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论文

基于绝缘硅的微环谐振可调谐滤波器

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摘要:

采用电子束光刻和感应耦合等离子刻蚀等工艺,研制了一种基于绝缘硅材料的微环谐振可调谐滤波器.滤波器微环半径为5 μm左右,波导截面尺寸为(350~500 nm)×220 nm不等.测试结果表明,波导宽度为450 nm时器件性能最为理想,其自由频谱宽度为16.8 nm,1.55 μm波长附近的消光比为22.1 dB.通过对微环滤波器进行热光调制,在21.4 °C~60 °C温度范围内实现了4.8 nm波长范围的可调谐滤波特性,热光调谐效率达到0.12 nm/°C.研究了基于单环和双环的多通道上下载滤波器,实验结果表明多通道滤波器的信号传输存在串扰,主要是不同信道之间的串扰,尤其在信号上载时,会在相邻信道产生较大串扰.

关键词: [绝缘硅](#) [微环谐振](#) [热光效应](#) [滤波器](#) [串扰](#)

Tunable Filters Based on SOI Microring-resonator

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Abstract:

Microring-resonator filters were fabricated based On Silicon on Insulator (SOI) nano-wire waveguide,adopting Electron-Beam photolithography (EBL) and Inductive-Coupled-Plasma (ICP) etching technology,etc.The cross-section size of the strip waveguides were (350~500 nm)×220 nm,respectively,and the bending radius of the microring was around 5 μm.The measured results show that performance of devices are much better with waveguide width 450 nm,the free spectral range (FSR) is 16.8 nm,and extinction ratio (ER) around the wavelength 1 550 nm is 22.1 dB.After thermally tuned,the tuning bandwidth reaches 4.8 nm,and the tuning efficient is 0.12 nm/°C.Meanwhile,multi-channel filters were fabricated and studied based on single-ring and double-ring.After experiments,some conclusions were drawn:crosstalk exists in the signal transmission in multi-channel filters,mainly among different transmission channels,and the crosstalk is fairly distinct when there are signals input to add ports.

Keywords: [Silicon On Insulator\(SOI\)](#) [Microring resonator](#) [Thermo-optic effect](#) [Filters](#)  
[Crosstalk](#)

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