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Bandgap Structures; 3.1.3 Doping of Photonic Crystals; 3.1.4 Waveguides and Nano-cavities in Photonic Crystals; 3.2 Fabrication and Characterization of Photonic Crystals
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4.2 Mechanisms for Optical Modulation in Silicon4.2.1 Absorption; 4.2.2 Optical Modulation Mechanisms in Silicon; 4.3 A Brief History of Silicon Modulator Designs; 4.4 Conclusion; References; 5 Silicon Lasers; 5.1 Introduction; 5.2 Why Bulk Silicon Cannot Amplify Light; 5.2.1 Physics of Optical Gain in Bulk Silicon; 5.3 Approach 1: Quantum Confinement; 5.4 Approach 2: Erbium Doping and Other Approaches; 5.4.1 Hybrid Integration of III-V and Silicon; 5.5 Approach 3: Raman Effect; 5.5.1 Physics of Raman Scattering in Silicon; 5.5.2 Limitation of Active Carrier Removal Using a p-n Junction
5.5.3 Electrical Power Dissipation Caused by Active Carrier Sweep-out5.4 Raman Wavelength Conversion; 5.5.5 Comparison of Raman with Other Optical Nonlinearities in Silicon; 5.6 Experimental Realization of Raman-based Silicon Photonic Devices; 5.7 GeSi Raman Devices; 5.8 Mid-wave IR (MWIR) Silicon Photonics; 5.8.1 Prospects of Mid-infrared Silicon Raman Devices; 5.9 Energy Harvesting in Silicon Raman and Other Nonlinear Optical Devices; 5.10 Summary; References; 6 Optical Detection Technologies for Silicon Photonics; 6.1 Introduction; 6.2 Photodetector Theory
6.2.1 Band-edge Photo-excitation of Charge Carriers

Sommario/riassunto

Silicon photonics is currently a very active and progressive area of research, as silicon optical circuits have emerged as the replacement technology for copper-based circuits in communication and broadband networks. The demand for ever improving communications and computing performance continues, and this in turn means that photonic circuits are finding ever increasing application areas. This text provides an important and timely overview of the 'hot topics' in the field, covering the various aspects of the technology that form the research area of silicon photonics. With contributions fro
