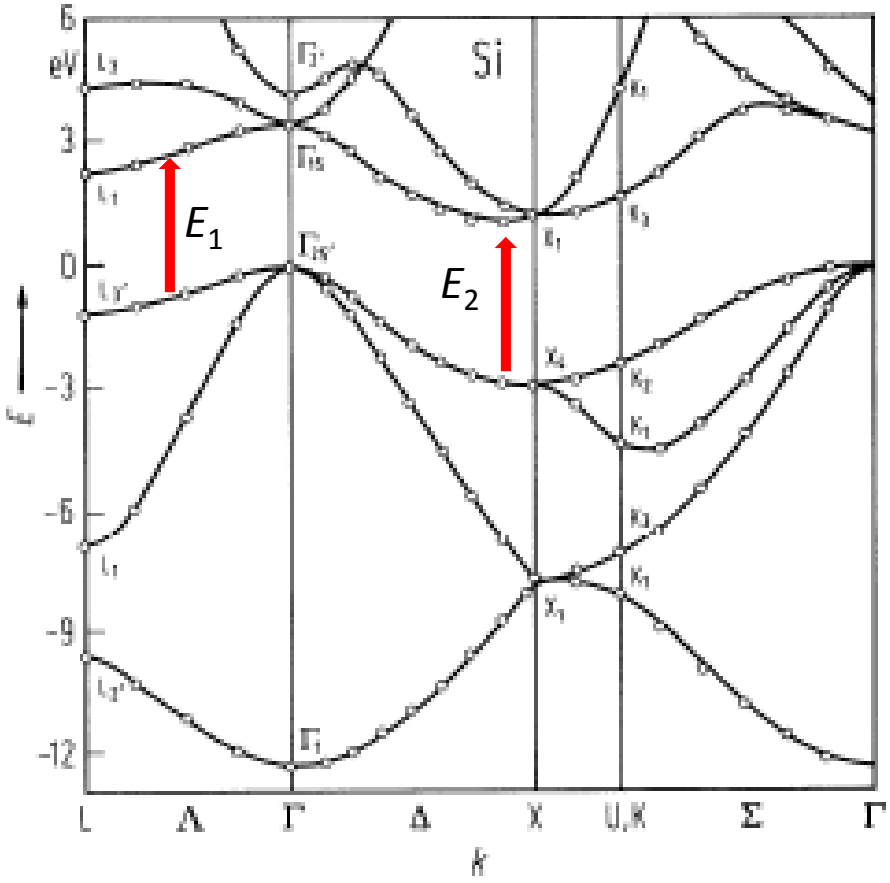
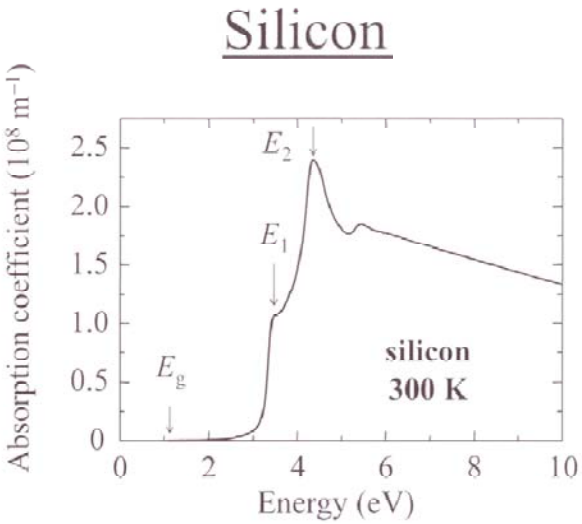
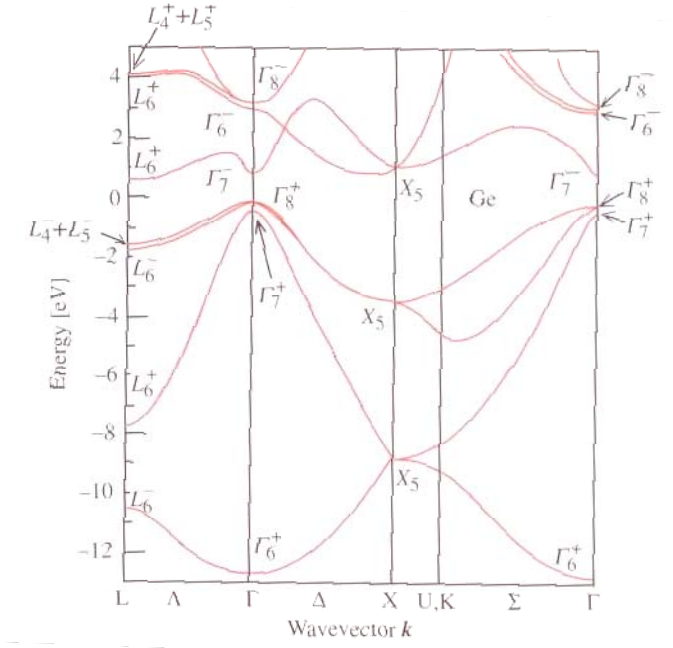


