Center For Nanotechnology, Materials Science, and Microsystems of National Tsing Hua University

XeF2 isotropic silicon etching Systems

Operation manual

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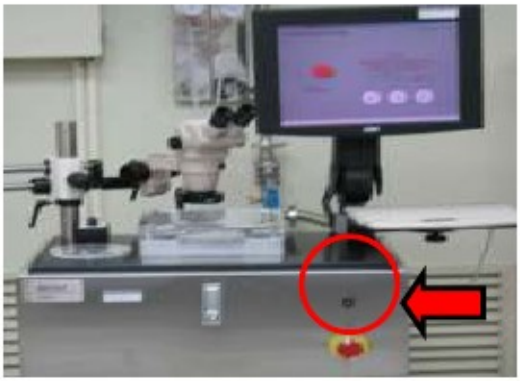
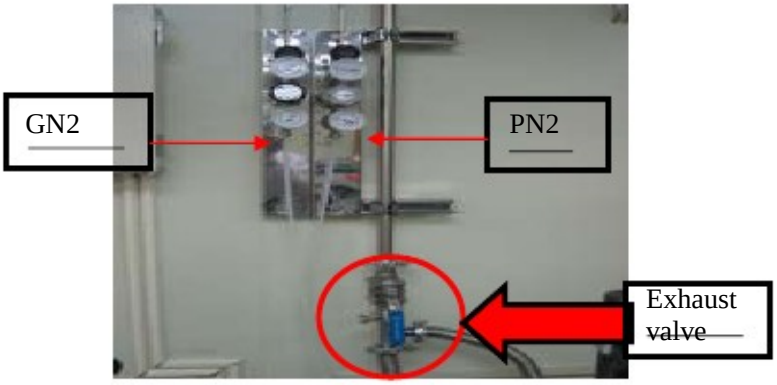
1. Check before process:

1-1. Cleanroom Temp. 25℃↓；Humility 65RH%↓ ＆ Gas Exhaust normally

1-2. If pump turn on & computer start up already?



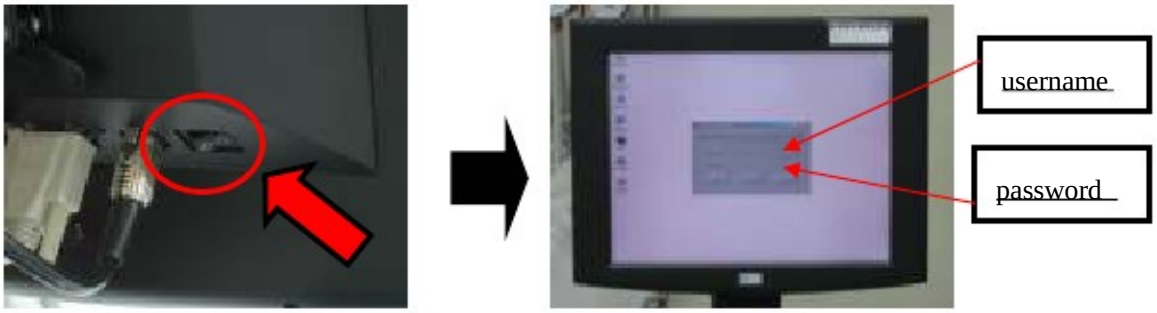
1-3. If the GN2 & PN2 gas pressure is enough (black line mark on gauge)?
If exhaust valve is open (paralleled vs. exhaust tube)?



2. Etching process flow chart

2-1. Card open (near machine sensor)→ input password & booking

2-2. open monitor & Login



＊ Input username ＆ password → push Login →Enter the Main Screen

＊ Don’t push the middle icon, it is computer shut down

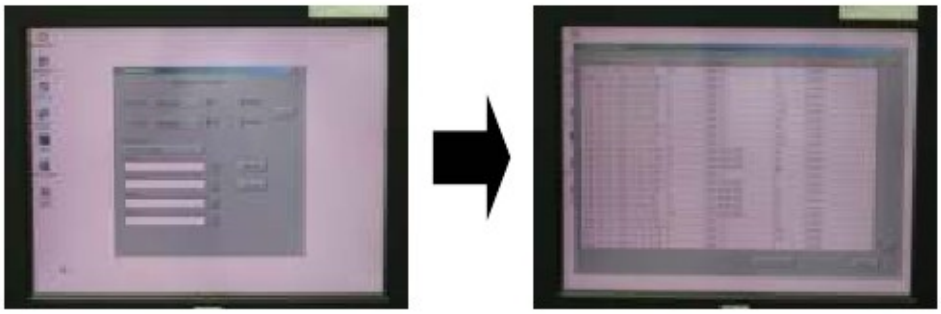
2-3. Etching Main Menu icon introducing:

