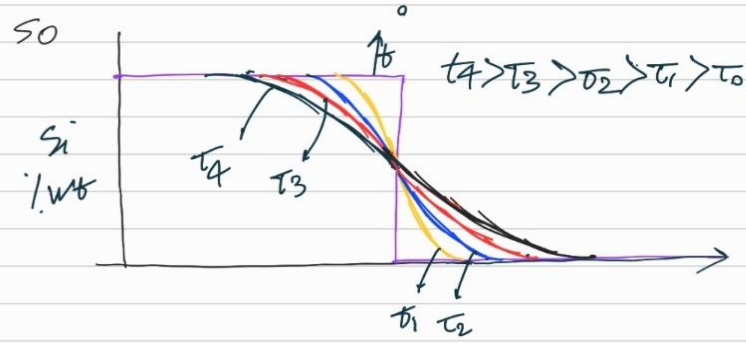
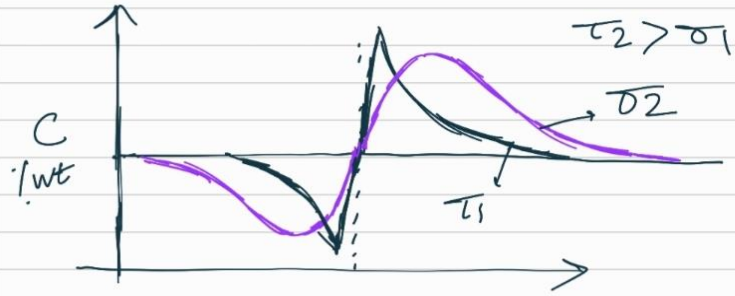
Q1.

Before starting it should be considered C has a diffusion coefficient of 1000 times faster than Si so Si needs longer time

