

Photonic Crystal-based Passive Devices for Photonic Integrated Circuits

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ABSTRACT

In the interest of realizing photonic integrated circuits (PIC), several key passive components such as optical 3 dB splitter/combiner, multi-channel wavelength drop filter, and higher-order resonant filter have been designed based on two-dimensional photonic crystal. For an ideal performance of splitter/combiner, a novel four-port structure has been proposed and designed. In the designed multi-channel wavelength drop filter, reflection feedback structure has been adopted to achieve 100% drop efficiency and all the output signals are coupled to in-plane waveguides so as to be easily integrated with other components. Finally, a general methodology to design higher-order transmission resonant filter using multiple coupled photonic crystal resonators has been developed and applied to design a third-order Chebysheff filter based on two-dimensional photonic crystal.