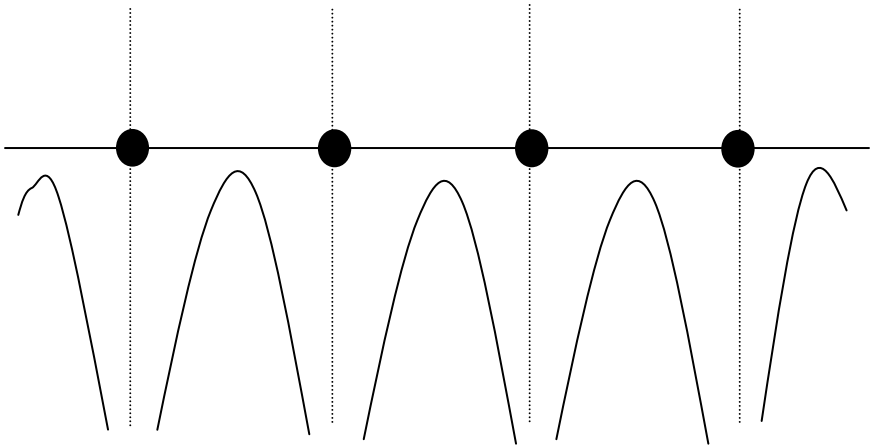


Figure 1.1 Schematic of the periodic lattice potential

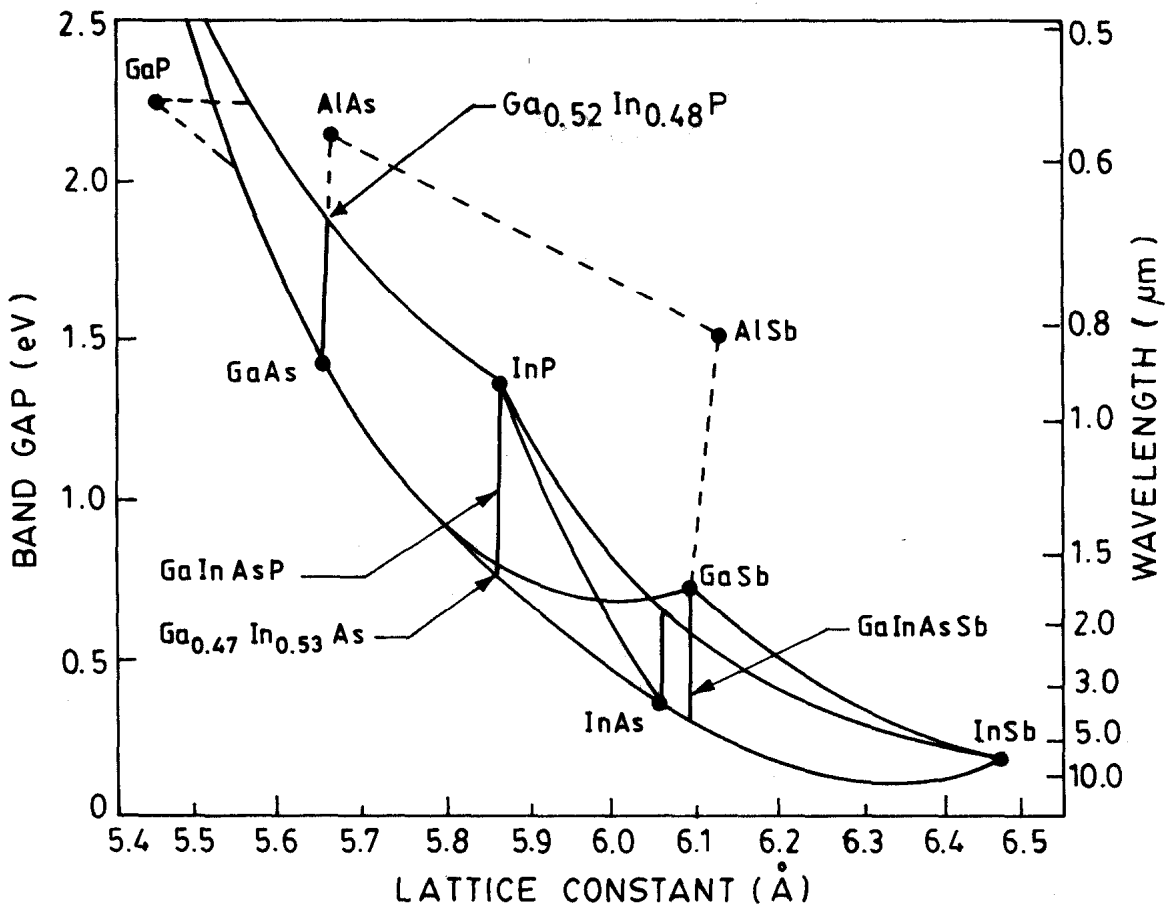


Figure 1.2 Bandgap and lattice constant of several semiconductors

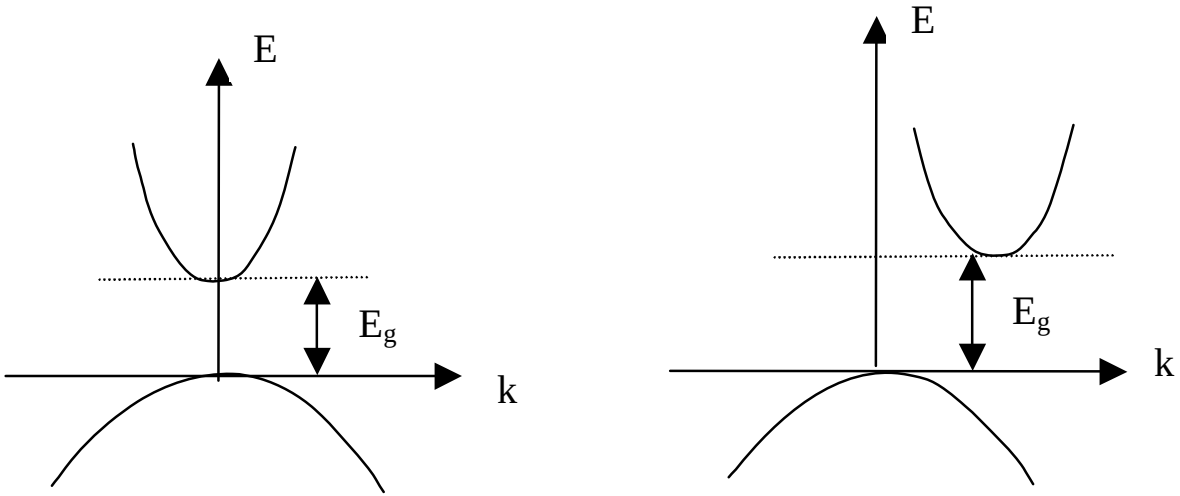


