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论文

基于圆柱型硅光子晶体的1×2光下路分束器

林贵敏[1], 陈曦曜[1], 李军军[2], 庄冬霞[2]

1. 闽江学院 物理学与电子信息工程系, 福州 350108;
2. 福建师范大学 物理与光电信息科技学院, 福州 350007

摘要:

本文设计了一个基于圆柱型硅光子晶体自准直环形腔的1×2光下路分束器.该光下路分束器由三个分光镜和一个反射镜构成,其中窄光束依赖自准直效应进行传输.利用多光束干涉理论分析了光下路分束器中不同出口的理论透射谱,并且利用时域有限差分法对光下路分束器透射谱进行数值模拟计算,其结果与理论预测基本一致.当下路波长为1 550 nm时,光下路分束器的自由光谱范围约为30 nm,几乎涵盖了整个光通信C波段.由于其小尺寸和全硅材料,本文设计的1×2光下路分束器有望应用于未来的集成光路中.

关键词: 光子晶体 自准直 光下路分束器

1×2 Optical Drop Splitter in a Rod-type Silicon Photonic Crystal

LIN Gui-min[1], CHEN Xi-yao[1], LI Jun-jun[2], ZHUANG Dong-xia[2]

1. Department of Physics and Electronic Information Engineering, Minjiang University, Fuzhou 350108, China;
2. School of Physics and Optoelectronics Technology, Fujian Normal University, Fuzhou 350007, China

Abstract:

Based on a self-collimation ring resonator (SCRR) in a rod-type silicon photonic crystal, a 1×2 optical drop splitter (ODS) with selected splitting ratio is proposed. The 1×2 ODS consists of three beam splitters and one mirror, and light propagates in the ODS employing self-collimation effect. The theoretical transmission spectra at different drop ports of the ODS are analyzed with the multiple-beam interference theory, and they were investigated with the finite-difference time-domain (FDTD) simulation technique. The simulation results agree well with the theoretical prediction. For the drop wavelength 1 550 nm, the free spectral range of the ODS is about 30 nm, which almost covers the whole optical communication C-band window. Because of their small dimensions and whole-silicon material, the proposed ODSs hold great potentials for applications in photonic integrated circuits (PICs).

Keywords: Photonic Crystal (PhC) Self-Collimation (SC) Optical Drop Splitter (ODS)

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通讯作者:

作者简介:

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