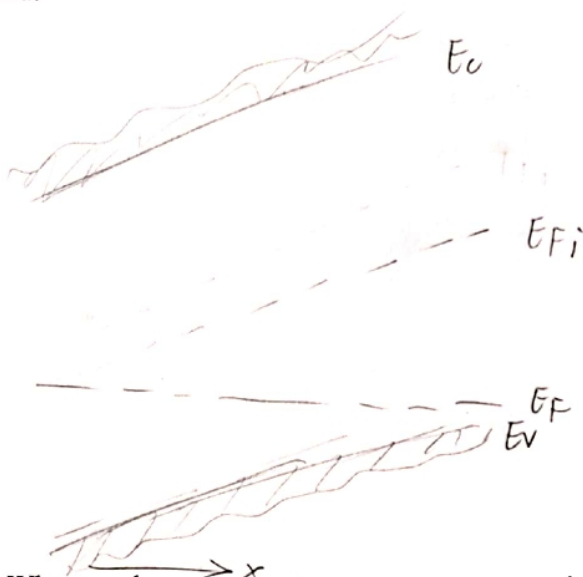


1. What are the ways to increase the hole mobility in Si? Please list at least two.

- ① decrease the temperature
- ② decrease the impurity concentration

2'

2. For a p-type Si piece with a nonuniform doping concentration (higher concentration on the right, lower concentration on the left), please draw the energy band structure, and explain why there is a built-in electric field.



$$\phi = +\frac{1}{e} (E_{fi} - E_F)$$

$$E_x = -\frac{d\phi}{dx} = -\frac{1}{e} \frac{dE_{fi}}{dx}$$

As intrinsic Fermi level changes, there is a built-in electric field.

Then any further diffusion, counter the diffusion ~~is~~ can be prevented.

3. What are the two ways to generate excess carriers?

- ① light illumination : photon with energy exceeding the bandgap energy.
- ② current injection : forward biased pn junction