Figure 1.3 E vs. k for direct and indirect bandgap semiconductor

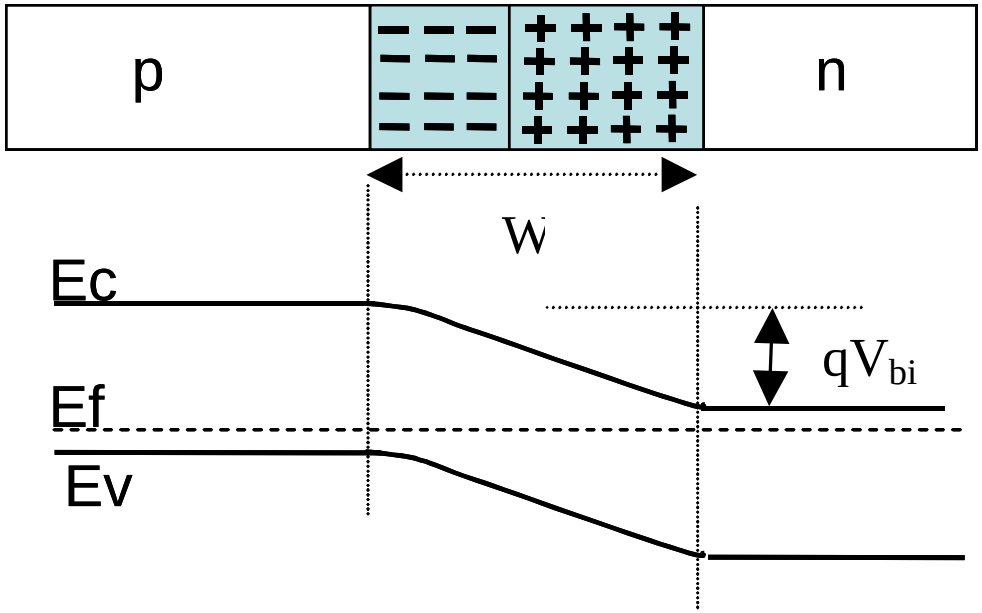


Figure 1.4 Charge distribution and band structure of a p-n homojunction

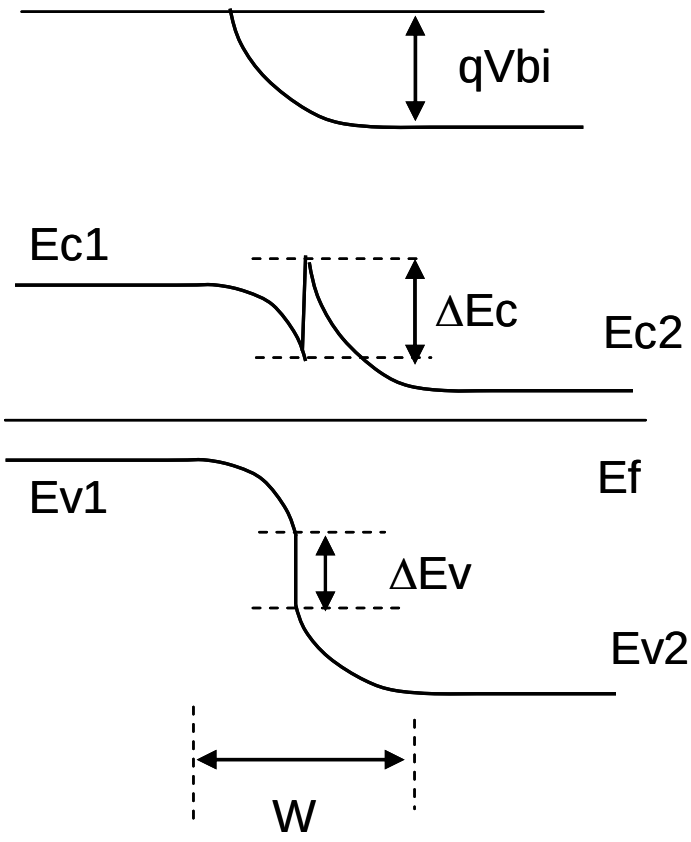


Figure 1.5 Band structure of a p-n heterojunction at thermal equilibrium

