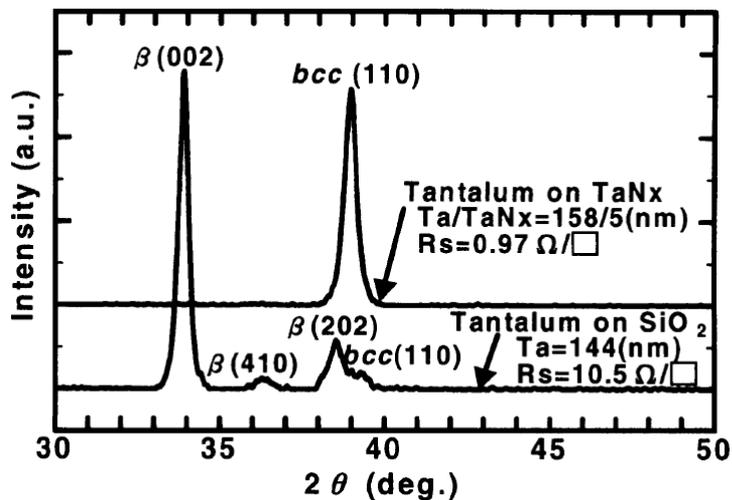


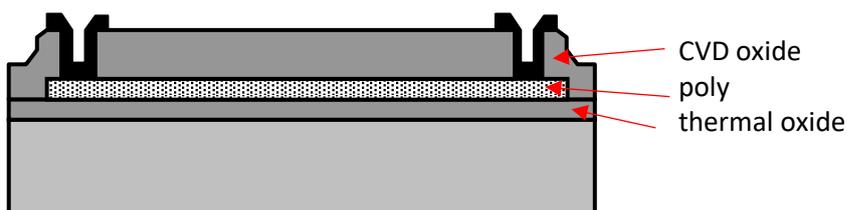
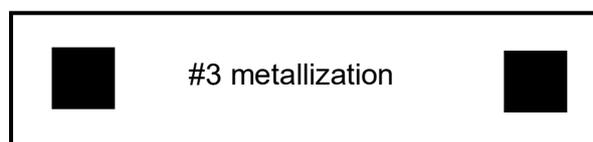
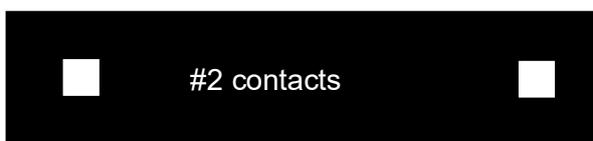
## H2 Resistors and capacitors

Return to MC by 17 March 10 pm. Exercise session March 19, 9.15 am.

- Q1. a) What are the resistivities of the two tantalum films of Fig. 5.1 ? Why are they different ?  
b) Resistor design: choose one of the tantalum films and make a 10 kOhm resistor out of it using a 3  $\mu\text{m}$  linewidth process. How long is the resistor ?



- Q2. Resistor design: you have 100\*100  $\mu\text{m}$  area available on a wafer, and 3  $\mu\text{m}$  minimum linewidth. Pt thin film is 100 nm thick and resistivity is 20  $\mu\Omega\text{-cm}$ . What range of resistances can you design ?  
Q3. Explain the fabrication process of this polysilicon resistor. Pay special attention to poly doping and etch selectivities.



**Q4.** What is the nitride thickness if areal capacitance density is  $4 \text{ nF/mm}^2$ , and nitride  $\epsilon=7$ ?

Why is the capacitor bottom contact hole (A) made by plasma etching and top contact hole (B) by wet etching ?

SiCr thin film (C) resistivity is  $2000 \text{ } \mu\text{Ohm-cm}$  and thickness  $50 \text{ nm}$ . How much area does a  $5 \text{ kOhm}$  resistor take ?

