

论文

硅基孔状光子晶体高选择性滤波器设计

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摘要:

通过平面波展开法研究了三角孔状光子晶体晶格的能带结构,并考虑了该过程的辐射损耗.用时域有限差分的方法模拟计算了对应六边形环形腔结构的光谱透射特性,得出优化的晶格周期和占空比.在C波段上,优化的结构达到了98.8%的光学选择比和32.9 nm的半高全宽.用光刻和反应离子刻蚀的方法对样片的加工过程进行了尝试并给出加工参量.搭建相应的系统测试了样片的光谱性能,结果表明:实际样片孔状的样片较之柱状样片更为稳定,而基于环形谐振腔的结构在未来有应用于滤波器、波分复用系统、微陀螺等领域.

关键词: 光子晶体 孔状三角晶格 六边形环形腔 能带结构 透过率 光刻

Design of Silicon Hole Based Photonic Crystal Filter with High Selectivity

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Abstract:

Abstract: The band structures of triangular hole lattice photonic crystal are studied via plane wave expansion method, with radiation loss considered. The spectrum transmission characters of the designed structure are investigated through simulation of finite difference time-domain method (FDTD) for hexagonal ring resonant, and the parameters of lattice period and radius of the lattice hole are optimized. The drop efficiency rate of 98.8% and FWHM of 32.9 nm are reached through optimization of the designing in C-band. The samples are tentative fabricated through photolithography and reactive ion etching and the parameters are given. The transmission spectrum is measured and the reasons of differences from the theoretical result are analyzed. The schemes of slab based on ring resonant holes show a more stable character than the rod ones, and have potential future for filters, WDM devices and micro gyroscope.

Keywords: Photonic crystal Triangular lattice holes Hexagonal ring resonant Band structure Transmission rate Photolithography

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