Comparison of Low Temperature Resistance and Delay Performance of Planar Optical Waveguides



Overview

Using a modified Euler-bend-based spiral structure, the proposed delay-line waveguide can simultaneously achieve a small footprint and low optical propagation loss.

Key Takeaways

Planar optical waveguides exhibit varying low-temperature resistance depending on material type, fabrication method, and cladding structure, with silica-based waveguides generally offering superior thermal stability compared to polymer-based alternatives.

Material Comparison for Low-

Temperature ResistanceSilica-Based Waveguides: Silica (SiO2) waveguides, including PECVD SiO2, borophosphosilicate glass (BPSG), and wafer-bonded thermal oxide, demonstrate excellent low-temperature resistance due to their high glass transition temperature and low thermal expansion. Wafer-bonded thermal oxide waveguides show minimal stress and record low propagation loss (

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Article Content

An exact analysis of the temperature control of optical waveguides ...

In this paper we have presented an exact analysis of the temperature dependence of optical waveguides with thermo-optic controlling regions, either as micro channels around a fiber

Design and Simulation of Optical Waveguide Digital Adjustable Delay ...

The comparative analysis reveals that the delay range, maximum delay tunable range, and loss–delay ratio of optical true time delay lines are significantly influenced by their design structures

Silicon Waveguides and Temperature-Dependent Performance

We examine the specific mechanisms through which temperature variations alter critical parameters, including refractive index modulation, mode coupling efficiency, propagation losses, and

Design and Simulation of Optical Waveguide Digital Adjustable Delay ...

Using a modified Euler-bend-based spiral structure, the proposed delay-line waveguide can simultaneously achieve a small footprint and low optical propagation loss.

Performance comparison of coupled-resonator optical waveguide

In this paper, we aim to demonstrate the superior performance of this novel architecture by utilizing III–V materials that induce higher effective index changes 32, 33, and to quantitatively...

Low-Loss Low Thermo-Optic Coefficient Ta2O5 on Crystal Quartz

We describe the waveguide structure and key design parameters as well as fabrication considerations for processing tantala on quartz waveguides.

Delay drift compensation of an optoelectronic oscillator over a large ...

In this paper, a solution to continuous tuning without mode-hopping and to compensation of drift without loss of phase lock of a time delay oscillator (TDO) is proposed and experimentally...

Ultralow-loss compact silicon photonic waveguide spirals

In this paper, we propose and realize an ultralow-loss and ultra-compact 220-nm-thick silicon strip waveguide spiral fabricated with standard MPW processes. Here the silicon strip waveguide is

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Optical Waveguide Tunable Phase Delay Lines Based on the ...

In this work, in order to optimize the polymer waveguide structure for the widely tunable phase delay, we fabricated three types of polymer waveguide devices with different waveguide

Coupling performance of a planar lens to ultra slow-light photonic ...

This study conducted a comprehensive analysis of the coupling performance between a planar photonic lens and a set of PC waveguides operating in both conventional and slow-light regimes.

A Comparison of Approaches for Ultra-Low-Loss Waveguides

Abstract: We compare ultra-low-loss silica waveguides with PECVD SiO2, borophosphosilicate glass (BPSG), and wafer-bonded thermal oxide upper claddings. We demonstrate fiber-like (0.045 dB/m)

Low-loss optical waveguides made with a high-loss material

Planar waveguides with low loss that are fully compatible with existing photonic circuit fabrication techniques are missing.

An exact analysis of the temperature control of optical waveguides ...

In this paper we present an exact analysis of the variation with temperature of the effective index of an arbitrary optical waveguide. Our results allow the design of temperature

Performance comparison of integrated optical switching delay lines on ...

Abstract Integrated optical switching delay line (OSDL) chip, which is composed of optical switches cascaded with optical waveguides of different lengths, has the merits of ultra-wide delay

Low-loss graded-index polymer crossed optical waveguide with high ...

Over the last couple of years, extensive research has been done on multimode polymer optical waveguides with step-index (SI) cores [7–9]. Meanwhile, we have reported the advantages of graded

Optimization and comprehensive comparison of thermo-optic phase

In this paper, we conducted a comprehensive comparison and optimization into the impact of the number of folded waveguides and the width of heater on the performance of folded

Reducing thermal resistance of high-power semiconductor diode

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Abstract Thermal resistance of diode lasers with different waveguide designs has been investigated. Coupled large optical cavity (CLOC) design allows reducing internal loss and

The role of index contrast in dielectric optical waveguides

The refractive index contrast plays a fundamental role in determining the characteristics of an optical dielectric waveguide and a higher index contrast permits to move towards larger scales of ...

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