

EE143 Week 10: Suggest Pre-Lab Quiz Solution 2006/02/20 Shong Yin

(1) At what temperature is the aluminum etchant kept? Why can't the aluminum etchant be used at room temperature?

50C. At a lower temperature there will be a slower etch rate.

(2) Why must the wafer be kept moving during the etch?

To replace chemicals at the wafers surface because bubbling will develop that impedes flow of chemical.

(3) What is the nominal etch rate of the aluminum etchant? Assuming 8000Å of aluminum and using a 10% overetch, how long should we etch?

Nominal etch rate: 100Å/sec. 1:28 nominal etch time required.

(4) Why does the lithography step require a lower exposure time this week?

The Al is highly reflective and will expose the resist from underneath.

(5) Why do we do the sintering step?

To allow Al and Si to interdiffuse to form a good contact.

(6) What will happen if the sintering temperature is too high or too low?

Too high: spiking may occur. Too low: no interdiffusion.

(7) What is "spiking" and how can it be prevented?

Spiking is when Al diffuses so much into the contact it crosses the N-P region forming a short to substrate. To prevent spiking, control the sintering time.

(8) What problems might have occurred if we used gold instead of aluminum for our contacts?

Gold is horrible for MOS devices. It will diffuse very quickly into Si and form trap states.

(9) Why don't we have to use a slow push/pull for the sinter?

At 500C there is a very low thermal gradient.