Abstract

In this study a wide bend, low loss (>2.0 dB) Y-splitter has been designed for TE-polarized light. The structure consists of hexagonal lattice where circular Si-dielectric rods in air background have been organized. For optimal design of photonic band gap, inter-cell distance and cell radius have been varied to find the largest photonic band gap which should correspond to the optical communication wavelength ranging from 1.3 µm to 1.6 µm. From the study, cell radius of 0.3 µm and lattice constant of 0.98 µm were the optimum values which provided the wavelength range of 1.34 µm to 1.58 µm. Using this structure, waveguide properties have been studied varying the cell radius of the adjacent cell of the propagating path. With the optimized waveguide design, a Y-splitter has been designed. Less than 2dB loss has been realized for wavelength ranging from 1.38 µm to 1.56 µm using the designed Y-splitter. And a minimum loss of 0.46 dB has been realized at wavelength 1.56 µm. By using plane wave expansion (PWE) method band gap of the structure have been evaluated. Finite difference time domain (FDTD) method has also been used to compute the transmission power, electric field distribution and magnetic field distribution properties of the system.
References

- See for example, C. Yeh, Applied Photonics (Academic, New York, 1990), Chap. 11.
Design of a Low-loss Y-Splitter for Optical Telecommunication using a 2D Photonics Crystal


Index Terms

Computer Science
Communication Systems

Keywords

- Plane Wave Expansion (PWE)
- Plane Wave Expansion Method (PWEM)
- Finite Difference Time Domain (FDTD)
- Photonic Crystals (PhCs)
- Photonic Band gap (PBG)
- Transverse Electric (TE)
- Transverse Magnetic (TM)
- Line Defect Waveguide (LDW)