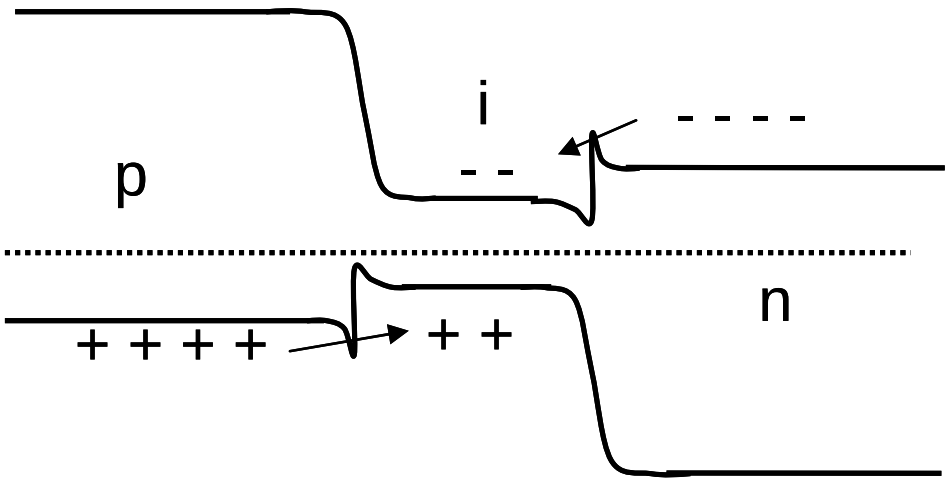


Figure 1.6 Band structure of a p-i-n heterostructure

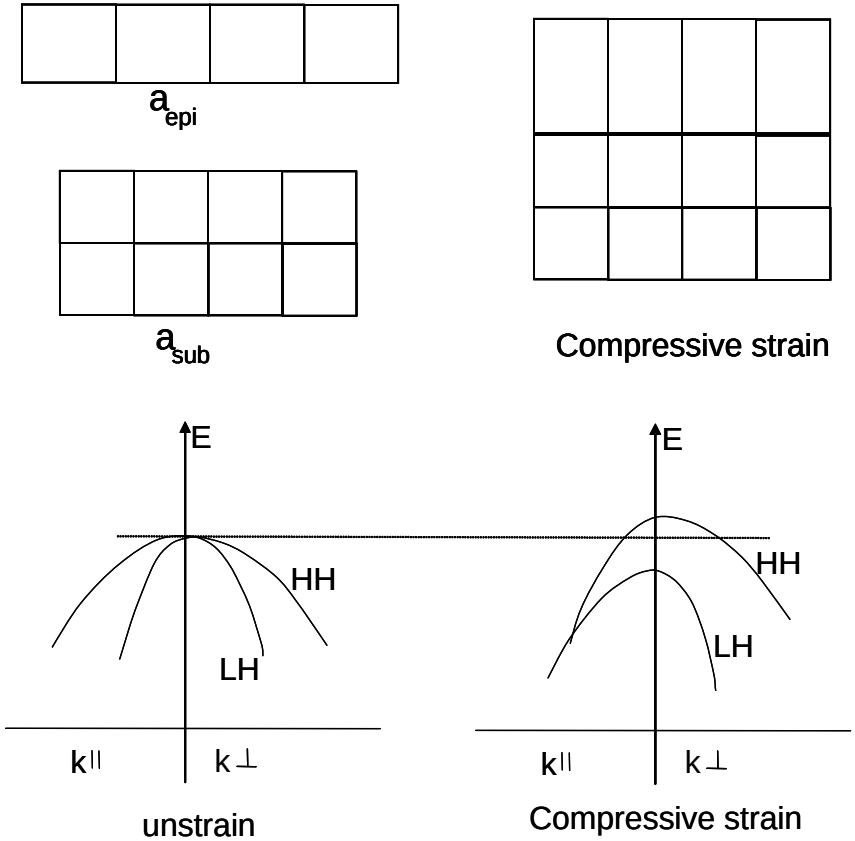


Figure 1.7 Lattice deformation and modification of the bulk valence band due to compressive strain