＊ Etch Menu：Enter the etching parameter set screen

＊ Load/Unload Sample：Load or Unload Sample

＊ Last Etch information：Here can see the last user using message

＊ View Log：You can search all users using message



＊Log Out：Exit Etching Main Menu to LOGIN screen

2-4. Operation Process

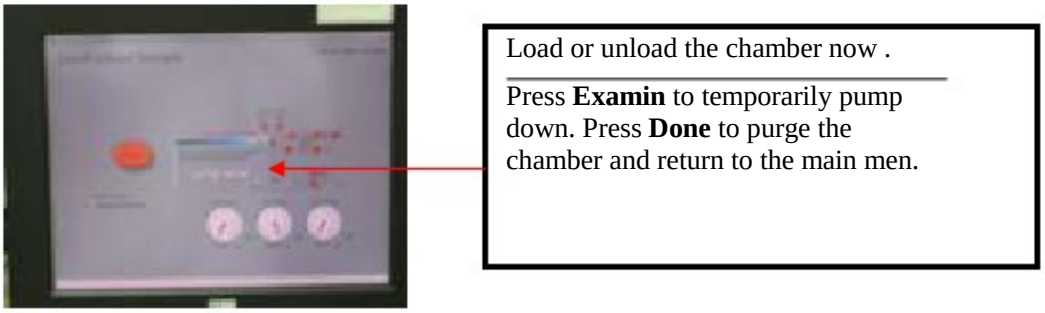
2-4-1. push Load/Unload Sample → vent to ATM

Load Sample

Do you really wish to load/change the sample：→ Yes → vent to ATM (Will PURGE 5~6 times)

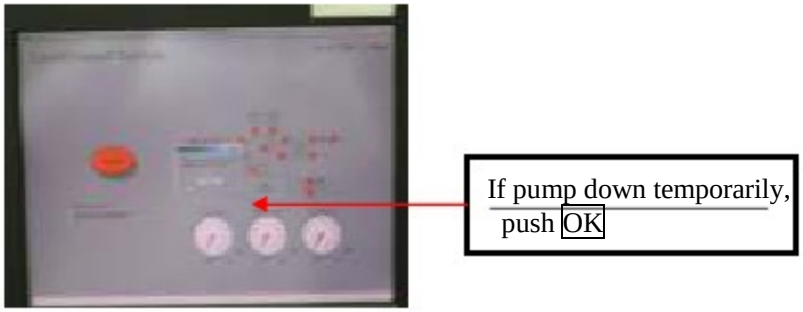
2-4-2. wait PURGE 5-6 times and CHAMBER pressure exceed to 1atm.

→ Load Sample



∗ Done：Run the next procedure and return to the Etching Main Menu

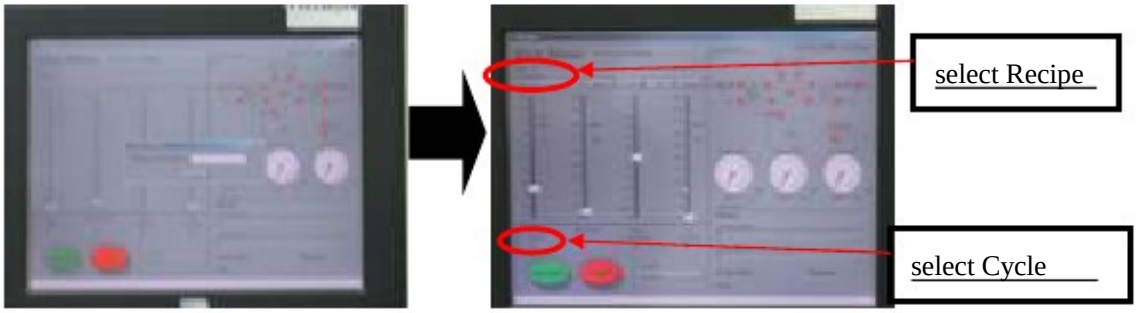
∗ Examine：Pump down temporarily. If push OK then return to Etching Main Menu.



