LAB 4: Hot Point Probe

Objective:
To see that the charge carrier in semiconductors can be either positive or negative.

General Safety Guidelines:
The soldering iron(once plugged to power) will become very hot, and must be held at the insulated part.

Lab Equipment:
Soldering iron, voltmeter, n and p type silicon substrates.

Procedure:
1. Plug the soldering unit to power outlet and let it stand for couple of minutes or until it's tip gets heated.

2. The p type and n type substrates are given in petri dishes. Place the soldering unit on the p or n substrate so that the tip makes contact at a slant angle not more 30 degrees from the horizontal surface.

3. Place the red probe at approximately 1mm(i.e. hold it as close as possible without touching the soldering tip). Place the black probe at approximately 5mm from the red probe. Hold the equipment this way until you see a voltage flowing across your multi-meter. Take a note of the reading. Repeat the process for the other substrate. You should see positive voltage for n type and negative voltage for p type substrate.

Data and Analysis:
Turn in the 2 Voltage readings that you observe for p type and n type substrates.

Questions:

1. Explain why you see a positive voltage for n-type and a negative voltage for p-type. You may find it helpful to use a picture.

2. What is the thermal energy needed to move an electron from the donor state to the conduction band in GaAs? (ε_r for GaAs is 13.1)