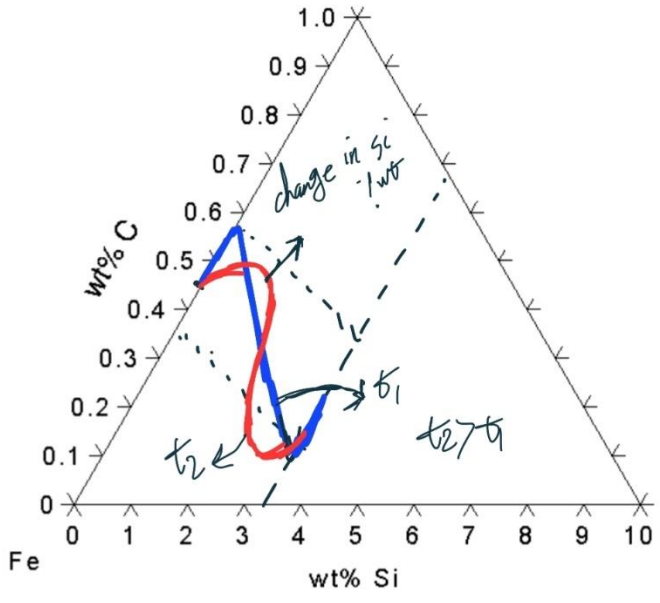
Mostafa Habibi
2022/12/4

so

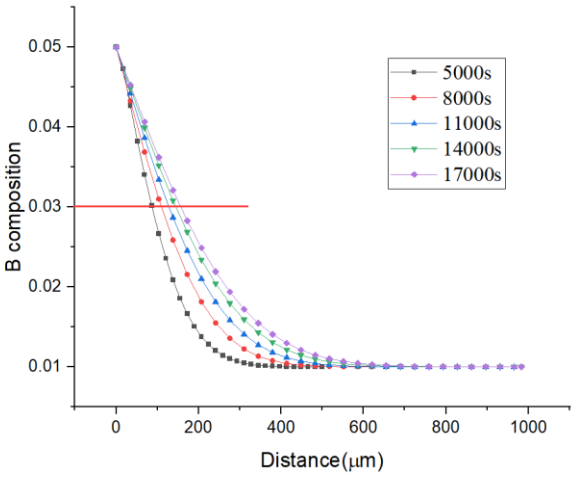


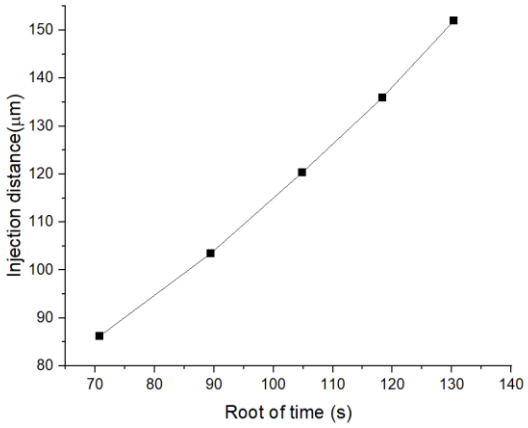


for diffusion path the Darken's uphill graph it should be considered at carbon reach side, high concentration of carbon causes C diffusion to opposite side. Also in Si reach side chemical potential is higher which causes carbon diffusion



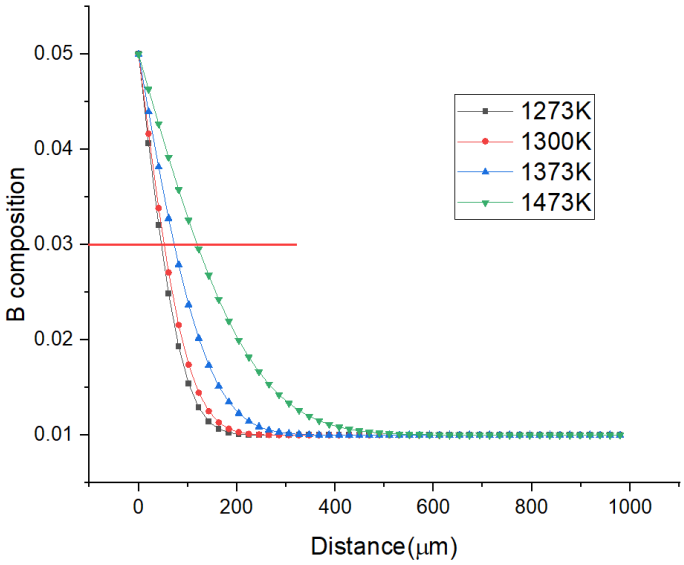
Q2 a)

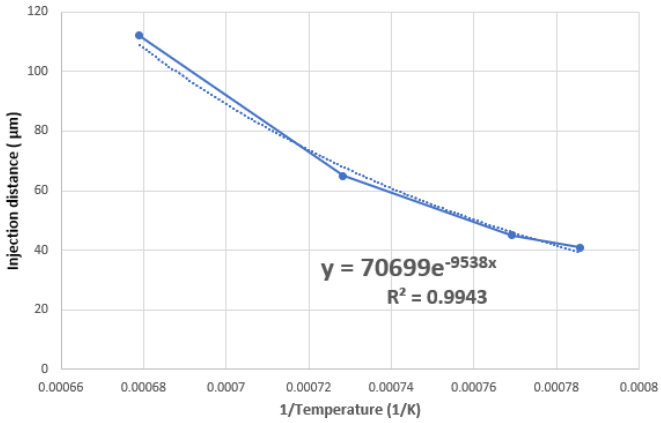




injection distance $\propto \sqrt{t}$

b)





injection distance $\propto \exp(\frac{1}{T})$

c)

we know $x = \sqrt{Dt}$

also $D = D_0 \exp\left(-\frac{Q}{RT}\right)$ then

$x = \sqrt{D_0}\, e\left(-\frac{Q}{2RT}\right)$.

↓ ln from both sides

$\ln x = \frac{1}{2} D_0 - \frac{Q}{2R} \frac{1}{T}$

now if we plot $\ln(x) - -\frac{1}{T}$

$Q = 9538 \times 8.3 \times 2 = 165330$

Plot: