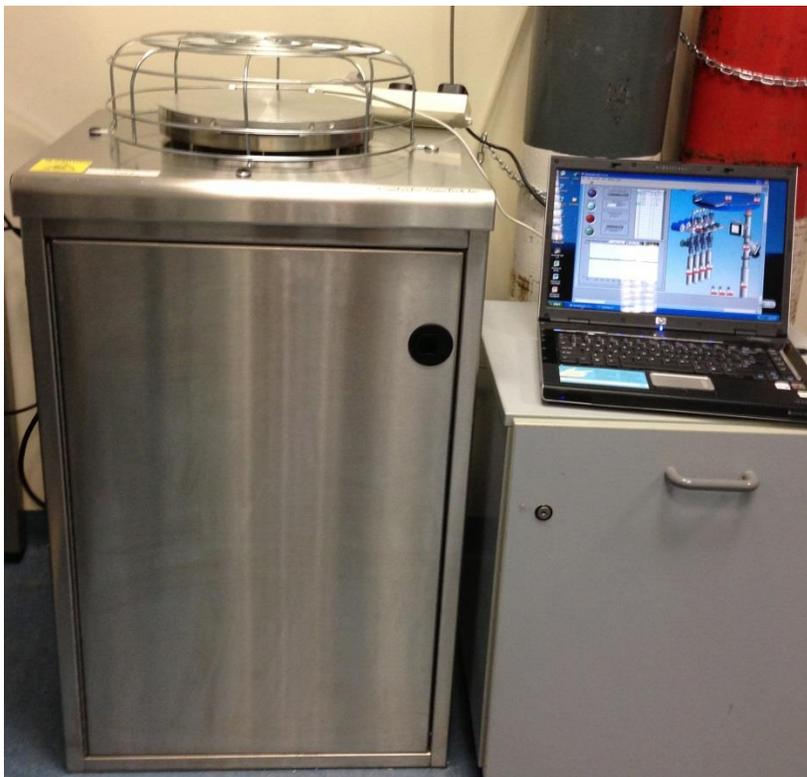


ALD SOP

This is a shortened version that focuses mainly on the operation. For more detailed instructions, please refer to the user manual “Savannah 100 & 200 Atomic Layer Deposition System”



1. Scope

1.1 This document provides operating procedures and requirements to deposit Al_2O_3 films with the Cambridge nanotech Savannah 200 Atomic Layer Deposition system.

1.2 System description

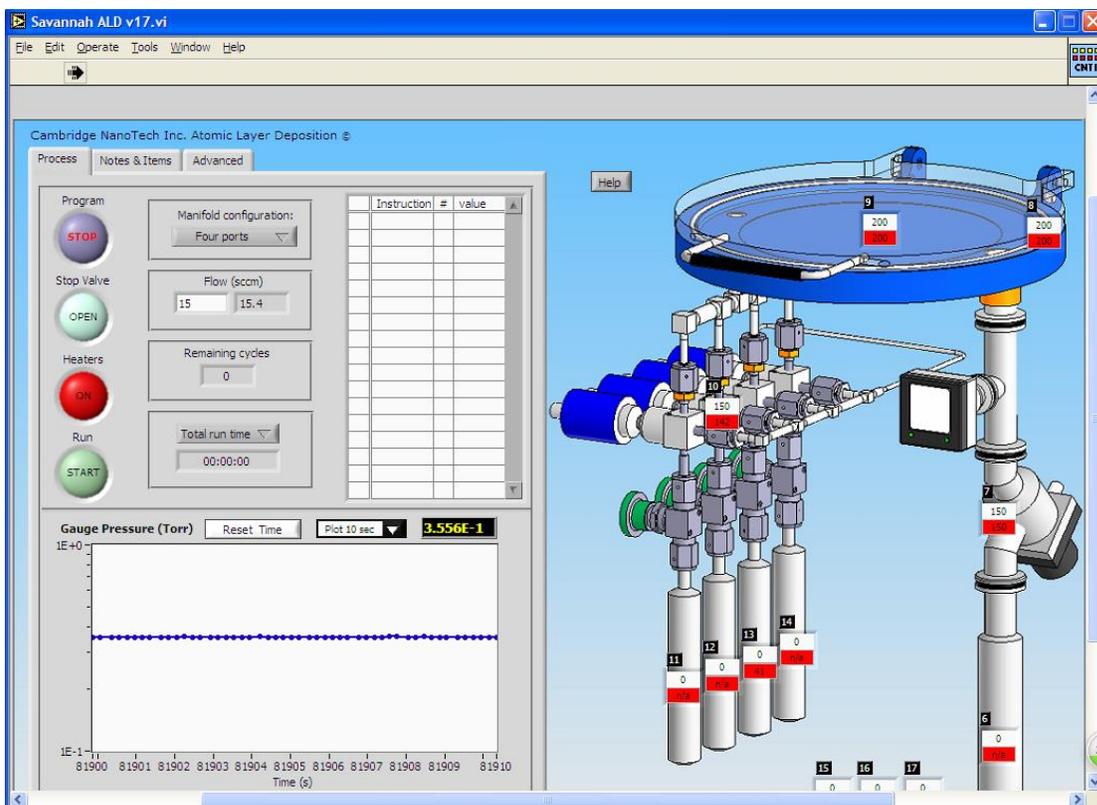
Atomic layer deposition (ALD) is a technique that allows growth of thin films with atomic layer precision. The ALD system in Nanomaterial and Nanodevice lab is capable of growth of many different material films including **Al_2O_3 , TiO_2 , SiO_2 , TaO_2 , ZrO_2 , ZnO , Cu , Pt and Ru .** (Currently only Al_2O_3 , TiO_2 , ZnO receipt are calibrated)

