

## 论文

### 小尺寸低折射率差硅基二氧化硅阵列波导光栅

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#### 摘要:

随着AWG型器件在光通信系统中的大规模应用,对低成本AWG芯片的需求越来越多。在各种降成本方案中,减小AWG芯片的尺寸是最有效的方法之一。本文介绍了一种新型小尺寸低折射率差硅基二氧化硅阵列波导光栅(AWG)的设计。在该AWG中,输入波导/输出波导与平板波导连接的部分制作成两侧为空气槽的高折射率差波导,所以在与输出平板波导连接处的相邻输出波导间距较小,这样可以在设计上缩短平板波导的长度、减少阵列波导的数量,实现较小的AWG芯片尺寸。该AWG的其它部分,如输入/输出波导与光纤耦合的部分、阵列波导光栅等均采用常规的低折射率波导工艺,所以就同时具有与常规的低折射率波导AWG相同的优点:如低耦合损耗、较好的串扰以及光学特性等。根据这个原理,设计了一种40通道100 GHz频率间隔的低折射率差硅基二氧化硅AWG,其芯片尺寸只有23.88 mm×10.5 mm,是传统相同材料制作的AWG尺寸的1/6。

**关键词:** 空气槽 阵列波导光栅 通带宽度 硅基二氧化硅技术

### Novel Compact Low Refractive Index Contrast Silica-on-Silicon AWG

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#### Abstract:

Arrayed waveguide grating (AWG)-type optical components are widely used in optical transmission system, and the low cost AWG chips are in more and more urgent need. Among all the methods for lowering the AWG cost, reducing the AWG chip size is one of the most effective methods. A novel compact AWG based on low refractive index contrast silica-on-silicon (SoS) technology was proposed. In this AWG, only the segments connected with the slab waveguides in the input and output waveguides are air trench (AT) waveguides. By using these AT segments, the distance between the adjacent output waveguides connected with the output slab was decreased greatly, so the focuses of slab waveguides, and the number of arrayed waveguides were decreased greatly. Thus, the size of AWG chip was decreased dramatically. The arrayed waveguides and the segments coupling to fibers in the input or output waveguides were all fabricated with low refractive index contrast waveguides, for the purpose to obtain low coupling losses with fibers and good performances as traditional SoS AWGs. The size of an AWG designed consisting 40 channels on 100 GHz ITU grid is only 23.88 mm×10.5 mm, which area is about 1/6 of a traditional AWG with the same function.

**Keywords:** Air trench Arrayed waveguide grating(AWG) Passband width Silica on silicon (SoS) technology

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