3D M_1-type critical point

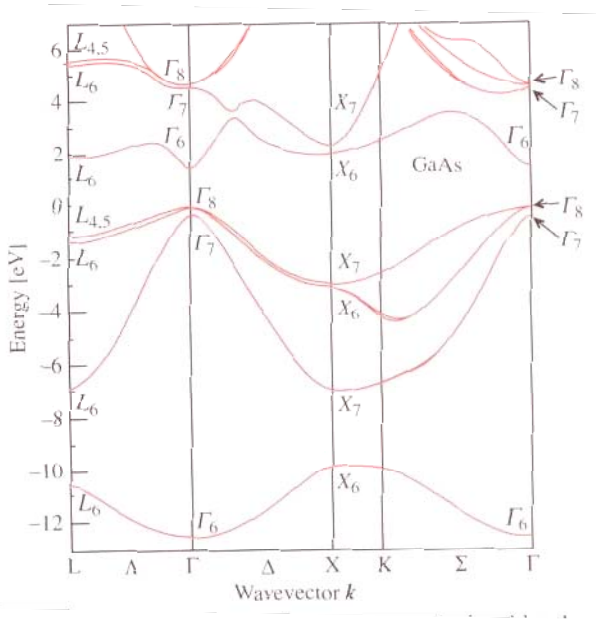
near parallel bands:
2D M_0-type critical point



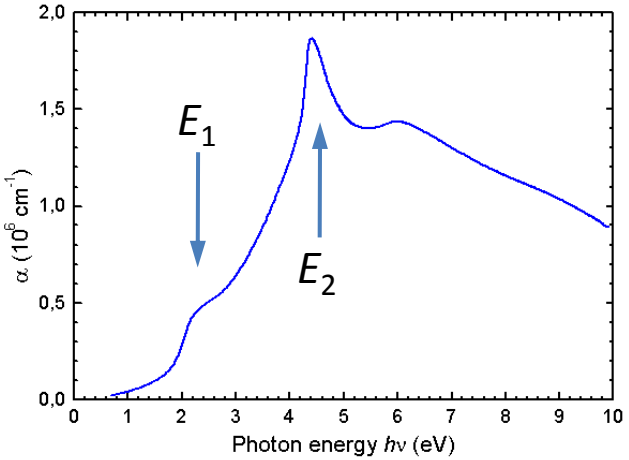
- Indirect band gap at 1.1 eV
- **Critical** points at E_1 (3.2 eV) and E_2 (4.3 eV)

