

# Fabrication process of CMOS transistor

- twenty basic fabrication steps

→ N-well / P-well technology

→ what we need most

→ mappings where different elements  
should go ~~here~~ on chip

→ mask for different layers

Step 1. Choose a substrate

p-substrate

Step 2. Oxidation → add layer of  $\text{SiO}_2$

Oxidation

p-substrate

Step 3. Grow photoresist

photoresist

oxid

P

Step 4. Mask. Where the mask is not present  
the photoresist hardens, becomes insoluble

MASK

photoresist

oxid

P

mask for N well

Step 5. Remove soluble part of substrate

photoresist

oxid

P

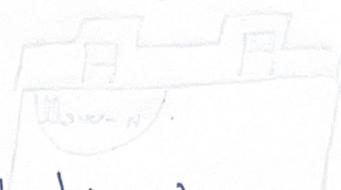
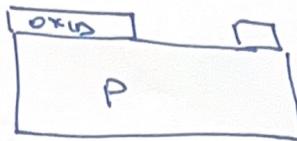
Step 6. Etching → remove oxide not covered  
by photoresist

photoresist

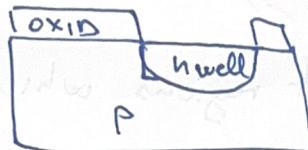
oxid

P

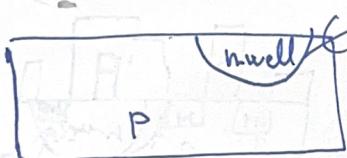
7. Remove p-hole photoreistor



8. Form N-well (Dope by radiation)

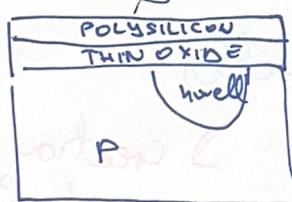


9. Remove OXID layer

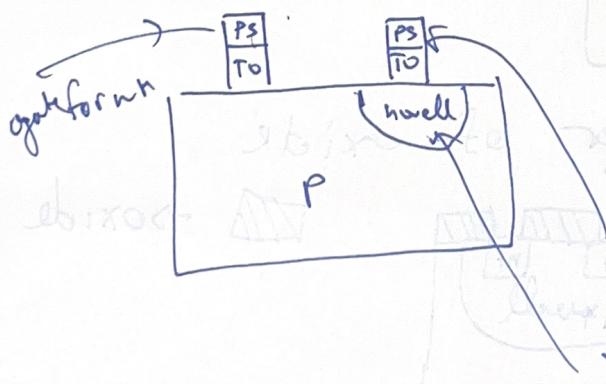


PLACE FOR  
PMOS

10. Add Polysilicon (acts as Metal) and thin silicon layer



11. Remove the unnecessary part to form the gates for N and P MOS FET

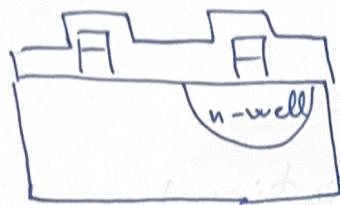


→ using masks  
→ PS → Polysilicon layer  
→ TO → Thin Oxide

gate for PMOS

PLACE FOR

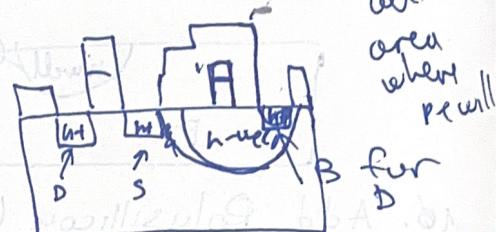
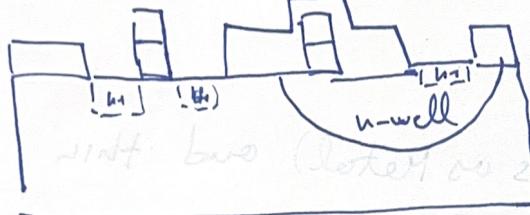
12. Oxidation process → place layer of Oxide to protect for diffusion and metallization process



creation of  $n^+$

13. Masking and diffusion  
→ using mask we select regions which will be  $h^+$  region

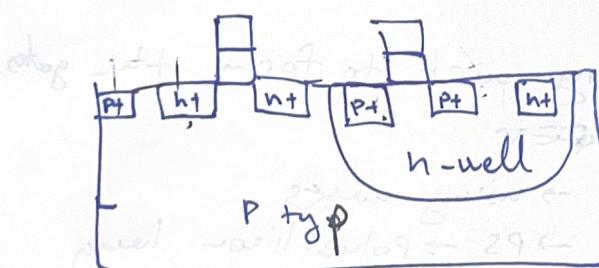
→ diffusion developing  $n^+$  region  
PLACE FOR P MOS



14. Remove oxide

15. Add Diffusion for Pt wells

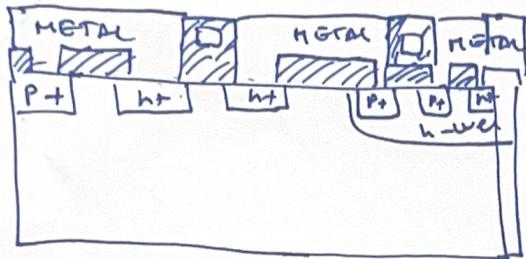
creation of  $P^+$



16. Add another layer of oxide



17. Connect the gates with wires (metallization)



18. Remove excess materials

19. Formation of terminals

