Chapter

3

BANDSTRUCTURE MODIFICATION

STRAIN AND CONSEQUENCES FOR VALENCE BAND



Biaxial strain can lift the heavy hole-light hole degeneracy.

Hole band dispersions for (top) unstrained GaAs, (middle) GaAs under 1% biaxial tension, and (bottom) GaAs under 1% biaxial compression.

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STRAIN AND VALENCE BAND MASSES

An important consequence of the splitting of the LH, HH states at k = 0 is that the bandedge density of states decreases. Hole dispersion in a 100 Å quantum well in (a) GaAs/Al_{0.3}Ga_{0.7}As, (b) In_{0.1}Ga_{0.9}As, and (c) change in the density of states mass as a function of strain at the bandedge.



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STRAIN IN QUANTUM WELLS: HH, LH ORDERING

By a proper choice of the sign and magnitude of strain it is possible to use strained epitaxy to control the ordering of the HH and LH states in quantum wells.

Consider growth along (001) direction:



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