2-4-3. When pump down finished→ Return to Etching Main Menu automatically

2-4-4. Push Etch Menu → input Lot Number → Enter → select the Recipe

➔ Update the Cycles → Start → Etching start



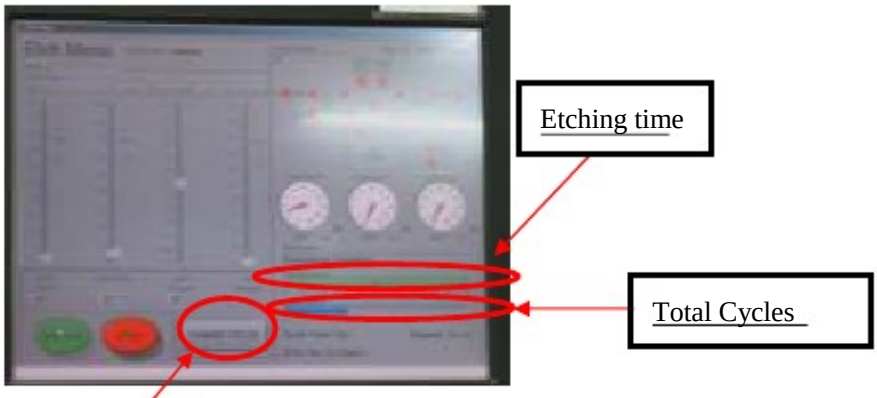
∗Etch Recipe have two choices：

Test-1-1 recipe (XeF_2/N_2 : 3/0 torr.) : rapid etching

low-stress recipe (XeF_2/N_2 : 2/3 torr.) : decrease the stress force of Si_3N_4 Film

∗Etch Time set 60s as internal parameter and can't be changed. For some special case, you can change it but should be agreement with the advised manager

2-4-5. Etching processing status



Cycle Change : You can increasse/decrease cycles during processing.
<NOTE> If increase/decrease too many cycles, the system will turn back to Etching Main Menu.

2-4-6. It will turn back to Main Menu after etching process finished automatically.

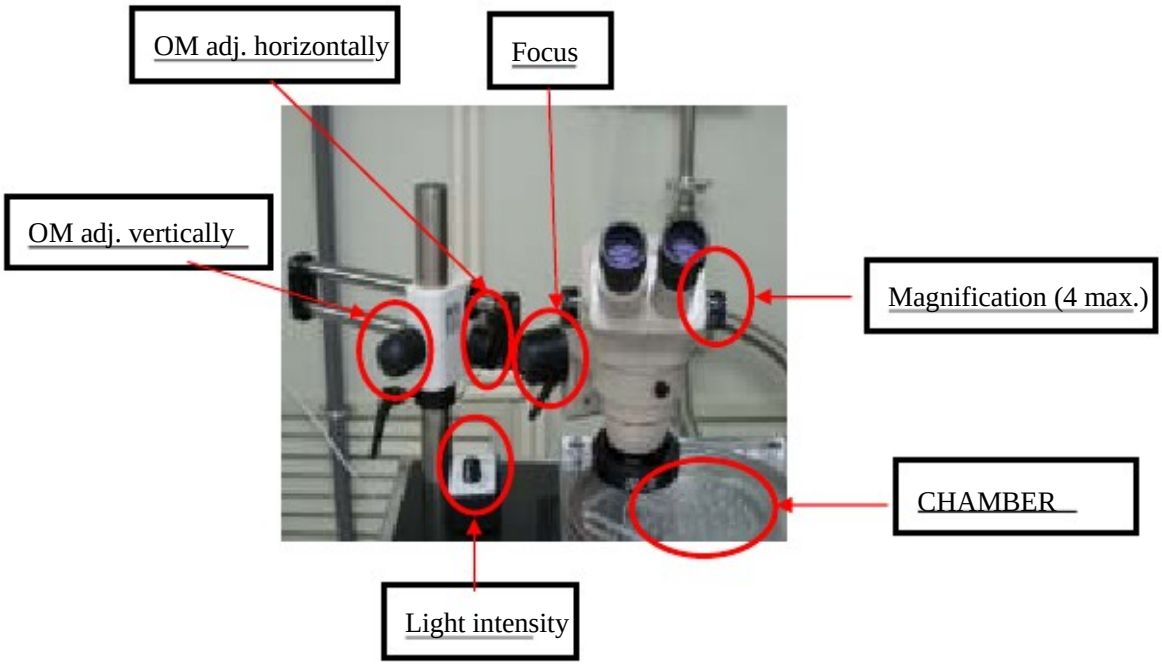
2-4-7. Push Load/Unload Sample → Vent to ATM → Unload Sample

2-4-8. Repeat 2-4-1 to 2-4-7 if you want to etch the next sample

∗ If the etched sample is done, repeat procedure 2-4-1 to 2-4-3
→ push Log Out
→ Return to Login screen
→ Turn off the monitor
→ logout from the card controller
→ Booking the record sheet

3. Notation:

3-1. How to use the OM



3-2. Mask materials: SiO_2、Al、PR、Cu、Si_3N_4

The forbidden material is Au and Au contained in etched substrate.

3-3. **Remind**: Before Etching, remove the native oxide and moisture on Si wafer.

3-4. Substrate size is from piece(≧ 8mm) to ϕ6 inch wafer.

Materials for which the etch behavior is known.

Material	What happens
Al	Does not etch
AIN	Does not etch
Low-stressow-Nitride	Etches unless N2 is mixed in
Mo	Etches
Ni	Does not etch
Poly-Sioly-	Etches
Photo-Resist Some	Does not etch. users report difficulty stripping resisthoto- afterafter very long XeF2 etching
Si	Etches
Pt	Does not etch
Ti	Etches
W	Etches very rapidly