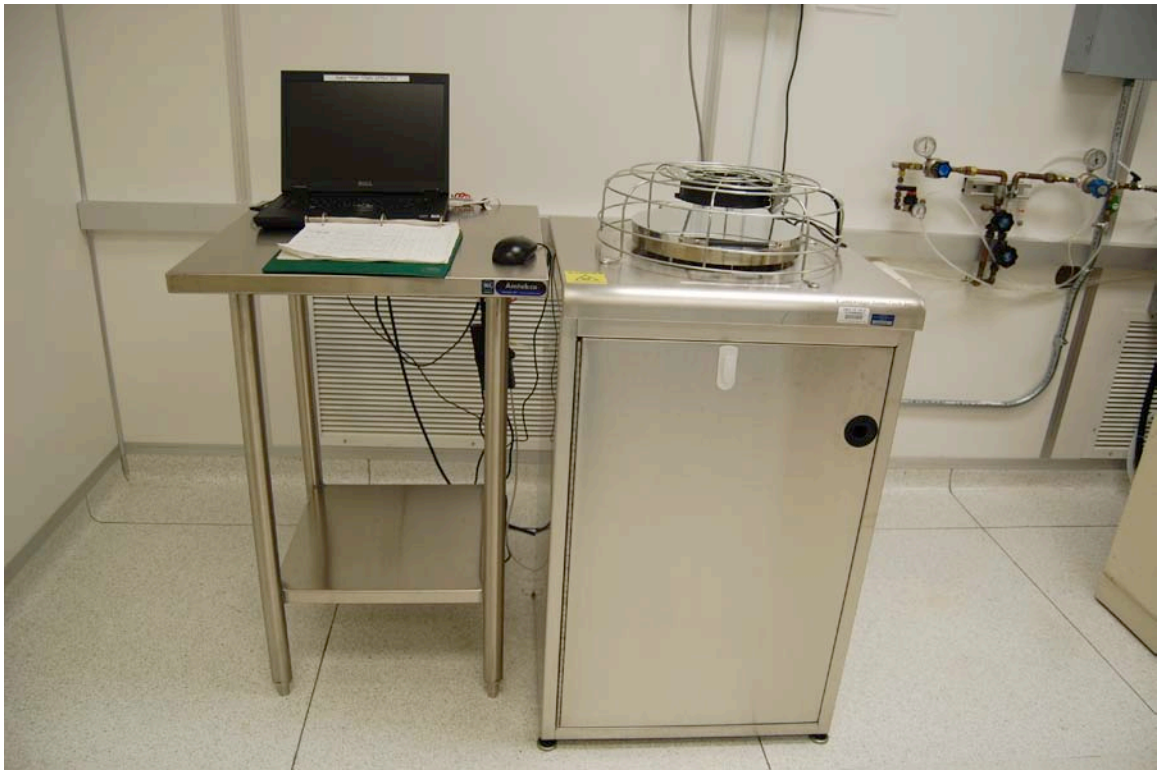


Usage Policies Notebook for Cambridge Nanotech ALD System

Revision date
September 2014

INRF UCIrvine

Emergency Plan for Cambridge Nanotech ALD System

Standard Operating Procedures for Emergencies

Contact information

Person	Phone number
Lab Manager	Jake Hes, 949-824-8239 (day), 562-522-8328 (alternate)
Director	G.P. Li: 949-824-4194 (day), 949-824-2047 (alternate)
Staff	Mo Kebaili: 949-824-8239 (day), 949-494-5892 (alternate)
Super User	Carlos Ruiz (818) 527-6349 (Anytime, voicemail or text only)

Hazardous chemicals, gases, and conditions

Hazard name	Description of hazard
Vacuum	Implosion
High temperature	Burn or ignition source
High voltage	Electrical shock, ignition source
Tetrakis(dimethylamido)hafnium	Water-reactive, corrosive, flammable solid May cause liver damage. May cause mild to severe eye irritation See MSDS
Trimethylaluminum (TMA)	Highly flammable and reactive chemica and a fire and explosion hazard. See MSDS

Authorized users for Cambridge Nanotech ALD System

The following users have been authorized to use this equipment.

Name	Date	staff Initials

Usage Policies for Cambridge Nanotech ALD System

Standard policies for usage

This document provides the standard operation procedure of the Cambridge Nanotech ALD System in the INRF cleanroom at UCI. The ALD system allows to deposit Al_2O_3 and HfO_2 thin films atomic layer by layer onto silicon based substrate.

