

Design of Passive Optical Devices Using Omnidirectional One-Dimensional Photonic Crystal

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Abstract

Omnidirectional one-dimensional (1-D) photonic crystal (PC) can exhibit omnidirectional reflection if the composition of the crystal is appropriately chosen. Although the plane wave expansion method can be used to calculate the band structure of omnidirectional 1-D PC, we propose a method to calculate the band structure of finite-sized 1-D PC by transfer matrix method. The magnitude of transmission in each allowed band can be shown, so that the ripples in transmission band can be dramatically reduced to improve the performance of the designed devices.

After introducing the heterostructure, the reflection bandwidth of the omnidirectional reflector can be enlarged. Further, we designed a tunable 1.3/1.55 μm dichroic beam splitter by the heterostructure and designed an angular tuning optical switch.