2. Before starting: Important note

- 2.1 You have to be authorized by Dr. Tang and properly trained by Dr. Tang's group member before operate the system.
- 2.2 TMA is pyrophoric and ignites when in contact with the air. Never remove TMA source.
- 2.3 The chamber lid and the walls are **HOT!** Use care when opening the chamber. Do not place any flammable materials on or near the ALD machine.

- 2.4 The chamber lid cannot be lifted if the chamber is cold. The temperature of the chamber outer heater should be set to at least 80°C.
- 2.5 Do not put in materials that will outgas. Do not use a substrate having carbon tape. Do not use vacuum grease on your substrate or in the chamber.
- 2.6 System is intended to have the pump running, nitrogen flowing, and heaters on at all times, even when idle.
- 2.7 If restarting the system after it has been cold, e.g. following a power outage or maintenance shutdown, warm up the system first and follow the out-gassing procedure completely as described in the system manual.
- 2.8 In case that either of the precursors is running out, indicated by the disappearance of pulses during the running cycles, contact Dr. Tang for replacement. Do not attempt to change precursors by yourself.
- 2.9 The largest wafer size supported is 8" circular.
- 2.10 Always set the center heater to 120°C and the outer heater to 120°C after you finish the growth.

3. Software user interface



Buttons:

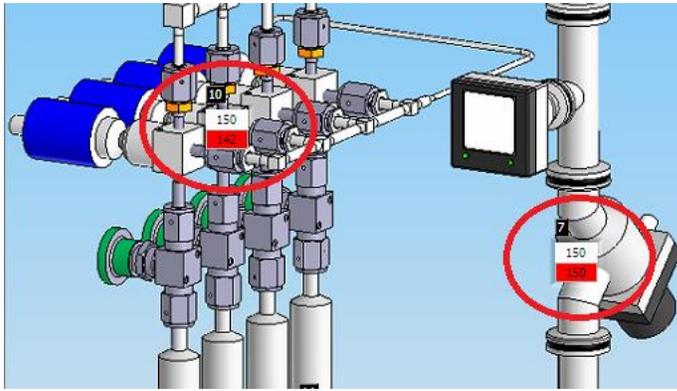
Program – Stop the Labview program

