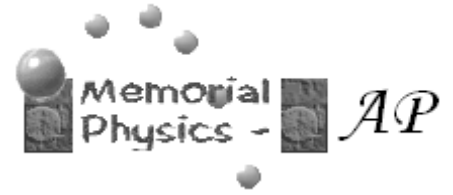


Instructor notes



Lift off exercise and testing of a silicon wafer

We have discussed the lithographic techniques that go into the design and production of nano and microchips (refer to "Making a Chip"). Today you are going to perform lift-off on a wafer and test the resulting circuit using digital multi-meters.

Important notes:

- Students will be using the mini-SST trainer checklist and run as Mechanic / Data teams.
- Students will need to take careful notes by hand, and then transcribe them into the computer to document everything. Consider which lab paper they wish to use to document the exercise.
- Consider which images they wish to capture and take the appropriate images. They will need to share the camera.
- You will be using acetone. Students need to wear the gloves to protect skin from drying, and safety glasses to protect from splashes.

This is considered a training exercise. What students need to do:

1. Determine the Mechanical and Data roles
2. Mechanic will gear towards the lift off – make a rough outline based on completing the lift off successfully.
3. Data will gear towards the voltage divider measurements – be prepared to take data and take measurements that will test the chip.
4. Mechanic will need to use probes, and document a working procedure that will get the data to the Data coordinator.
5. Data will need to analyze the curves in Excel or LoggerPro to get a best fit and relevant data (will need to discuss this in class.)

Needed prior to lab:

Slide show of the lithographic process
Explanation of the lift off procedure
Explanation of the DMM
Explanation of voltage divider, with exercises
Wafers, ready for lifting
Microscopes
Acetone
Squeeze bottles
Safety glasses
Disposable latex gloves
Flash drives and computers preloaded with mini-checklist, lab manual paper for lab books, and camera(s)

Use:

"wafergridLGJPEGPOS.jpg"
as mask when exposing resist.

Using the student lab group assignment roster, students will know ahead of time who is coordinating each role. It would be good to have a WORD primer with the students on basic skills (dropping in images, etc.). They will need to back up all work onto their flashdrives, including their partner's work.

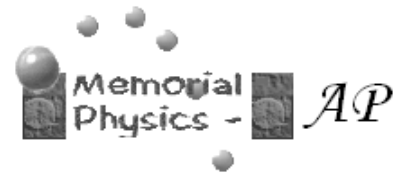
As of 2008: Wafers will need to be processed initially at a fabrication lab (I am using Notre Dame's nano-fabrication lab). This involves:

- a. 500 Ang. Oxide layer
- b. 700 Ang. Poly-Si layer
- c. PMGI layer (for undercut)
- d. 1813 layer
- e. Apply mask and expose/develop pattern
- f. Deposition of 500 Ang. Ti
- g. Deposition of 3000 Ang. Au

Students will complete process by rinsing with Acetone.

AP Physics

Lift off exercise and testing of a silicon wafer



We have discussed the lithographic techniques that go into the design and production of nano and microchips (refer to “Making a Chip”). Today you are going to perform lift-off on a wafer and test the resulting circuit using digital multi-meters.

Wafers were processed initially at the Notre Dame Nano-Fabrication laboratory. This involved:

- a. 500 Ang. Oxide layer
- b. 700 Ang. Poly-Si layer
- c. PMGI layer (for undercut)
- d. 1813 layer
- e. Apply mask and expose/develop pattern
- f. Deposition of 500 Ang. Ti
- g. Deposition of 3000 Ang. Au

Lift off completes the process by the use of Acetone.

Important notes:

- You will be using the mini-SST trainer checklist and run as Mechanic / Data teams.
- You will need to take careful notes by hand, and then transcribe them into the computer to document everything. Consider which lab paper you wish to use to document the exercise.
- Consider which images you wish to capture and take the appropriate images. You may need to share the camera.
- You will be using acetone. Wear the gloves to protect your skin from drying, and safety glasses to protect from splashes.

This is considered a training exercise. What you need to do:

1. Determine the Mechanical and Data roles
2. Mechanic will gear towards the lift off – make a rough outline based on completing the lift off successfully. Consider safety seriously, as you will be using Acetone (what gear do you need?).
3. Data will gear towards the voltage divider measurements – be prepared to take data and take measurements that will test the chip. Record both currents and voltages.
4. Mechanic will need to take notes during the presentation on using the probe station to make measurements of voltage and current. Add these to (2) above to complete your procedure.
5. Mechanic will need to position wafer carefully on the probe station (be careful to not add too much pressure).
6. Data, complete a fit of the curves. You may use Excel or Loggerpro.
7. Both roles: document, document, document (use scoring guides).
8. Complete all responsibilities according to your role, and safely complete your work as a collective exercise on your flash-drives. Save work as: WaferLiftoff MD_ _ _ _ (initials). Have fun.