H3 Oxide & doping

Return to MC by 24 March 10 pm. Exercise session March 26, 9.15 am.

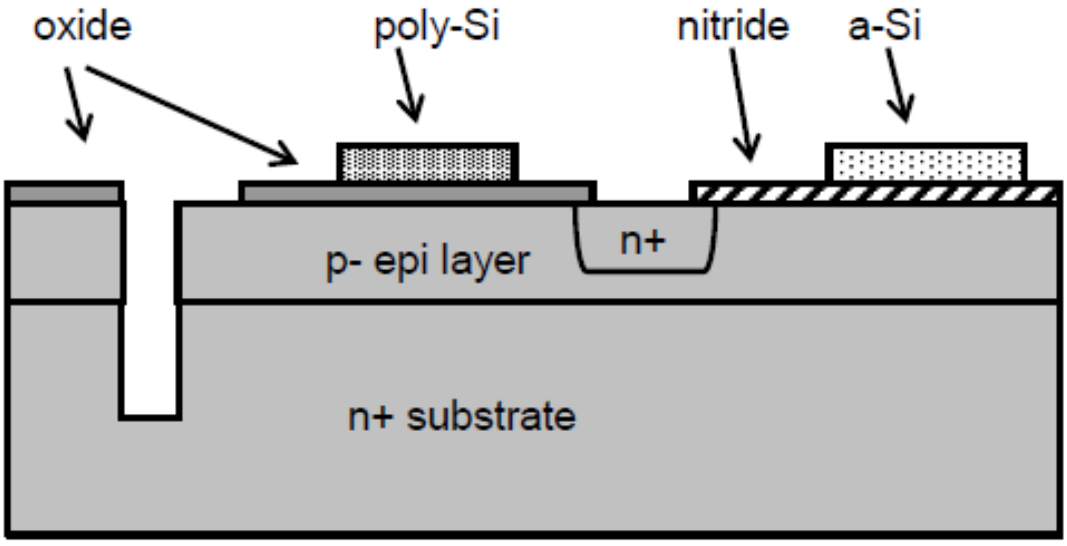
Q1. a) If 250 minute wet oxidation results in 1 µm thick oxide, how long will it take to grow 5 µm oxide under same conditions?

b) How long will it take to grow 200 nm thick oxide?

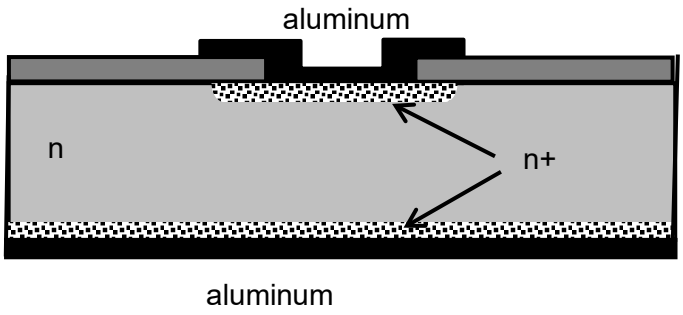
Hint: Use the parabolic assumption, figure 13.3.

Q2. a) Make a comparison of thermal oxide versus CVD oxide. Compare film processing, quality, thicknesses, applications … side by side.

b) Draw where 0.5 µm thick thermal oxide will grow in the structure shown below. The figure is DRAWN TO SCALE !! Trench width is 1 µm and epilayer thickness 1.5 µm and so on. Detail drawing needed; no points for hasty sketches. Hint: scan your drawing.



Q3. a) Design a step-by-step fabrication process for the device shown below. The n+ doping is done by thermal diffusion.



Q4:

a) Ion implantation is basically a room temperature process, and photoresist can be used as a mask. Explain step-by-step how such an implantation process is done, from lithography to sheet resistance control measurement. Identify key issues and discuss them in more detail.

b) Draw projected range of implanted ions as a dotted line for the cases shown below. Use figures from Chapter 15 as your guide in estimating depths.