

ECSE-2210 Microelectronics Technology
Homework 2

1. The bonding model for a semiconductor is explained in Figs 2.3 and 2.4 in the textbook.
 - a. Draw the bonding model for GaAs depicting the removal of one Ga and one As atom.
 - b. Redraw the bonding model showing the insertion of Si atoms into the missing Ga and As sites.
 - c. Is the GaAs p- or n-type when Si atoms replace Ga atoms? Explain.
 - d. Is the GaAs p- or n-type when Si atoms replace As atoms? Explain.
 - e. Suppose it takes an energy amount equal to 1.43 eV to break one of those bonds shown in the figure, draw the band model for GaAs.
 - f. Draw the band model for GaAs when GaAs is doped with Si on (i) Ga sites and (ii) on As sites. Assume typical values for the ionization energy.