

EE 432/532 — CyMOS process

Contact via lithography and metallization

In this lab, we perform the 5th lithography/etching step, opening the *vias* for contact formation. Following the lithography, we will deposit aluminum for the contacts using electron-beam evaporation.

Before Lab

1. Review class notes on evaporation for depositing thin films.
2. Review lithography procedures.
3. Look over the SOP for electron-beam evaporation.
4. Review the mask patterns in the *CyMOS Mask* document.

Activities

1. Measure oxide thickness on remaining test wafer. In particular, look at the gate oxide grown last week. You do not need to do a wafer map, but be sure to measure several points on each test wafer and calculate an average for each.
2. Perform level-5 lithography on all device wafers. (Test wafers are not patterned.)
3. Perform the aluminum evaporation on the previous groups' wafers.
4. Inspect the patterned photoresist. (You can take photos at this point, if you'd like.)
5. Etch the patterns, using test wafer 2 as the etch calibration. (Include TW1 in the etch, also.)
6. Take photos of the patterned SiO₂ on the wafers.
7. Load your wafers into the evaporator and begin the pump-down sequence.

Comments

1. It is essential that the contact areas be completely free of oxide before metal deposition, so add an extra 60 seconds of etching beyond the point where the test wafer is clear. (Usually we etch for 30 extra seconds.)
2. Include TW1 in the etching so that the sheet resistance can be measured later.
3. The lab instructors will operate the evaporator. However, you should look over the instructions for the evaporator to get a sense for what the system does.
4. During the evaporation, 0.25 μm – 0.3 μm of Al will be deposited on the wafers.
5. Because of the several-hour pump-down time needed for the evaporator, we will use a rolling schedule for the depositions. Here is how it will work: On Tuesday, Group 1 will view a “dummy” evaporation on some random test wafers. Then they will load their wafers into the evaporator at the end of their lab period, and start the pump-down process. The system will pump down until Group 2 meets. On Wednesday, Group 2 will deposit aluminum on Group 1's wafers, remove those, load their own wafers, and begin the pump-down process, leaving their wafers until group 3 meets. The cycle repeats with Groups 3 & 4 on Thursday. On Friday, Group 5 will deposit aluminum on Group 4's wafers and then load their own. The lab supervisor will deposit aluminum on Group 5 wafers later in the day to complete the cycle.

Report

The results of this work will be combined with the work of the previous two lab (gate oxide growth) and the next lab (metal contact patterning) into a single report. Be sure to record all relevant lithography and metallization process information to include in the report.