928. A singly ionized phosphorus ion implant into an 8" diameter silicon wafer is performed with the following conditions:

- Time: 15 seconds
- Energy: 100 keV
- Current: 1 mA
- N$_c$: $1 \times 10^{15}$ cm$^{-3}$
- Raster: square

Calculate the following:

a. Dose (Q)
b. Peak concentration (N$_p$)
c. Junction position ($x_j$)

929. Calculate and graph N vs. x curves (0 < x < 0.4 µm in 0.005 µm increments) for singly ionized boron ion implants at the following dose and energies with the help of an Excel spreadsheet:

- Q = $2.27 \times 10^{14}$ cm$^{-2}$
- E = 10 keV, 30 keV, 50 keV, 70 keV, 90 keV, 110 keV, 130 keV, 150 keV

(a separate curve for each energy)

Figure 2 is an example of what the graph should look like (using phosphorus).

Figure 2: N vs. x for phosphorus ion implant at various energies.
A singly ionized phosphorus ion implant into an 8" diameter silicon wafer is performed with the following conditions (same as 830):

- time: 15 seconds
- Energy: 100 keV
- current: 1 mA
- \( N_c: 1 \times 10^{15} \text{ cm}^{-3} \)
- raster: square

Calculate the minimum oxide thickness to act as an effective mask using the following materials:

a. Silicon dioxide
b. Photoresist