

Homework: Silicon and Project

Question 1 (project)

In no more than 1000 words and maximum of 2 figures describe an application of **either**

1. Flow cytometer on a chip, or
2. Waveguides on a chip

Question 2 (substrate materials)

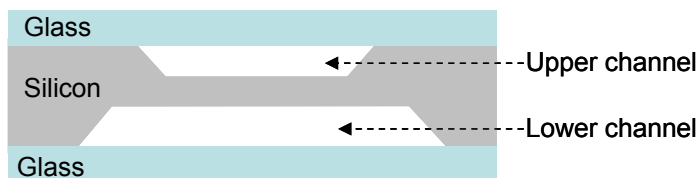
A mixture of 30% of silicon and 70% germanium (atomic percentage) is heated to 1100 °C. If the material is in thermal equilibrium, what is the concentration of silicon in the melt? At what temperature will the entire charge melt? The sample temperature is raised to 1300 °C, then slowly cooled back down to 1100 °C. What is the concentration of silicon in the solid?

Question 3 (substrate materials)

A silicon wafer 1 mm thick having a diameter of 200 mm contains 5.41 mg of boron uniformly distributed in the substitutional sites. Find (i) the boron concentration in atoms/cm³ and (ii) the average distance between boron atoms.

Question 4: (Process flow)

Design and briefly describe a process flow (with figures) for fabricating the following dual-channel structure. How many lithography steps and etch steps are used in the fabrication process?



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