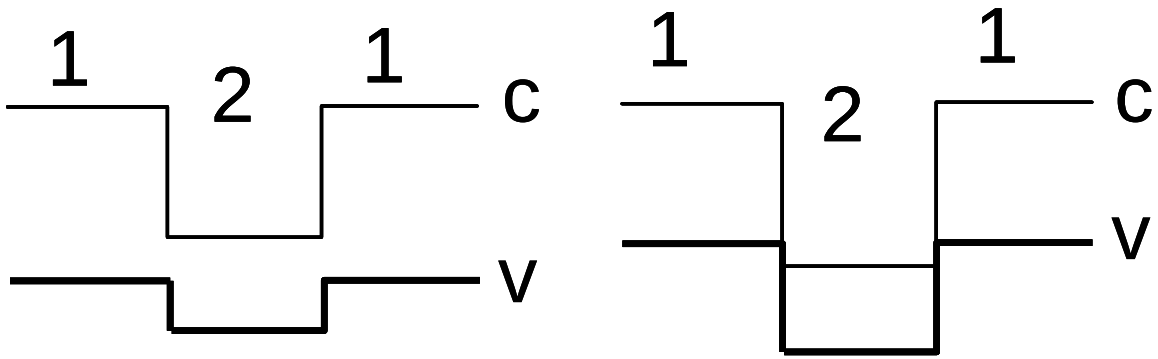


Figure 1.8 A quasi-type II (left) and a type II (right) heterostructures

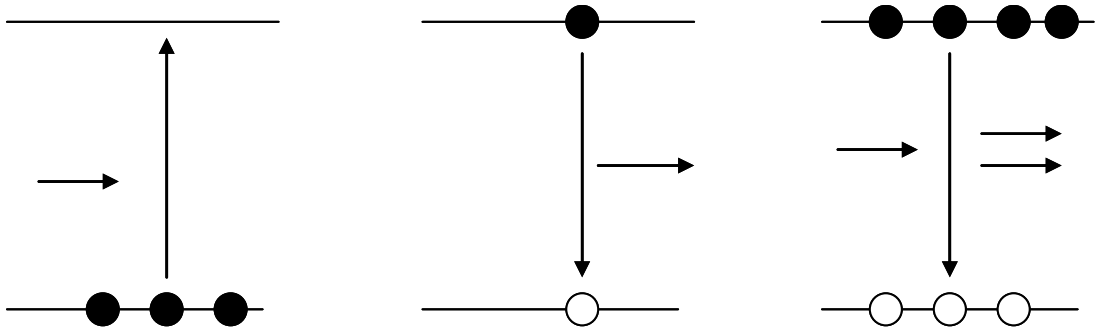
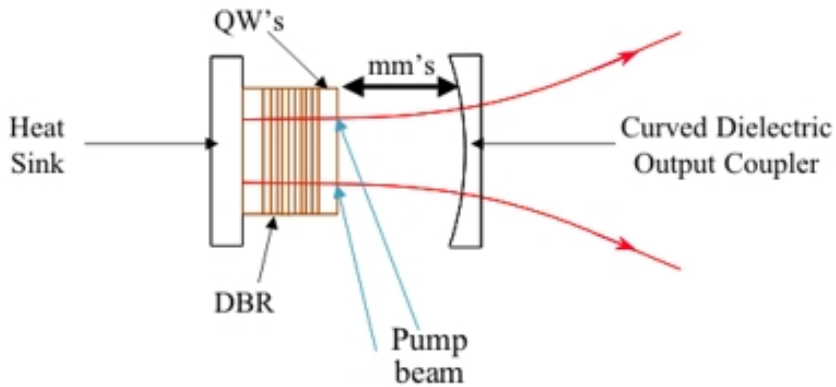
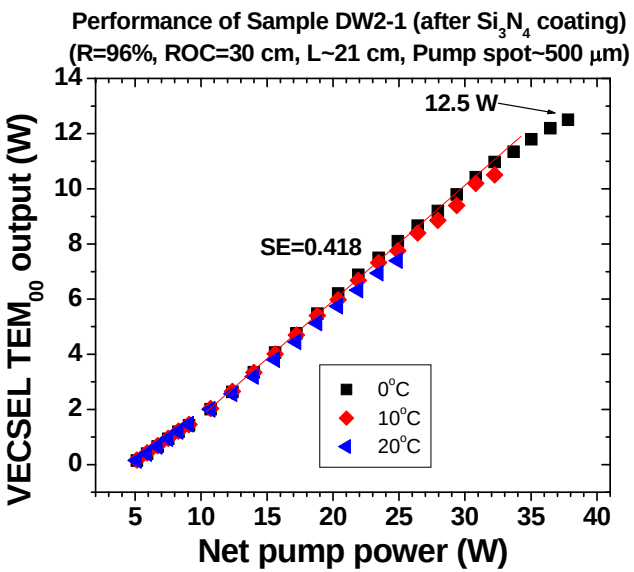