Stop Valve – Open and close the stop valve to the pump

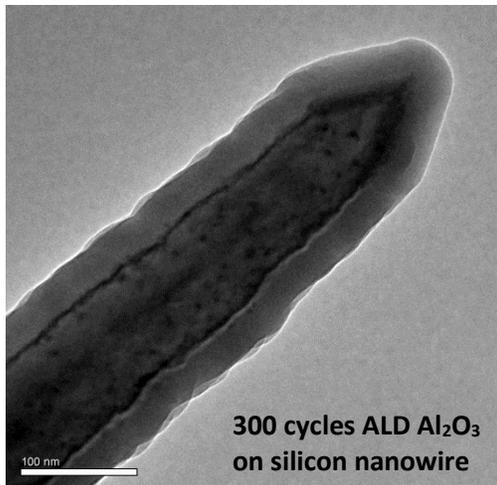
Heaters – Turns all the heaters ON/OFF

Run – Start/abort deposition

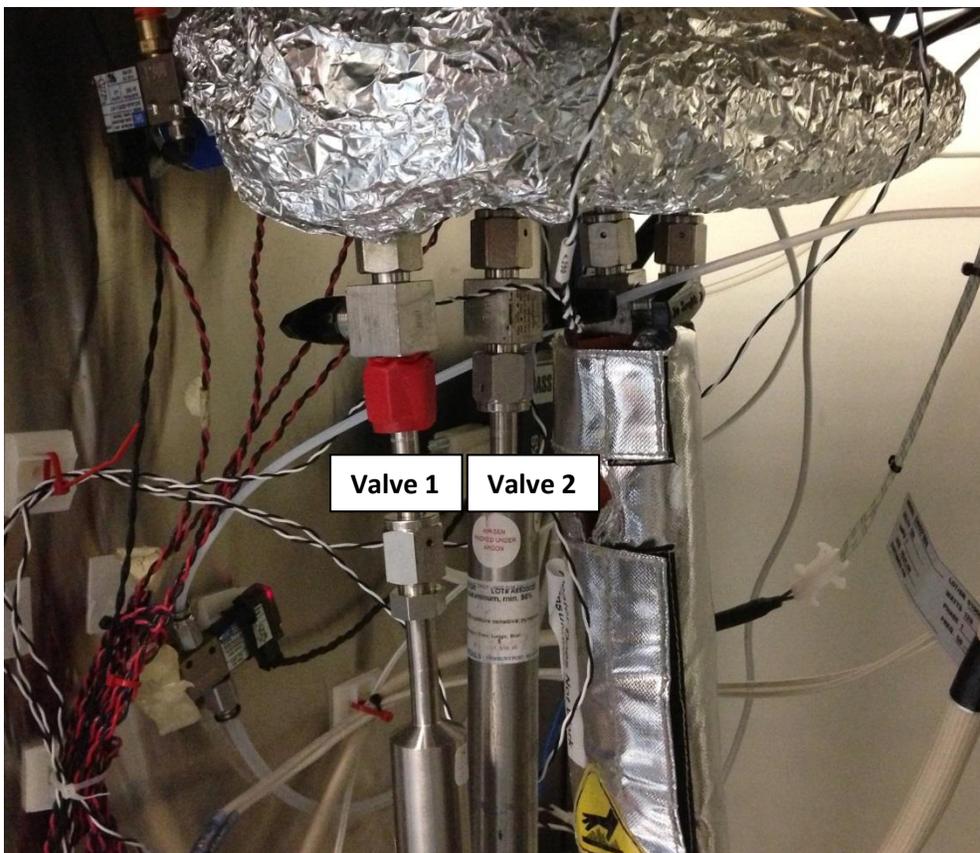




- 4.7 Right click the receipt area and load receipt: “Al₂O₃ 200C” from Jinyao’s folder (the chamber temperature should be set to 200°C)
- 4.8 This receipt is calibrated to for 0.11nm/cycle Al₂O₃ deposition.



- 4.9 Open the machine case and open the mechanical valve of 1 and 2 (water and TMA)



- 4.10 Click Start run in the run cycle area. You can see the pulses in the pressure plot area.
- 4.11 After the run is over, vent the system by set flow rate to 100sccm and remove your sample. Close the lid and pump down with flow rate set to 10 sccm.

System Shut-down

- 4.12 Close mechanical valve 1 and 2. Run the same receipt for 10 cycles. Let the system idle. Write down your process on the log book. (if other receipt is used with use different source, same applies, close corresponding valve and run the system to completely remove the residue source in the ALD valve).
- 4.13 Set the outer ring and inner ring back to 120°C, check the the N₂ flow is at 10sccm.

5. Questions for the exam

1. You want to open the chamber lid to load/unload, the pressure is already back to 7.6E+2 torr. However, you try to lift the lid, looks like the lid is stick to the chamber. What can you do?
2. What is the minimum chamber temperature for open/close?
3. You see no pulse during in the pressure plot during run. What should be checked?