

Physics of Semiconductor: Lecture # Lec 2

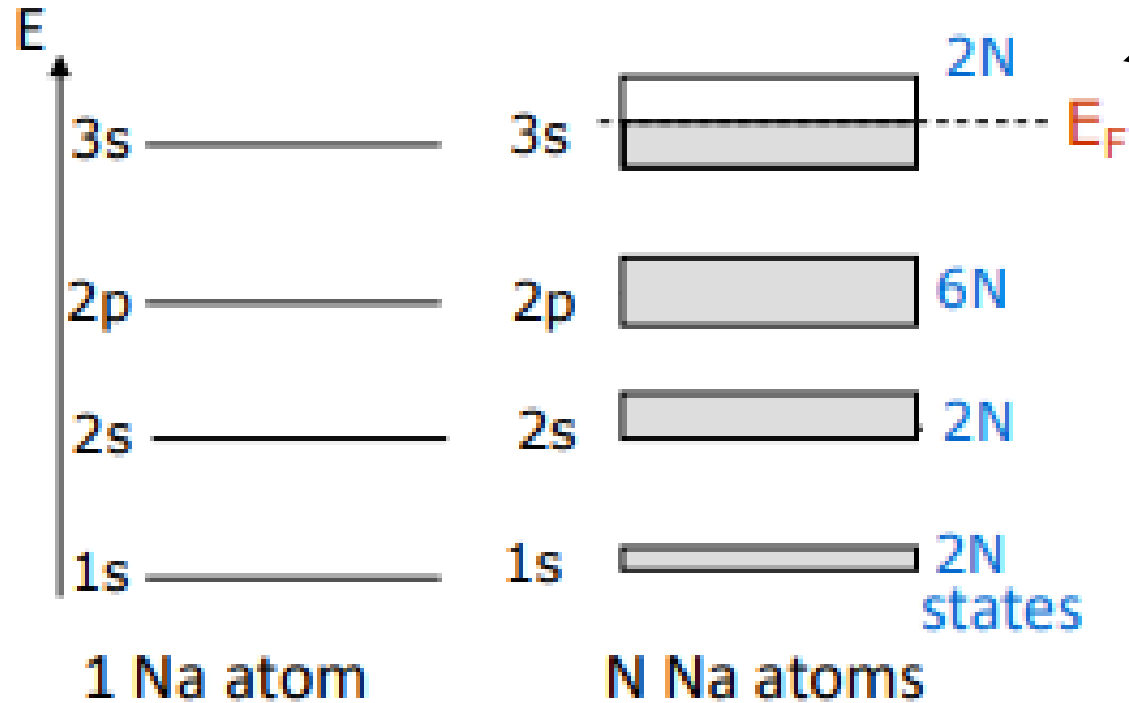
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What we have learnt last week

Let us take the example of Na,
 $Z = 11$ ($1s^2, 2s^2, 2p^6, 3s^1$)



@ RT, with thermal energy those electron which are posited in the quantum states can move to the empty states.

