of the materials used must be indicated.** Any processing changes must be discussed with MFC management **beforehand.**
6. All material lots are to be labeled with processor's name, project title, and date started. **Any materials not properly labeled will be discarded.**
7. All material lots must be accompanied by travelers for operation being performed. **Any materials that cannot be identified during processing will result in having process halted and materials discarded. All processing must be accounted for by travelers, including test/experimental runs. Failure to comply will result in application of maximum hourly cleanroom charges being applied toward user's work.**
8. Materials left in processing tools during long processing segments, such as in furnace and CVD tubes, must be claimed and removed **soon after the completion of process.** The **only**

exceptions to this are arrangements made with MFC management **beforehand** (e.g., overnight runs).

9. **All** processing materials entering the clean room must be identified and approved by MFC management. This includes materials leaving the cleanroom lab and returning for continued processing.

10. Only authorized equipment is to be used, and the operator must reserve the use of all tools, with the exception of inspection equipment (microscopes, etc.) and chemical stations, provided that the equipment will not be needed exclusively for more than a half day. All other equipment must be signed up for **beforehand** to insure it is reserved and ready to use by operator at the time needed. **Failure to do this may result in unavailability of equipment when needed.**

11. All equipment for which a log sheet exists must be logged in and out of by the operator, who must provide all necessary information. When log sheets are full, MFC management must be notified to provide for a new sheet. **Failure to log in and out of stations properly will result in application of maximum hourly cleanroom charges being applied toward user's work.**

12. The use of the cleanroom is restricted to normal working hours agreed to beforehand. As of 06/03/2002, **lab hours are 9:00am - 4:00pm**. Any other arrangements must be worked out with MFC management. No processing work is to be performed before or after the official lab operating hours without prior arrangement. **Failure to comply will result in termination of work in process.**

13. Operating instructions are included with most processing tools. **Operators using equipment for the first time must be checked out by MFC management before they can use such equipment.** This includes a **thorough understanding** of all instructions posted for the equipment in question. **Other operators are not to train new users unless this is approved by MFC management beforehand.**

14. Work areas are to be left clean, free of clutter and debris, and ready for next operator to use.

15. When using CVD tubes, all loading and unloading of quartzware and sealing of tube doors is to be done only by people authorized by MFC management. **This will be limited to MFC personnel.**

16. The use of "batch process" equipment, where large numbers of wafers are intended for processing at once, such as chemical cleaning stations, furnace and CVD tubes, should be used to process as many wafers as possible per run. **The operator shall attempt to combine wafer runs within their own lots, and share equipment with other operators' lots whenever possible to reduce waiting times, expenses, and down time of operating such equipment.**

17. The MFC is dedicated to providing the best services available for academic projects, and it is expected that all who use the facilities are to assist to this end. **Therefore, all results pertinent to cleanroom operations (etch rates, deposition rates, new process development) obtained by operators are to be recorded and/or reported to MFC personnel for future references.**

## **NJIT MFC CLASS 10 CLEANROOM PROTOCOL**

**NOTICE: Charges for decontamination of cleanroom equipment may be imposed for processes which do not comply with the Cleanroom Protocols. Additional costs for equipment damage may also apply. Processes outside the Protocols must be submitted to the MFC Management for approval prior to implementation.**

**SPIN DRYERS:** Standard whole wafers only ( no thin, thick or non-standard shaped wafers).

**NMP BATH - PRIMARY:** Previously processed standard whole wafers only. No virgin wafers. Aluminum is only metal allowed.

**NMP BATH – SECONADRY:** Virgin standard whole wafers and primary bath processed wafers only.

**P-CLEAN:** Previous NMP Clean Process Mandatory. Standard whole wafers only.  
**ABSOLUTELY NO METAL ALLOWED!**

**RCA-2 CLEAN:** Previous NMP Clean Process Mandatory. Standard whole wafers only.  
**ABSOLUTELY NO METAL ALLOWED!**

**100:1 HF PRE-CLEAN:** Extremely clean bath! Use with caution. Previous P-Clean or RCA-2 clean mandatory. Absolutely no metals! Absolutely no glass wafers! Standard whole wafers only.

**6: 1 HF n or p TYPE:** Extremely clean bath! Use Caution. Dopant Sensitive, Use appropriate bath. No metals or non-standard wafers. Absolutely no glass wafers! Standard whole silicon wafers only.

**49% HF BATH :** Dangerous Bath! Use with extreme caution. For stripping oxide or nitride off standard whole wafers only. Absolutely no metals or non-standard wafers.

**ALUMINUM ETCH :** For etching Aluminum off. Standard whole wafers only.

**NITRIDE ETCH:** Standard whole wafers only. No Metals!

**POLY-SILICON ETCH:** Standard whole wafers only. No Metals!

**KOH SILICON ETCH BATH:** CAUSTIC BATH! Use with extreme caution. Standard whole wafers must be clean and dry before being processed in this bath.

### **PHOTOLITHOGRAPHY**

1. No Negative photoresists. Only Positive Photoresist Shipley 3813 , MF 319 Developer and Prime
2. Exposure Time less than 25seconds. If more time than this is needed, contact MFC personnel. Obviously there is a problem!

### **LPCVD FURNACES**

#### **LPCVD Silicon Nitride**

P-Clean and 100:1 HF clean mandatory. Standard wafers only! Only fixed thickness 1250Å for 23 minutes .

## **ATMOSPHERIC FURNACES**

### **1. STEAM OXIDATION TUBE NO 2**

P-Clean and 100:1 HF clean mandatory. Standard wafers only! Oxide thickness from 2000Å to 5000Å at 1050 °C only.

### **2. DRY OXIDATION TUBE NO. 3**

P-Clean and 100:1 HF clean mandatory. Standard wafers only! Oxide thickness from 500Å to 2000Å at 950 °C only.

### **3. ANNEALING TUBE NO. 8**

Annealing for upto at 1100 °C. ONLY FOR BONDING.

## **VARIAN DC MAGNETRON SPUTTER**

P-Clean and 100:1 HF clean mandatory. Standard whole wafers only! Al Sputtering : thickness 500Å to 5kÅ. P-Clean and 100:1 HF clean mandatory. Standard whole wafers only! TaSi Sputtering : thickness 200Å to 1000Å

## **EV 501 WAFER BONDER**

1. Fusion bonding for standard whole wafers only. P-Clean Mandatory.

Maximum Force upto 1000 Newton

2. Anodic bonding standard whole wafers only. P-Clean Mandatory.

Maximum Voltage upto 1000V

I have read and understand the above rules, and have read and understood all necessary safety rules from the Microelectronics Safety Manual.

**signature:**

**date:**