Figure 1.9 Mechanism of stimulated absorption (left), spontaneous emission (center) and stimulated emission (right)





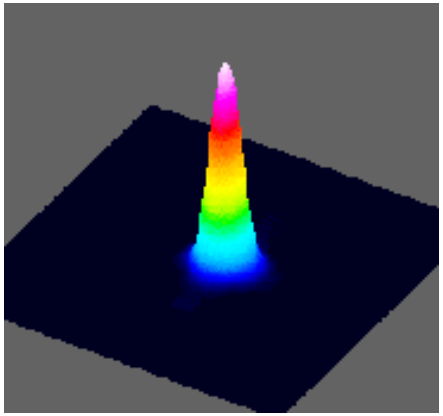


Fig. 10 (a) Schematic of an optically pumped external cavity semiconductor laser, (b) Out put power vs pumping power for the VECSEL

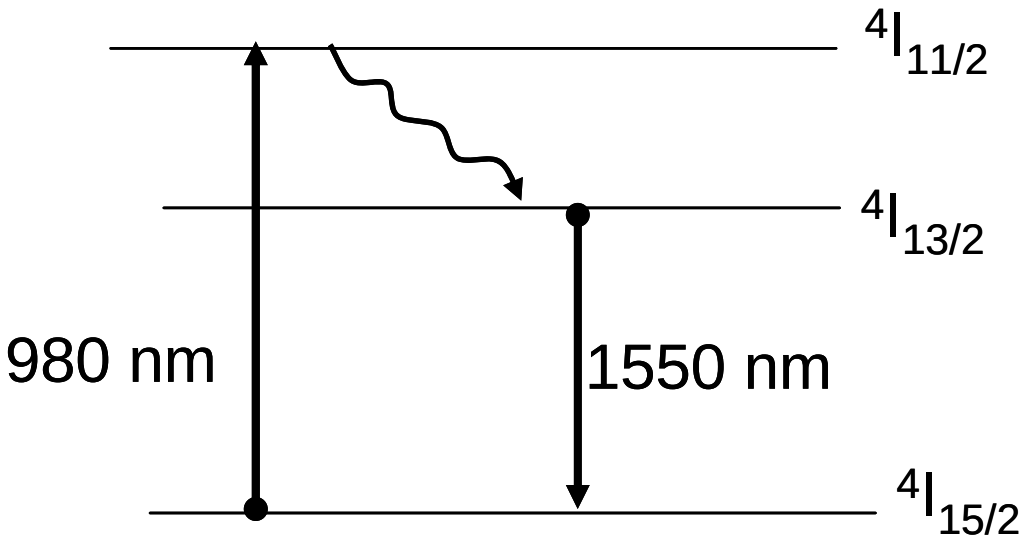


Figure 1.11 Schematic Energy diagram of Er3+ ions

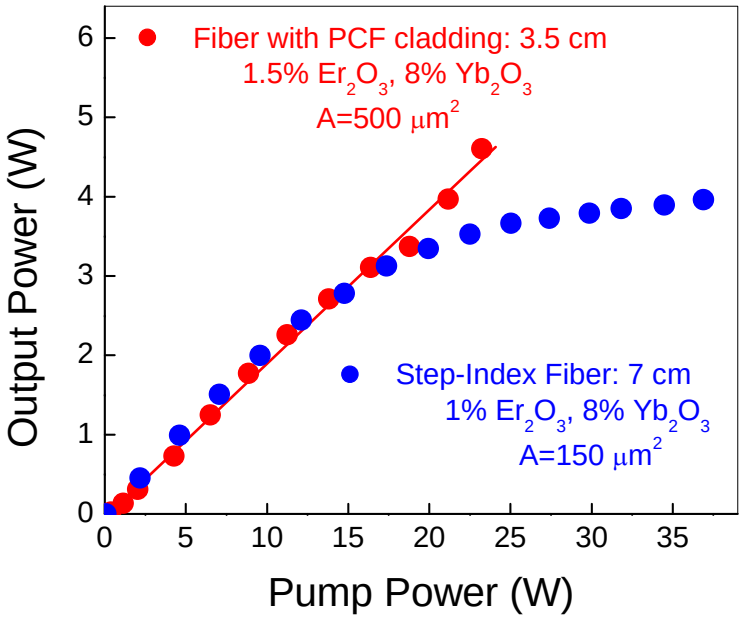


Fig. 12 Examples of the output power versus pumping power for Er/Yb codoped short Fiber lasers. The red curve is for a 3.5 cm long photonic crystal fiber laser while the blue curve is for a 7 cm long step index fiber

