
Problem 1.6 What is the width of an infinite quantum well if the second lowest energy of a free electron confined to the well equals 100 meV?

Solution The second lowest energy is calculated from

$$E_2 = \frac{h^2}{2m^*} \left(\frac{2}{2L_x}\right)^2 = 1.6 \times 10^{-20} \text{ J}$$

One can therefore solve for the width, L_x , of the well, yielding:

$$L_x = \frac{h}{\sqrt{2m^* E_2}} = \frac{6.626 \times 10^{-34}}{\sqrt{2 \times 9.11 \times 10^{-31} \times 1.6 \times 10^{-20}}} = 3.88 \text{ nm}$$
