

Performance Comparison of Upgraded Planar Waveguide and Alternative Solutions



Article Overview

Upgraded planar waveguides, particularly those with bonded thermal oxide claddings, offer ultra-low propagation loss and high integration potential, outperforming conventional polymer, glass, and grating-based alternatives in spectral control and reliability.

Planar Waveguides Overview

Planar waveguides confine light within a high-index core layer between lower-index claddings, enabling integration of multiple optical functions on a single chip. They are fabricated using semiconductor-inspired lithographic processes, allowing precise control over geometry and refractive index profiles. Upgraded planar waveguides, such as those with wafer-bonded thermal oxide upper claddings, achieve record low propagation losses below 0.1 dB/m, reduced absorption, and low dielectric stress, making them highly suitable for high-speed optical interconnects.

Alternative Waveguide Solutions

- **Waveguide Gratings:** Incorporate periodic structures for wavelength-selective filtering, dispersion compensation, and optical feedback. They provide high spectral selectivity but involve more complex fabrication and higher cost compared to planar waveguides.
- **Polymer and Glass Embedded Waveguides:** Graded-index polymer waveguides off...

Article Content

Advances in waveguide to waveguide couplers for 3D integrated

These performance metrics will serve as the basis of comparison for these inter-chip couplers and a starting point for

Waveguide-based augmented reality displays: perspectives and

Augmented reality (AR) displays, as the next generation platform for spatial computing and digital twins, enable users

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

Integrated planar optical waveguide interferometer biosensors: A ...

Integrated planar optical waveguide interferometer biosensors are advantageous combinations of evanescent field

A Review on Improved Design Techniques for High Performance

In this review, our attention has been focused mainly on the improved available design techniques to obtain high

Brief Review on Integrated Planar Waveguide-Based Optical Sensor

Planar optical waveguides are the input devices to build an integrated optical sensor. This chapter provides review

Design and Performance Analysis of Compact Printed Ridge Gap Waveguide ...

This paper introduces compact Printed Ridge Gap Waveguide (PRGW) phase shifters tailored for millimeter-wave

Planar Transmission Line Comparison: Microstrip, Stripline, CPW, and ...

A comparison of planar transmission lines, including microstrip, stripline, CPW, slotline, and finline, highlighting differences in

Optimizing Structured Surfaces for Diffractive Waveguides

design to match the performance of a traditional square dielectric waveguide, supporting the transmission of target spatial modes

Development of planar diffractive waveguides in optical see-through ...

The planar diffractive waveguide is widely adopted in optical see-through head-mounted displays in the field of

(PDF) Waveguide-based augmented reality displays ...

PDF | Augmented reality (AR) displays, as the next generation platform for spatial computing and digital twins, enable

A Review on Improved Design Techniques for High Performance Planar ...

We present in this work a review of the most typical waveguide slot array configurations proposed in the literature, describing their

Introduction to the Special Issue on Ultralow Loss Planar Waveguides ...

Ultra Low Loss Planar Waveguides and Their Applications. Ultra-low loss optical planar waveguide technology is a critical research

Lecture 20 More on Waveguides and Transmission Lines

More on Waveguides and Transmission Lines Waveguide is a fundamental component of microwave circuits and systems. The study

Past, present, and future of hybrid plasmonic waveguides for

A potential solution to this problem has emerged in recent years with the emergence of plasmonic waveguide (PWG)

Waveguide-based augmented reality displays: perspectives and

In this review paper, we focus on the perspectives and challenges of optical waveguide combiners for AR displays. We will begin by

Waveguide-based augmented reality displays: perspectives and

After decades of extensive device and material research efforts, and heavy investment in manufacturing technologies,

Ultra-compact and efficient photonic waveguide bends with different ...

As an alternative solution, an adiabatic curvature matching approach was suggested to create a smooth match

Progress in Passive Silicon Photonic Devices: A Review

Silicon photonics has emerged as a critical enabling technology for a diverse range of applications, from high-speed

Waveguide Gratings vs Planar Circuits: Decision Making Insights

These variations influence the optimal balance between technical performance, manufacturing complexity, and cost

A Review on Improved Design Techniques for High Performance Planar ...

Planar waveguide slot arrays (WSAs) have been used since 1940 and are currently used as performing antennas for

Design of waveguide with double layer diffractive optical ...

In the bilayer-coupled diffraction optical waveguide, optical information is modulated into a planar wavefront before

Designs of Substrate Integrated Waveguide (SIW) and Its Transition to ...

Keywords: Substrate Integrated Waveguide (SIW), Rectangular Waveguide (RWG), Waveguide transition, high

A comprehensive review on optics and optical materials for planar ...

A systematic comparison of optics and optical material design parameters and the merit of the different PLC systems

Planar-Waveguide External Cavity Laser Stabilization for an Optical ...

Abstract—We stabilized the frequency of a compact planar-waveguide external cavity laser (ECL) on a Fabry-Pérot cavity (FPC)

Improved Design Techniques for High Performance Planar

In this paper we describe the main limitations and drawbacks of waveguide slot arrays configurations, and the possible

Full Planar waveguide Design with Complementary Split Ring

In this paper, a comparison between the simple SIW structure, and the SIW-CSRR of a single and a double line is presented, for the

Progress and technical challenge for planar waveguide

The paper reviews progress and future prospects of two kinds of planar waveguide devices; they are (a) silica and

Advances in waveguide to waveguide couplers for 3D integrated

In this paper, we provide an overview and comparison of devices used for optical waveguide-to-waveguide coupling

Breaking the in-coupling efficiency limit in waveguide-based AR ...

Overall, this polarization conversion phenomenon serves as the first evidence to showcase the superiority of PVG fi in-coupler in

Waveguide-based augmented reality displays: perspectives and

Next, we investigate the operation mechanisms and properties of different waveguide combiner couplers and discuss their technical

Silicon-Based Photonics

Silicon, as the main material in the microelectronics industry, has attained great success; thus one wishes to utilize silicon as the

Planar Waveguide

Planar waveguide lasers are a special class of laser where light is confined to a waveguide. They have distinctive advantages that

2.7 Waveguides and Integrated Optics

As in the case of a planar-mirror waveguide, one can show that the trans-verse mode functions are orthogonal to each other. At first,

Optical meta-waveguides for integrated photonics and beyond

Recent years have witnessed substantial potential in allying meta-optics with diverse waveguide platforms to enable

Next-Gen wireless unleashed: Coplanar waveguide antennas on

Abstract With the rapid expansion of 5G and emerging IoT applications, there is an increasing demand for compact,

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