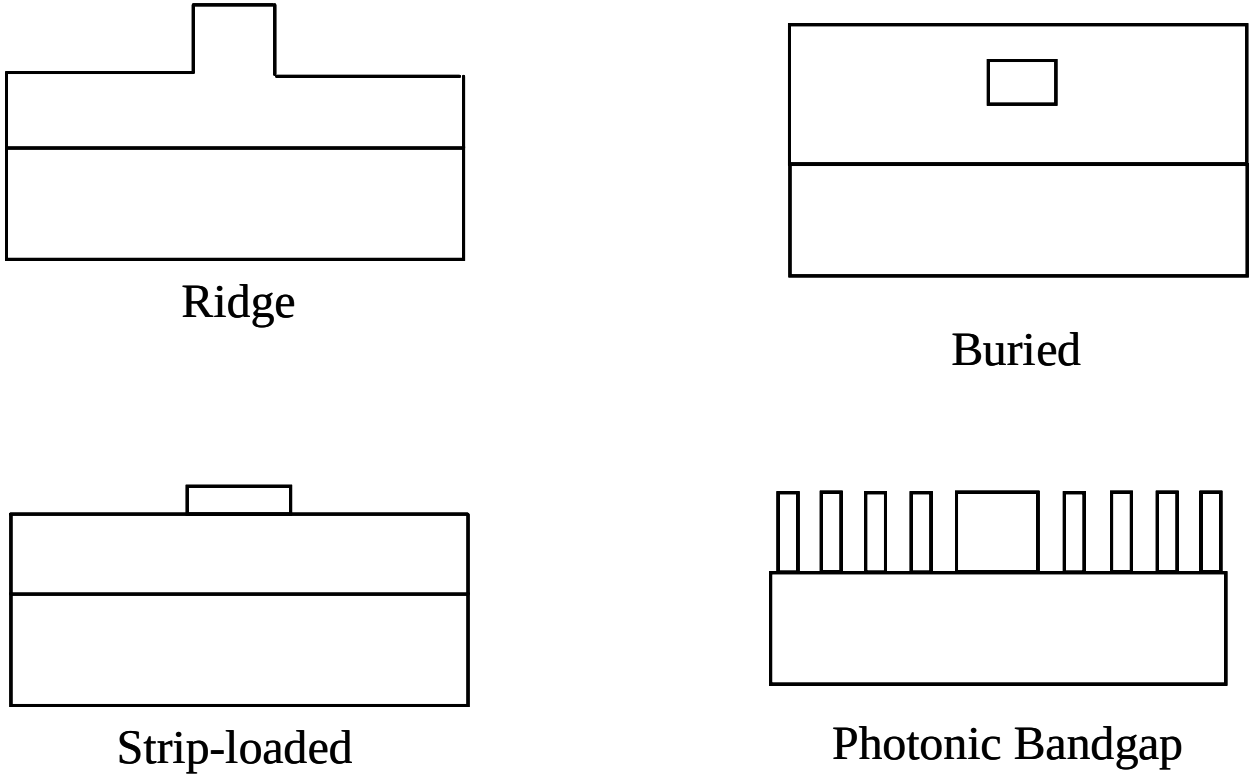


Fig. 13 Different types of waveguides are shown

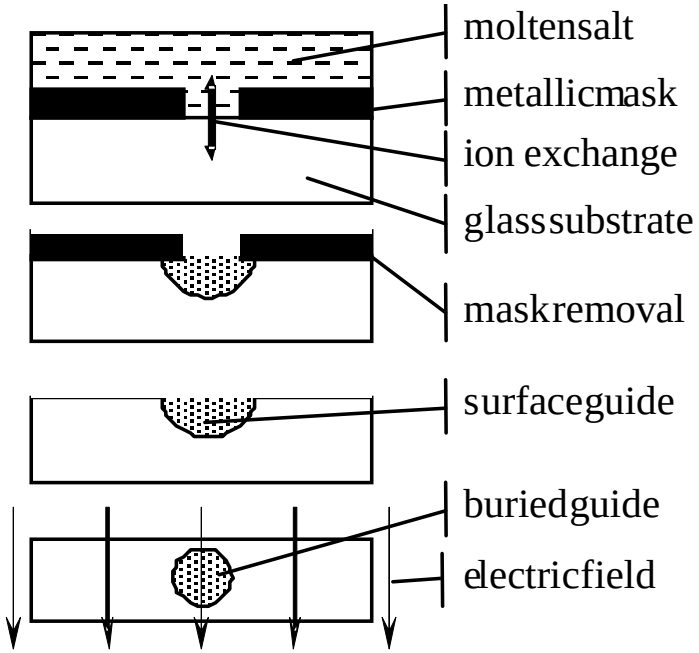


Fig. 14 Waveguide fabrication by ion-exchange process

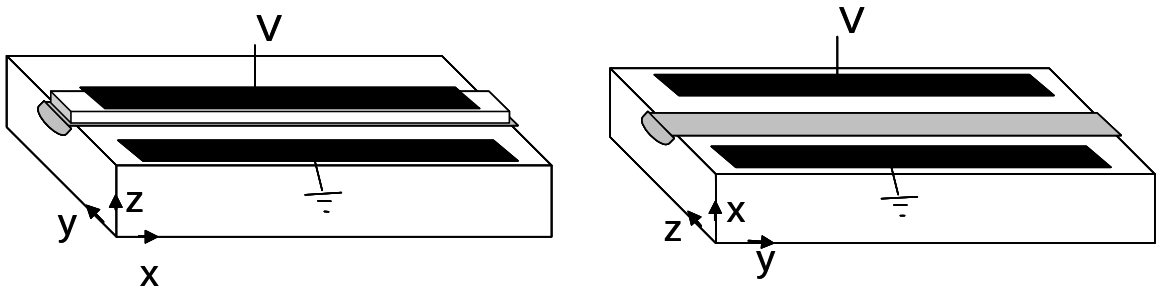