Thereby, takes part in conduction

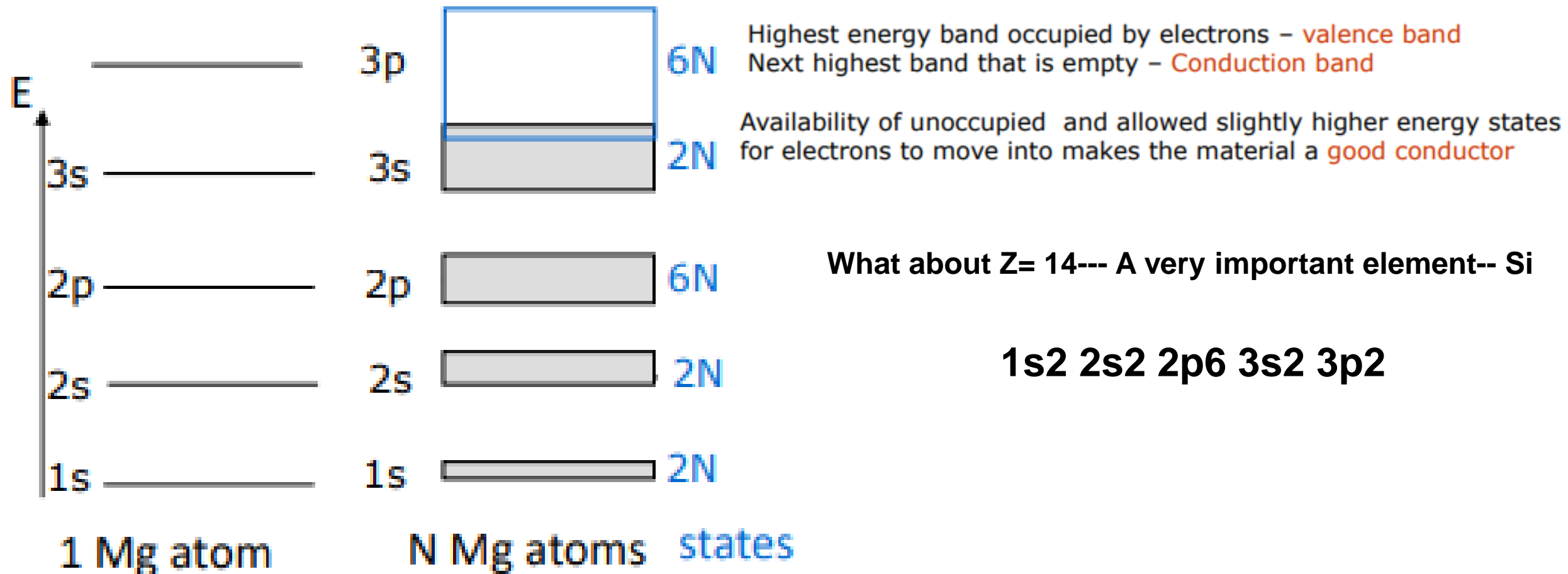
As the conduction electrons are available, this band is called as conduction band

