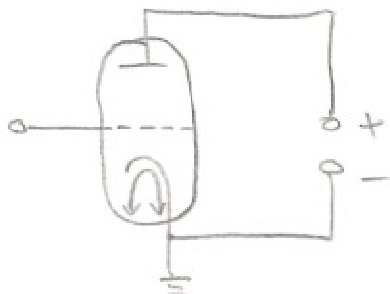
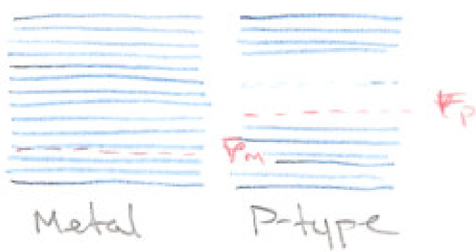
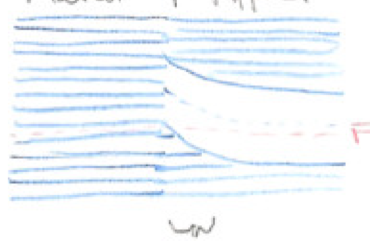
MOS (Metal oxide) TRANSISTORS

Vaccum Triode



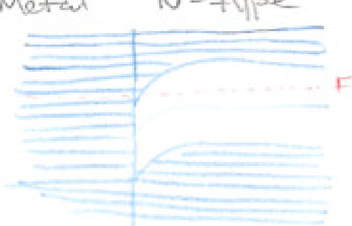
note: we create charges in the vaccum so to adjust the overall conductivity





here it becomes more P.

And similiorly for n-type.

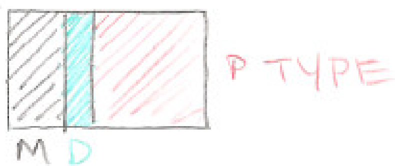


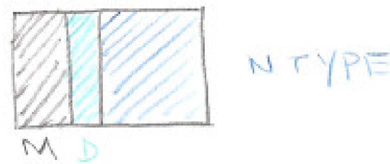
$$\boxed{\varphi_m < \varphi_n}$$

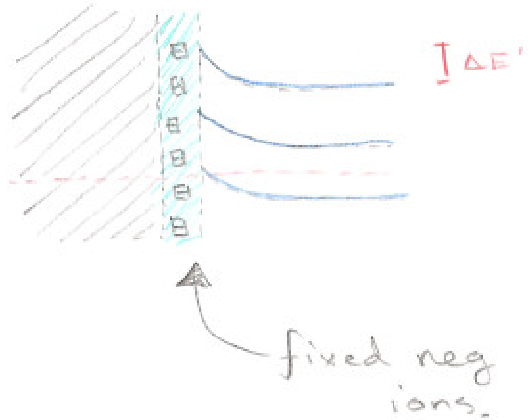
$\Delta E = F_p - F_m$

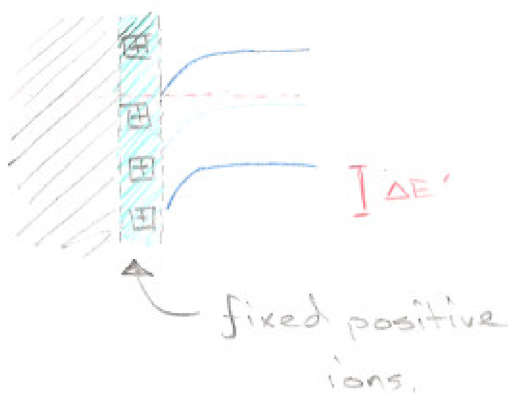
$\Delta E = F_m - F_n$

Now suppose that between the metal and semiconductor, some dialectric is inserted.





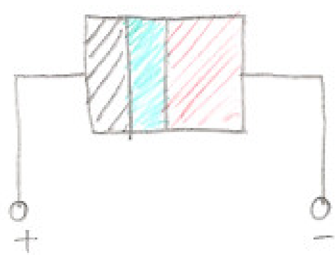




note: this will result in more curve ($\Delta E' > \Delta E$)

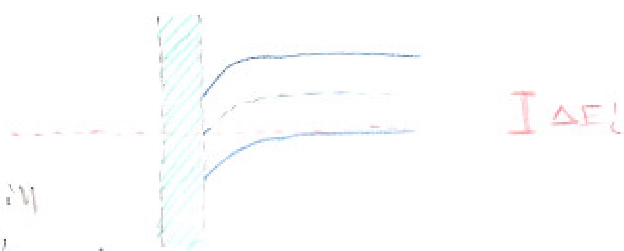
$$\boxed{\Delta E'' = \Delta E' - \Delta E}$$

We wish to adjust the conductivity by applying an external voltage source to the dialectric.



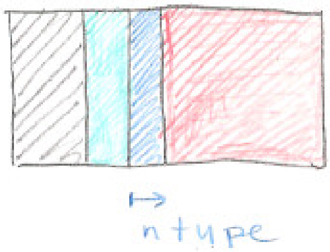
note: As more voltage is applied the curve ref P type will slope down until the middle of energy band gap reaches the fermi level.

$$V' = \frac{\Delta E'}{q_0}$$



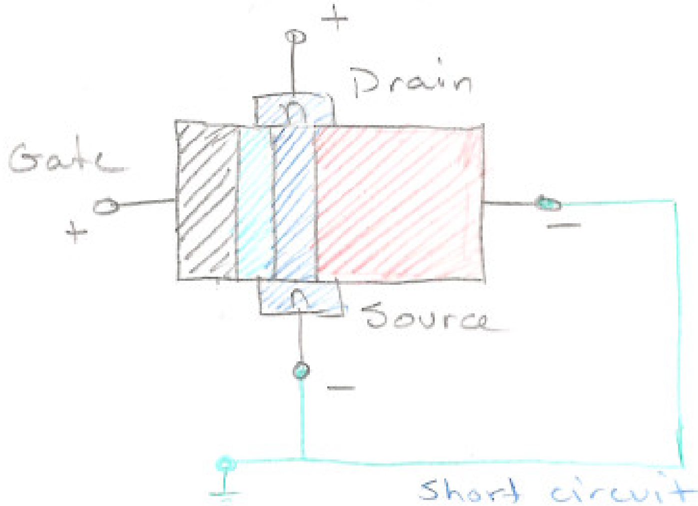
If the voltage is i/c more, then the curve will continue to curve down, n-type conductivity is achieved.

Hence, by applying voltage we have achieved different conductivity.



note: by applying voltages we can adjust the width of the ntype material.

For the Ntype device, we switch the polarity of the voltage applied, And a similior effect occurs,



Again the N-type device is designed in a similiar fashion, but the polarity of the Drain to Source voltage is reversed.