Figure 1.15 Schematic cross section of a z-cut and x-cut waveguide phase modulators

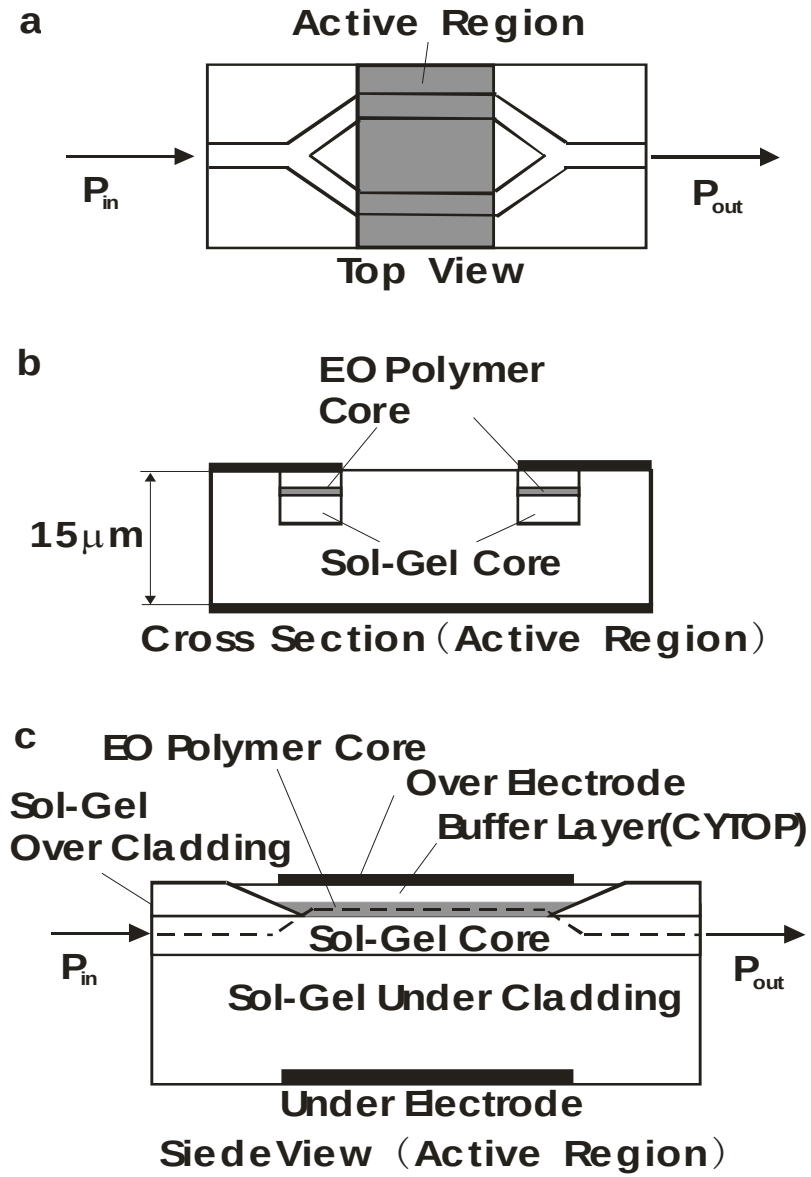


Figure 1.16 Schematic of an integrated polymer/sol-gel Mach-Zehnder waveguide modulator