LUMO and HOMO

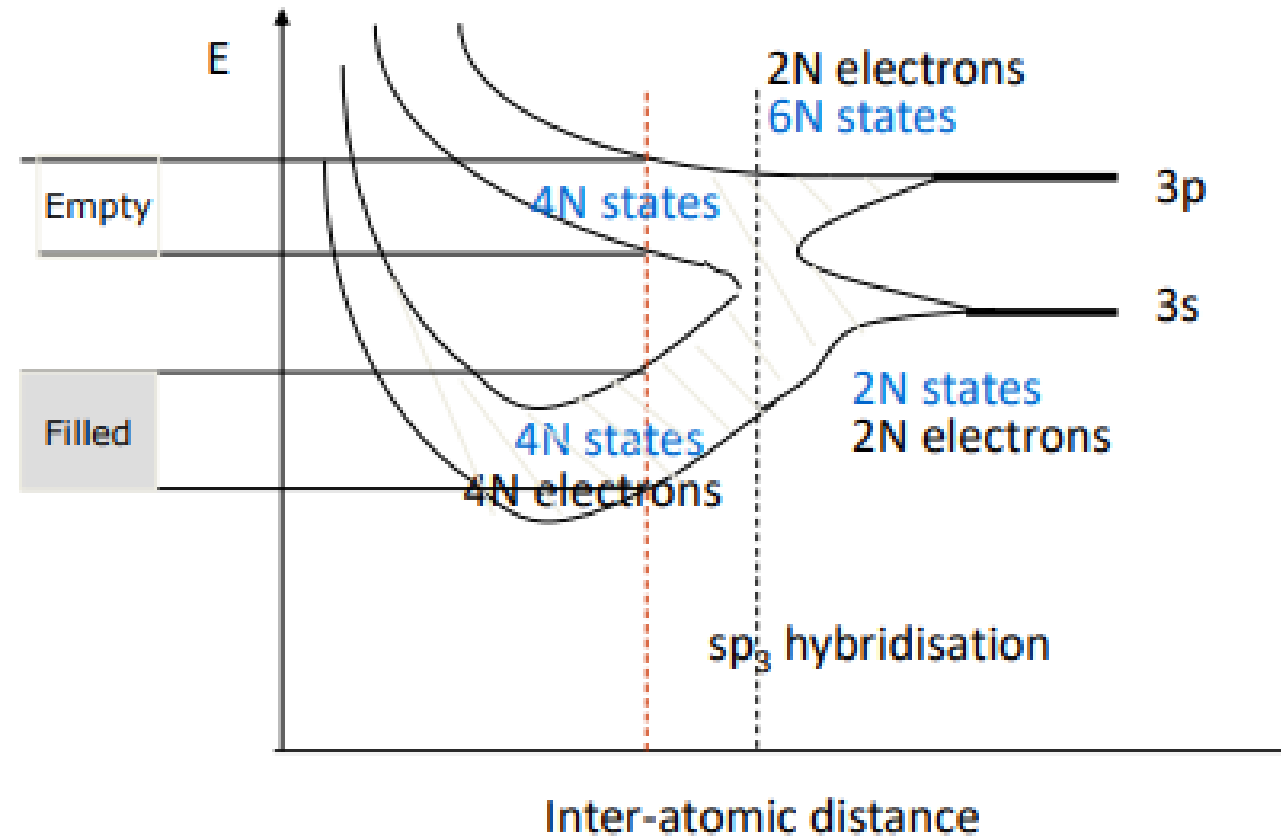
Metal

Example 2: of Mg,
 $Z = 12$ ($1s^2, 2s^2, 2p^6, 3s^2$)

Semi-metal
(overlapping conduction band)

