Homework: Silicon & Project

Question 1 (project)

In no more than 1000 words and a maximum of 2 figures, describe an application of **one of the following**:

1. Flow cytometer on chip, or
2. Metal electrodes on chip

Please cite any references borrowed from literature.

Question 2 (substrate materials)

A mixture of 40% of silicon and 60% germanium (**by weight**) is heated to 1150 ºC. 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 1400 ºC, then slowly cooled back down to 1150 ºC. What is the concentration of silicon in the solid phase?

Question 3 (substrate materials)

A silicon wafer 1 mm thick having a diameter of 4 in. contains 5.41 mg of boron uniformly distributed in the substitutional sites. Find (i) the boron concentration in atoms/cm^3 and (ii) the average distance between the 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?