Contact information

The INRF / BiON staff or the lab manager can be reached at 824-8239 or 824-9831.

Authorized users

Only the INRF/BiON registered users who have completed the training and passed the certification may use this equipment. The users may only use the portion of the system for which they have been trained.

Training

The users must have received direct training from the staff in order to use this equipment. The users are expected to understand the nature of the system, as well as the proper control and use of the crystal monitor. Training varies slightly, depending on the material to be deposited on the substrate. Contact the staff for details or to arrange for a training session.

Usage logs

The users are required to log all activity in the log sheets provided. All users must log when they use the evaporator (date and time), which material they deposited, and when they completed their process in the user log sheet. If the users notice anything unusual, they should record it in the user log sheet, and add details in the maintenance log sheet. Any maintenance to the tool must be logged in the maintenance log sheet (maintenance staff only).

Safety equipment

There is no specific safety equipment for use on this tool, however, cleanroom gloves and tweezers should be used when handling substrates in the evaporator chamber. Care should be taken not to avoid hitting their head on the chamber or pinching their fingers upon lowering the hoist.

Safety

- Follow the INRF / BiON lab safety rules
- Do not place flammable materials underneath, on or near the unit. Do not place paperwork, wipes etc. on or near the unit.
- Do not run the system unattended; do not run the system overnight.
- Do not heat materials to temperatures above those recommended by the manufacturer.
- Make sure heat monitoring and limiting devices are working properly.
- During the process, a metal shield needs to be put on the top of the tool to avoid the direct touch of the high-temperature ALD lid.

Standard equipment and materials

The laboratory provides the following gas: N_2. Other gases must be cleared with the lab manager.

User maintenance

Please clean substrates prior to use

Waste disposal

Dispose of broken glass and broken wafers in the appropriate container. Dispose of alcohol soaked wipes in a waste container marked for flammable solid waste.

Scheduling

Reservation can be done on-line also the system can be used on a first-come, first served usage if no reservation was made.

Other issues

Users should record the base pressure on the log sheet prior to venting the chamber.

Users should remain physically present at the tool during evaporation to monitor the deposition rate and the current set point, and they should also monitor the chamber pressure during operation.

On completion of the evaporation, the system should be left in the idle mode, with the high vacuum valve open. Users should record the roughing time into the log sheet.

Any new materials introduced into the system need to be cleared with the lab manager or the staff.

At no time should a user adjust a system pressure regulator.

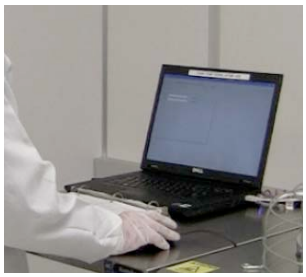
Non-standard use

Users may not modify any hardware on this equipment. For the usage of non-standard processes, gases or materials, contact the staff or the lab manager.

Usage Notes for Cambridge Nanotech ALD System

Guide for using ALD tool correctly

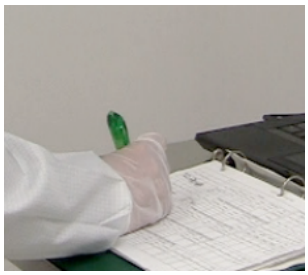
Procedures



STEP 1
Login to the computer.

STEP 2
Check the logbook to make sure previous runs were OK.

STEP 3
Check the N_2 cylinder pressure and make sure the valve of the N2 tank is open.



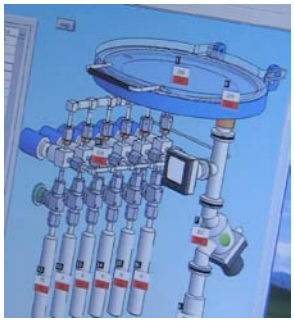
STEP 4
Fill the log sheet.

STEP 5
Make sure the precursor valves are closed under the chamber.

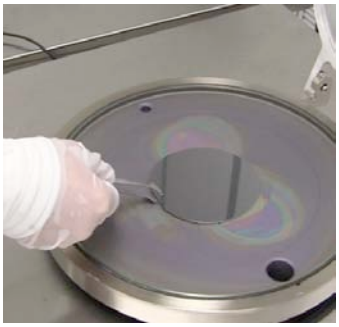
STEP 6
Set the chamber walls, pump line, and precursor bottle to desired temperature.