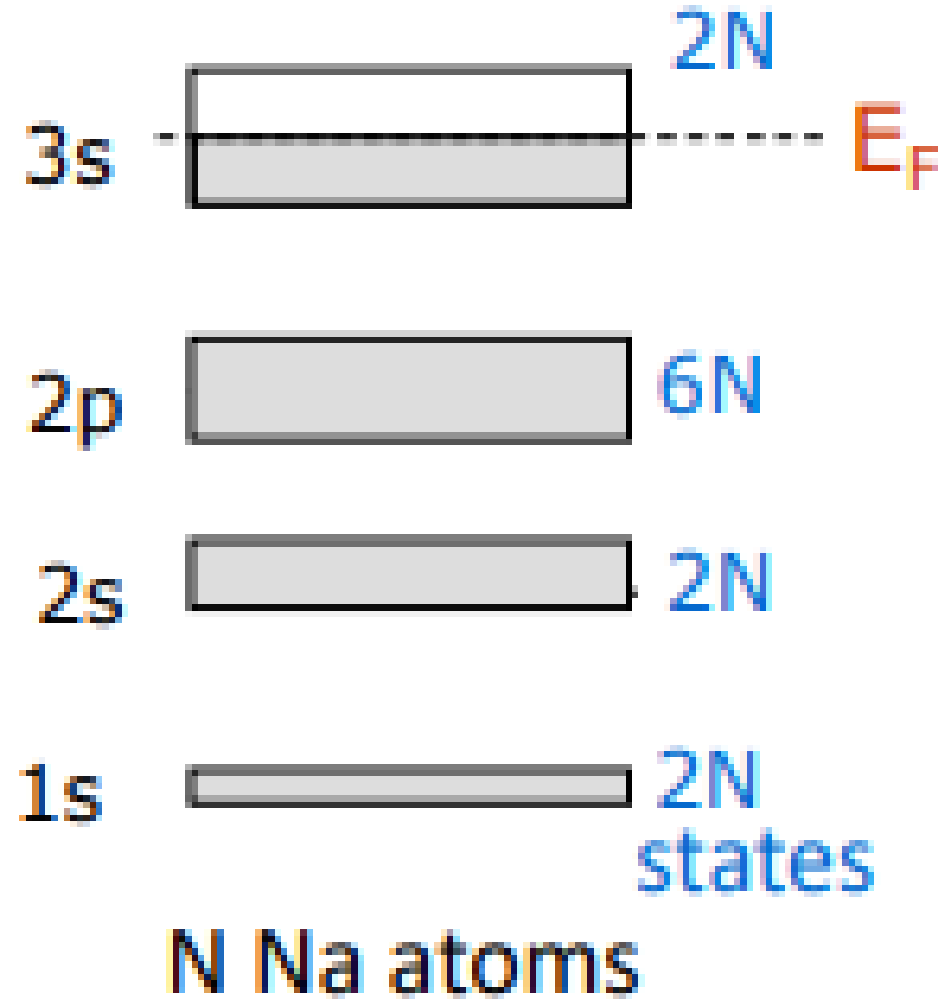


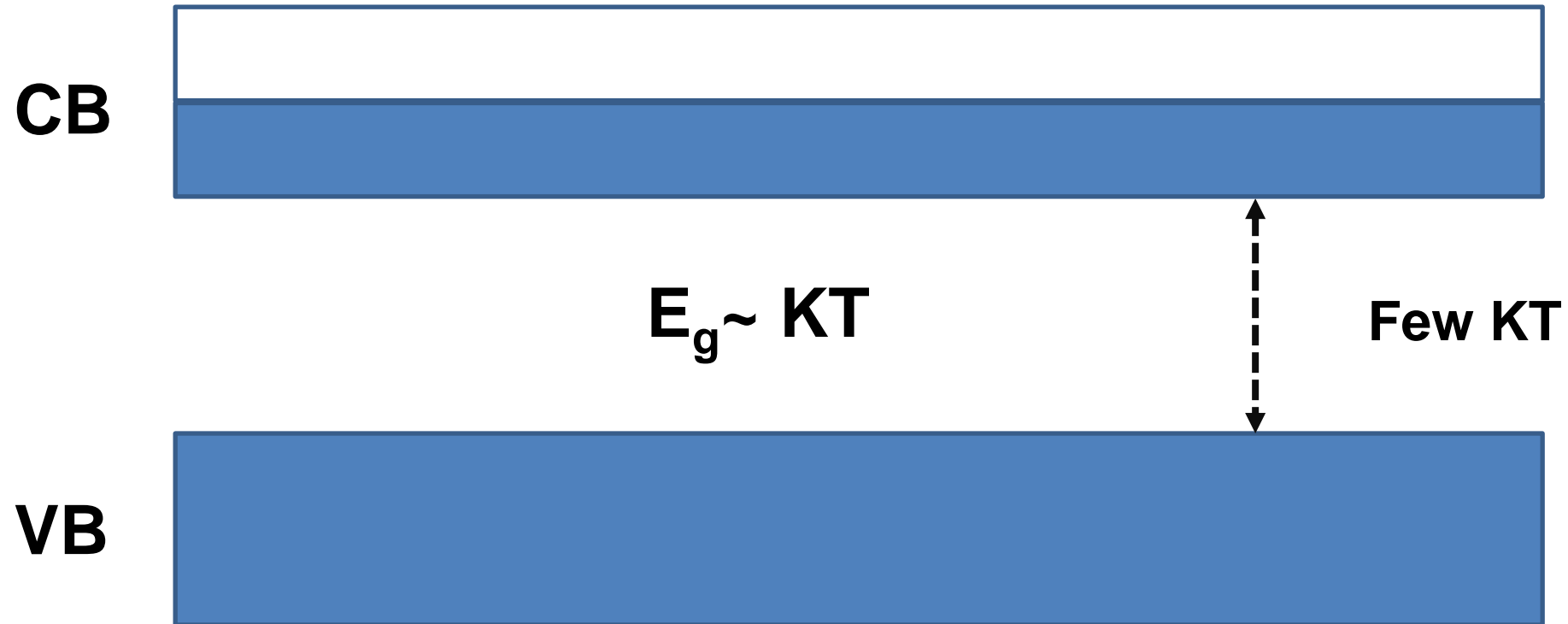
Hybrid energy band structure of silicon $1s^2, 2s^2, 2p^6, 3s^2, 3p^2$