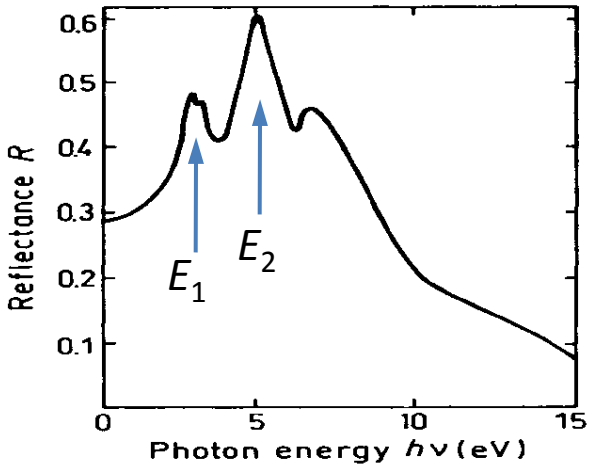

Energy [eV]
Wavevector k
L Λ Γ Δ X U,K Σ Γ
Ge

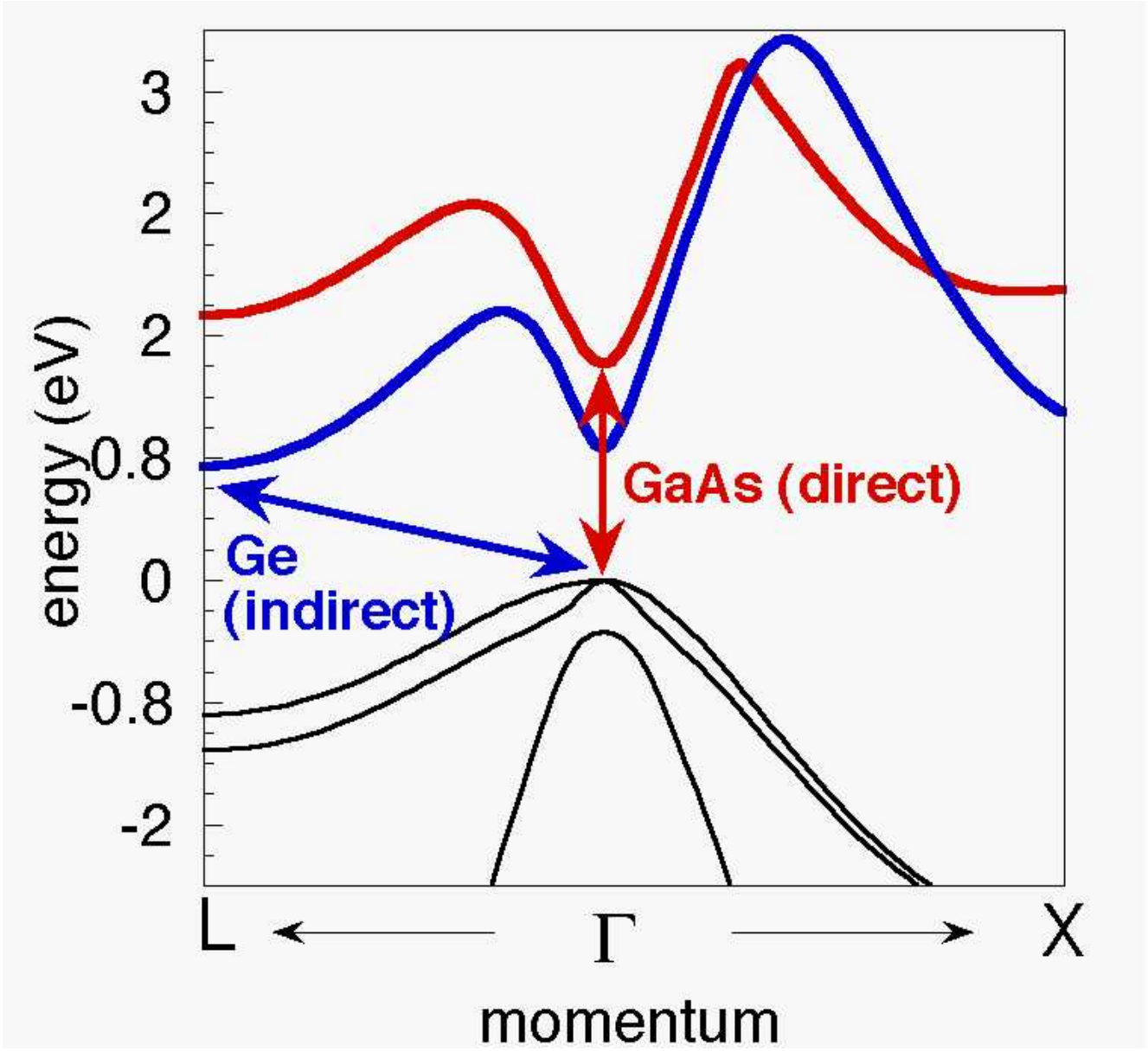
Ge


Energy [eV]
Wavevector k
L Λ Γ Δ X K Σ Γ
GaAs

GaAs

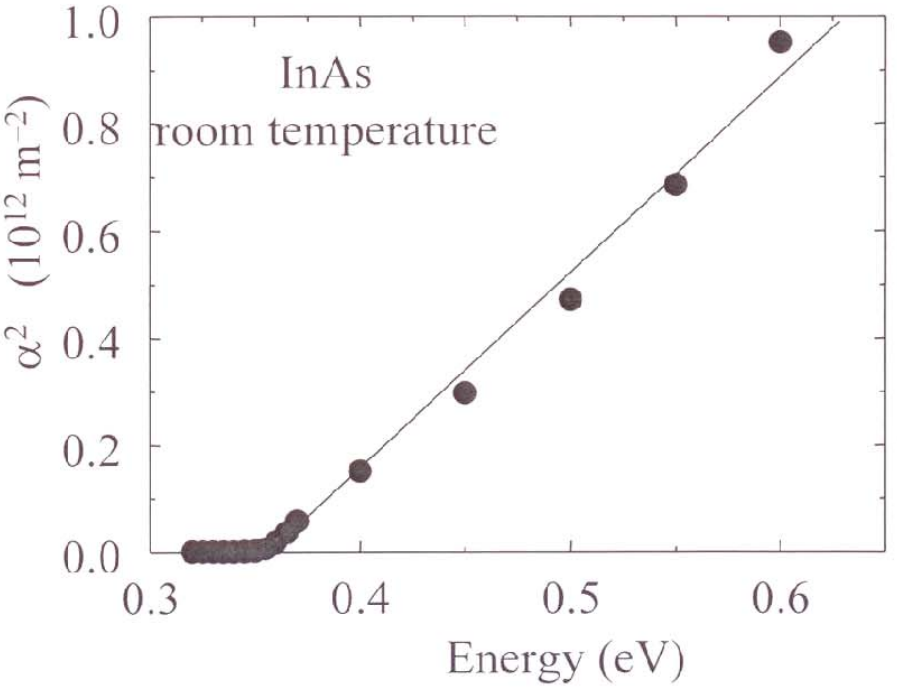

α (10^6 cm^-1)
Photon energy hν (eV)
E1
E2


Reflectance R
Photon energy hν (eV)
E1
E2


3
2
2
0.8
0
-0.8
-2
energy (eV)
GaAs (direct)
Ge
(indirect)
L
Γ
X
momentum

3D M_0-type critical point
(weak excitonic effects)

InAs band edge absorption



InAs is a direct gap III–V semiconductor with $E_g = 0.35$ eV

$\hbar\omega < E_g$: $\alpha = 0$

$\hbar\omega > E_g$:

$\alpha \propto (\hbar\omega - E_g)^{1/2}$