

EE143 Week 7: Suggest Pre-Lab Quiz Solution 2006/02/20 Shong Yin

(1) What is the purpose of the spin-on glass (SOG)?

To provide a phosphorous diffusion source.

(2) Why is the timing of the pre-diffusion step important?

It controls the diffusion dose.

(3) What is the dopant atom we are depositing in the source/drain regions?

Phosphorous.

(4) Why do we use a wet oxidation for the intermediate oxide?

We want to do a faster oxidation than the gate oxidation.

(5) What is the purpose of the N₂ anneal?

To provide an inert ambient for the Si substrate to anneal away damage caused by stress from the intermediate oxidation.

(6) If the polysilicon was only 100nm thick instead of 350nm what problems might this create?

The intermediate oxidation might completely oxidize the poly-si gate.

(7) What are the advantages of using ion implantation instead of spin-on-glass to dope the source and drain? What are some of the disadvantages?

Advantage:

There is more precise dose control. It's possible to implant dopant beyond the surface.

Disadvantage:

Ion implanters are expensive. It's difficult to implant shallow junctions.

(8) After the deposition, when we use the four-point probe, are we measuring sheet resistance or bulk resistivity?

Sheet resistance. Bulk resistivity includes the depth of the material.

(9) Draw a cross-sectional view of what the diffused source and drain regions will look like after this week's lab for a simple transistor (MOSFET), including all other layers and the effects of isotropic etching. Is this a self-aligned process? Explain. (2 points)

Intermediate Oxide