When N atoms come together to form a solid

Definition of valence band and conduction band





CB



$$E_g \gg KT$$

VB

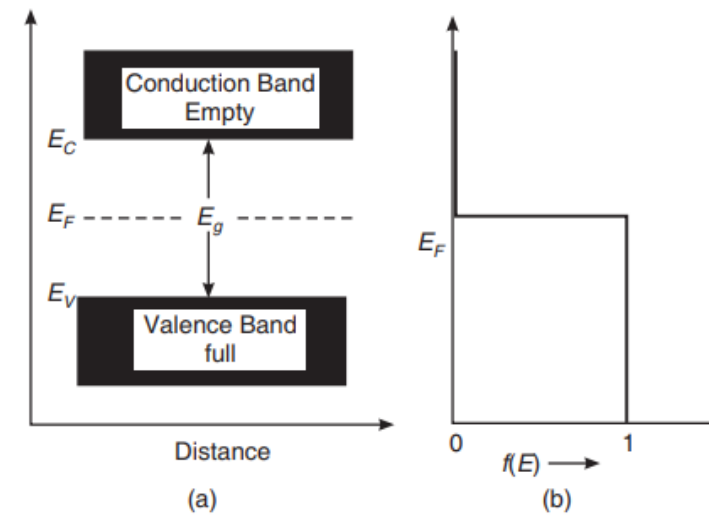


Fig. 29.17

CB



$$E_g \sim KT$$



VB

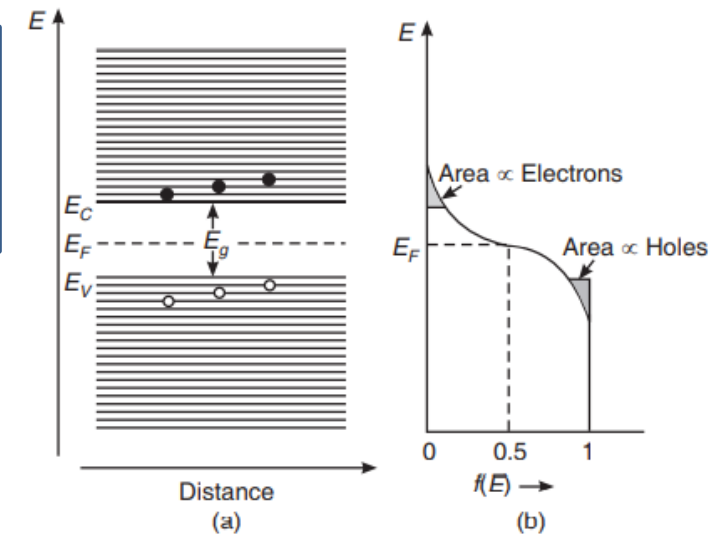
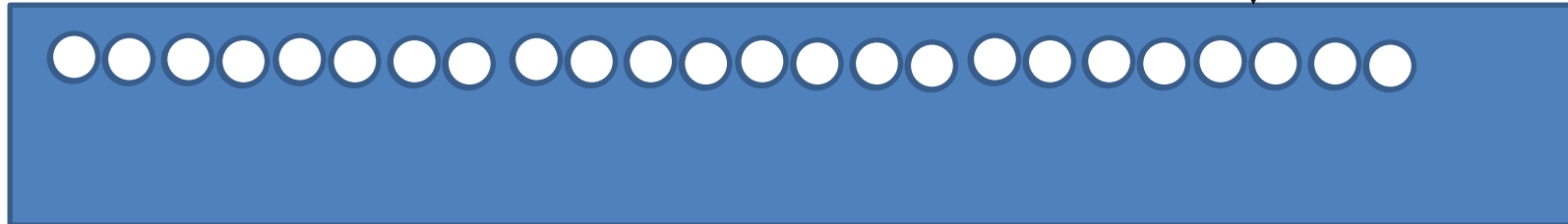
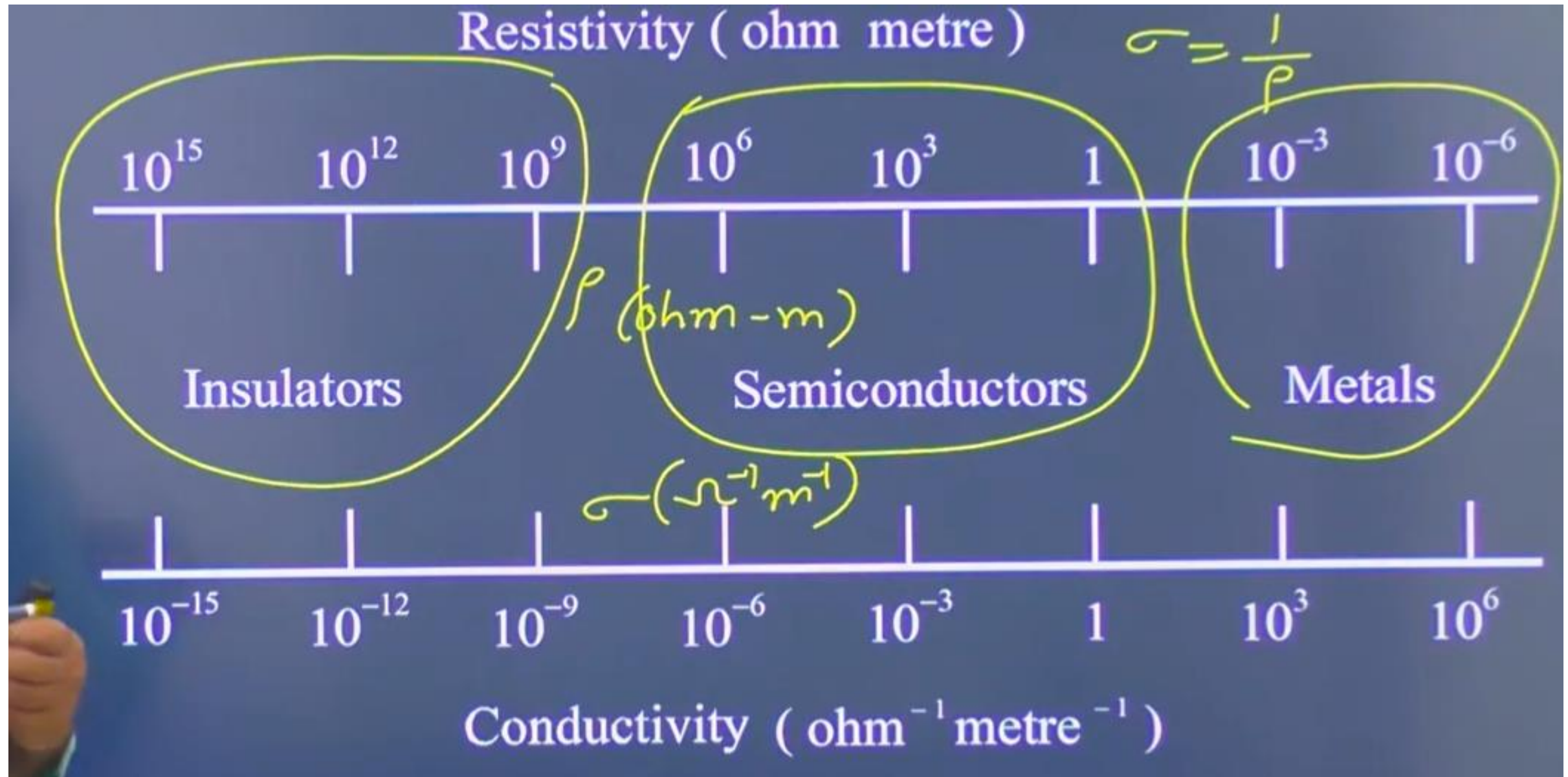


Fig. 29.18



SEMICONDUCTORS: They are here, there, and everywhere

❖ Computers,
laptops,

❖ Cell phones

Silicon (Si) MOSFETs, ICs, CMOS

Si ICs, GaAs FETs, BJTs



❖ CD players

AlGaAs and InGaP laser diodes, Si photodiodes



❖ TV remotes:

Light emitting diodes (LEDs)



❖ **Satellite dishes**

❖ **Fiber networks**

InGaAs MMICs (Monolithic Microwave ICs)

InGaAsP laser diodes, pin photodiodes