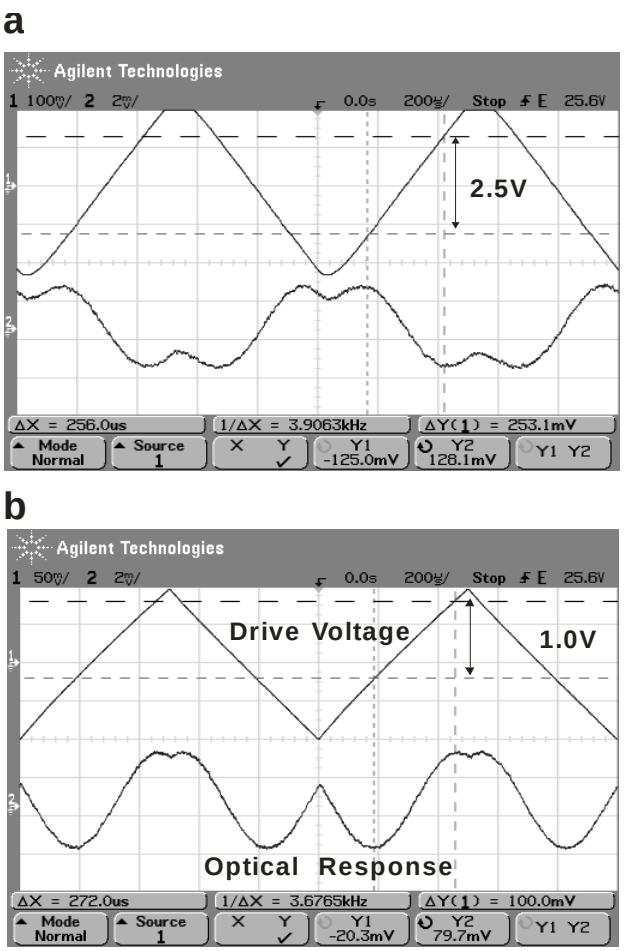


Figure 1.17 The oscilloscope screen shows the traces of the modulation voltage and the optical signal. Upper: applied voltage. Lower: optical output signal. a) Phase modulator with 2.5V for $V\pi$, b) A Mach-Zehnder modulator with 1.0V for $V\pi$

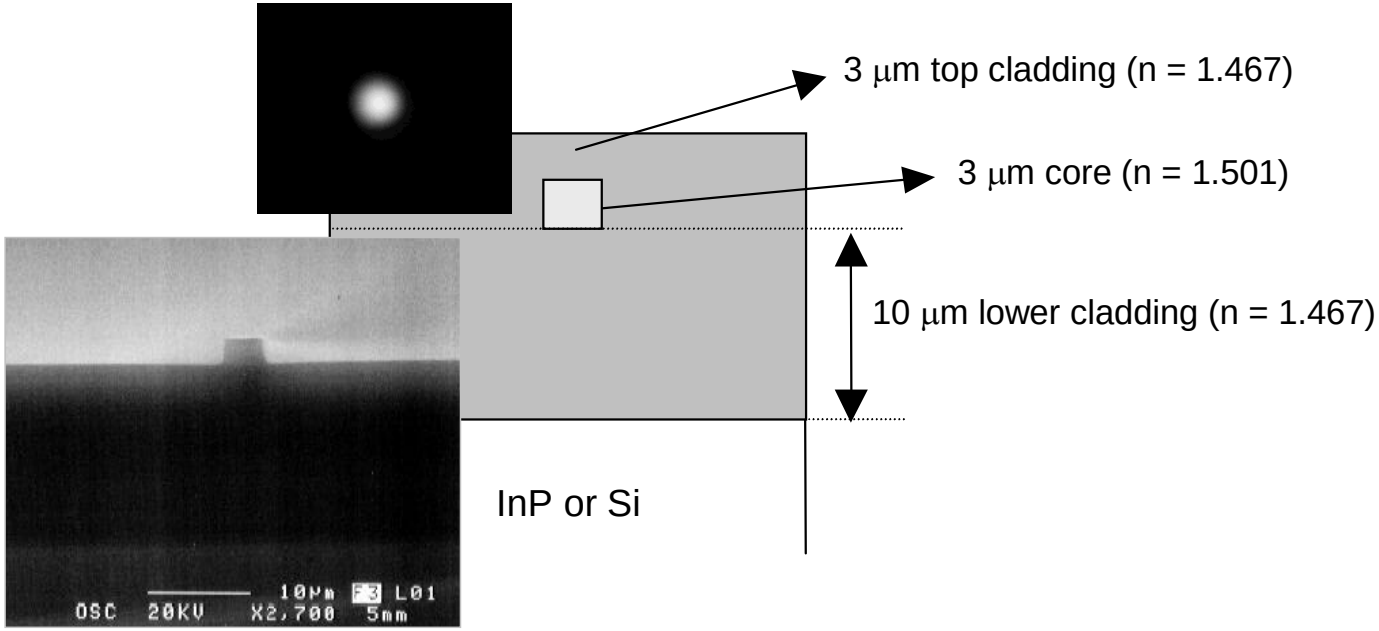


Figure. 18 Integration of an organic-inorganic buried waveguide over a high index semiconductor