Bi Z=83, group VA ; structure: RHL

two atoms per unit cell => 10 electrons per unit cell

Bi has:

- the **highest Hall coefficient**, $R_H = -1/(nec)$, is several orders of magnitude higher than expected with that n.
- the **second lowest thermal conductivity** (after Hg)
- a **high electrical resistance** (or low electrical conductivity)
(look for instance at Tab 1.2 and 1.6 of A&M)

Why?

Is the "effective" electron concentration n for some reason much lower than the calculated one?

Bi Z=83, group VA ; structure: RHL

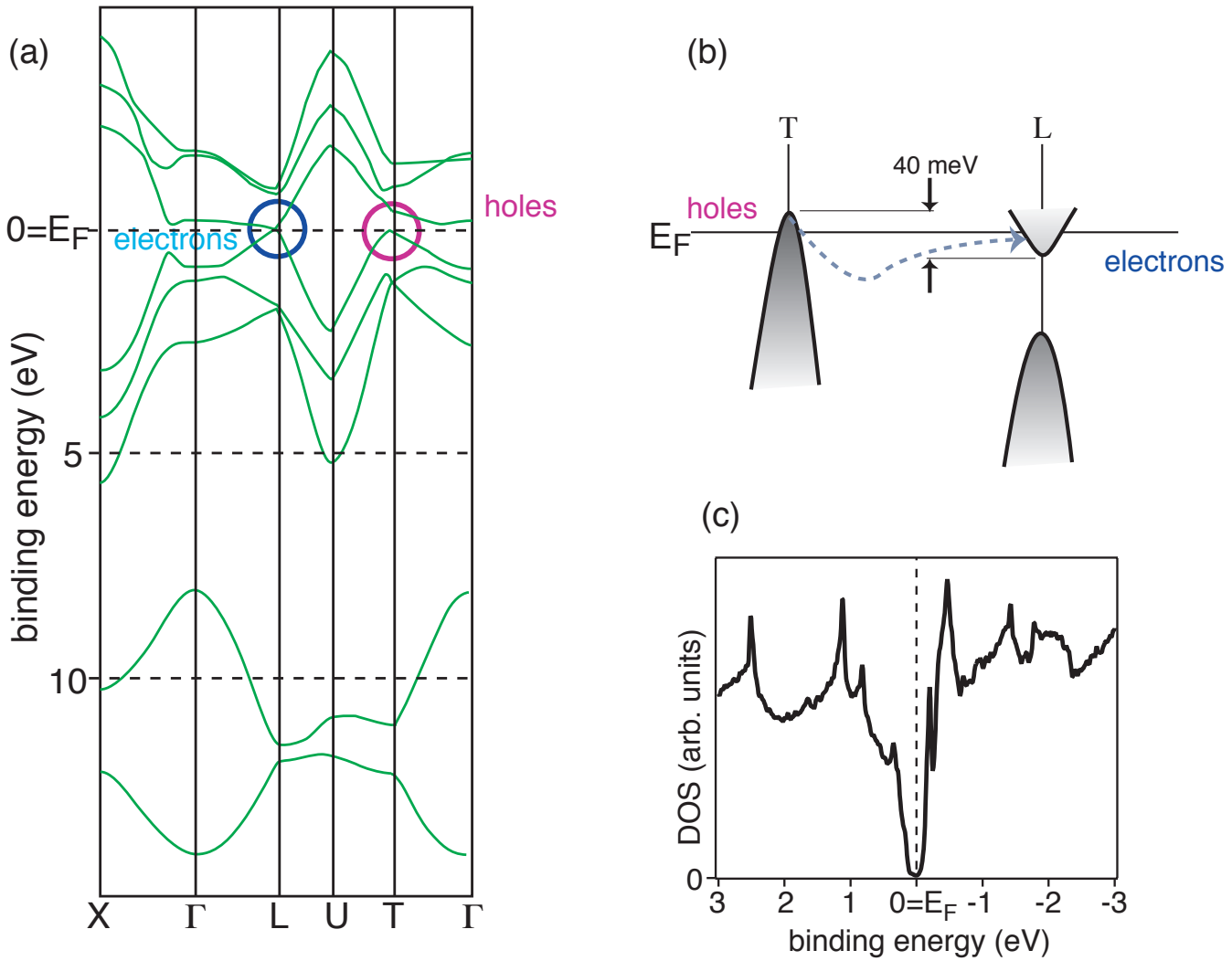

Figure 1: Electronic structure of Bismuth. (a) Bulk band dispersion in different directions of the Brillouin zone (b) Schematic band structure of the bands crossing the Fermi energy. (c) Density of states.

Bi Z=83, group VA ; structure: RHL

The effect of the presence of both holes and electrons on the Hall constant can be understood qualitatively from the expression for R_H:

$$R_H = \frac{p\mu_h^2 - n\mu_e^2}{e(p\mu_h + n\mu_e)^2}$$

(see: Ashcroft-Mermin: problem 12.4;

written test of January 16, 2012 - problem n. 3)

(qualitative picture!)