Ex: for standard Hf/H2O deposition:

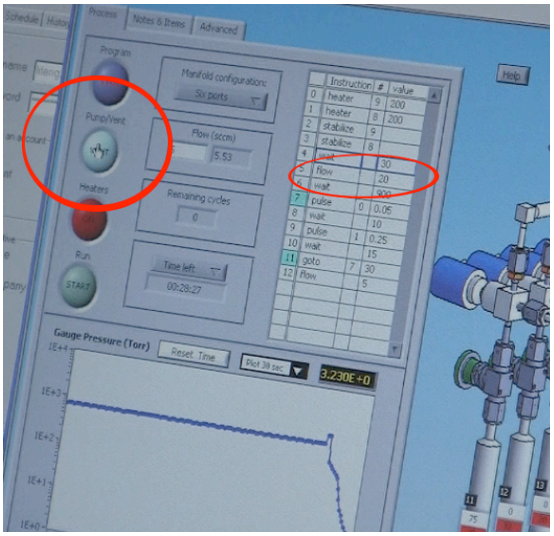
	Pumpline		Substrate		Precursor	
Temp (ºC)	Line 6	Valve 7	Out 8	Inner 9	Valve 10	Bottle 11
Set	150	150	120	120	150	75



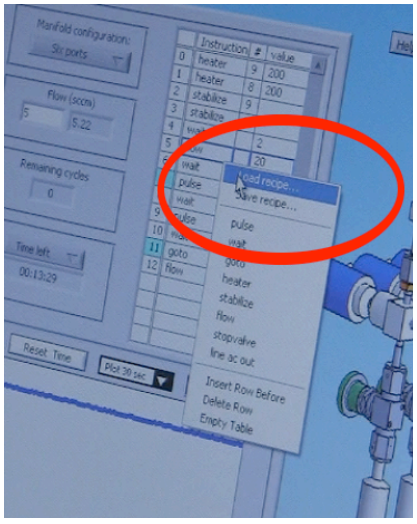
STEP 7
After the temperatures are ready, vent the chamber.



STEP 8
Load the sample into the chamber.
(Be careful, the chamber wall is extremely HOT!)
Note: Make sure that the sample is clean and there is no photoresist or polymer on the sample.



STEP 9
Pump down the chamber.

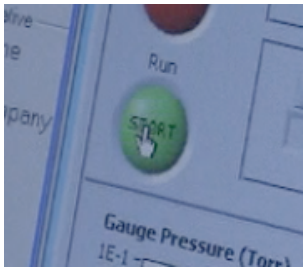


STEP 10
Load the process recipe.

Ex: for standard HF/H_2O ~ 200 A film

Valve	Time (s)	Delay (s)	Pump (s)	Cycle	Sccm	Delay (min)
0	0.015	0	15	200	20	1
1	0.2	0	15			

MAKE SURE THE PRECURSOR VALVE IS OPEN!!!

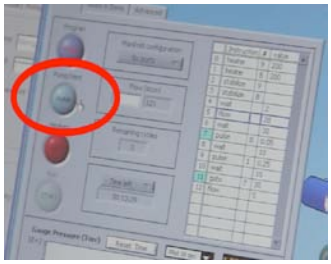


STEP 11
Press **Start Run** button to run the recipe.

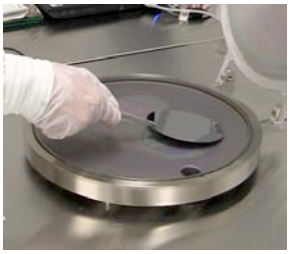
STEP 12
Make sure to be with the system during the run and record everything to the logsheet. Keep your eyes on the precursor temperature (Hf), make sure it doesn't go over 75 degrees C during your run.

STEP 13
Once the run is complete, close the precursor valve immediately.

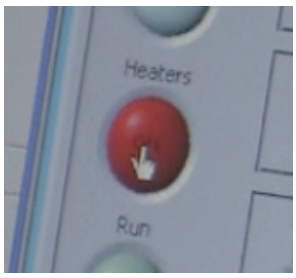
STEP 14
Change the N_2 flow to 100 sccm for 3 minutes, to purge out the residual process gas from the chamber.



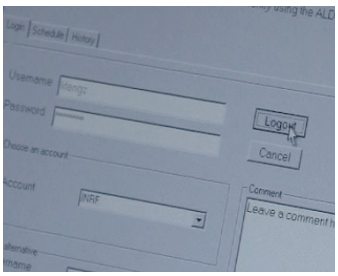
STEP 15
Vent the chamber.



STEP 16
Remove the sample from the chamber. (Be careful, the chamber walls and sample are extremely HOT!)



STEP 17
Turn off the heaters by clicking the red "ON" button.



STEP 18
Log out.