

Planar optical waveguide



AI Overview

A planar optical waveguide is a flat, thin layer of high-refractive-index material that confines and guides light in one dimension along its plane.

Definition and Structure

A planar optical waveguide, also called a slab waveguide, is an optical device designed to guide light along a specific path within a thin, flat layer of material. The waveguide consists of a core layer with a higher refractive index, sandwiched between cladding layers of lower refractive index. This refractive index contrast confines light within the core by total internal reflection, allowing it to propagate along the plane of the waveguide while being restricted in the perpendicular direction.

Fabrication Methods

Planar waveguides are typically fabricated using techniques such as:

- Thin-film deposition: A high-index material, like neodymium-doped YAG, is deposited onto a substrate .
- Diffusion processes: An index-raising agent is diffused into the substrate, creating a smooth refractive index profile .
- Lithography and etching: Used to pattern the waveguide on semiconductor or polymer substrates .
- Plasma deposition: Produces low-loss waveguides by depositing thin films with precise control . The thickness and width of the core layer determine the waveguide...

Article Content

Sep 20, 2025

Waveguides – optical fiber, fabrication, modes, nano optics, plasmonics

Planar waveguides guide light only in the vertical direction, whereas channel waveguides guide in two dimensions. Most waveguides

Jan 25, 2026

of optical waveguides 1

1.1.2 Diffraction of plane waves in waveguides The propagation and properties of optical waves in optical waveguides can also be

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2.7 Waveguides and Integrated Optics

Both the planar-mirror waveguide and the planar dielectric slab waveguide confine light only in one direction. It is straight forward to

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Introduction to Planar Waveguide Optical Sensor

Sensing platform based on the integrated optical planar waveguide represents an active research area. The

Oct 29, 2025

Comprehensive Guide to Optical Waveguides: From Fundamentals to ...

To meet these needs, planar waveguides—an applied form of optical waveguide technology—have become increasingly important in

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Planar Waveguides and other Confined Geometries

This book provides a comprehensive overview of the theoretical concepts and experimental applications of planar waveguides and

Apr 01, 2026

Introduction to Optical Waveguides | Springer Nature Link

This chapter presents an introduction to the optical waveguides including planar and nonplanar structures.

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OPTICAL WAVEGUIDING

Conceptually, the simplest optical waveguides are the step index and graded index planar waveguide, and the most straightforward

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

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

Aug 23, 2025

Chapter 2. Planar optical waveguides

This chapter reviews planar optical waveguides, which are the key devices to construct integrated optical circuits and

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Waveguide (optics)

Perhaps the simplest optical waveguide is the dielectric slab waveguide, also called a planar waveguide. Owing to their

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Planar waveguide devices (Chapter 5)

How to analyze the generalized planar guided waves has already been discussed in Section 1.2.5. A distinct feature of planar

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Planar Optical Waveguides | Springer Nature Link

Recent advances in opto-electronics and electro-optics have opened the infrared and visible part of the electromagnetic spectrum for

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Fundamentals of Optical Waveguides

This chapter focuses on planar lightwave circuits which are used by silica-based optical waveguides. These are fabricated on silicon

Mar 23, 2026

Planar optical waveguides for sensing applications

Planar optical waveguides formed by ion-exchange in glass are sensitive to changes in parameters such as:

Dec 26, 2025

Fundamentals of Optical Waveguides

The book consists of ten chapters. In Chapter 1 fundamental wave theories of optical waveguides, which are necessary to

Apr 03, 2026

Planar Waveguides – slab waveguides

A planar waveguide, also known as a slab waveguide, is a structure with a planar geometry that guides light in only one dimension. It

Feb 15, 2026

Modes in Optical Waveguides | Springer Nature Link

This chapter discusses in detail the concept of modes in planar and channel dielectric optical waveguides which are the fundamental

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Planar Waveguide

The fundamental element in a photonic integrated circuit is the optical planar waveguide, also known as planar “dielectric”

Mar 25, 2026

Introduction to Optical Waveguides

Abstract This chapter presents an introduction to the optical waveguides including planar and nonplanar structures. Additionally, an

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Comprehensive Guide to Optical Waveguides: From Fundamentals to ...

Note: “Planar waveguides” refer to a type of waveguide structure formed on a flat substrate. For more information on waveguides,

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Planar Waveguides

Planar waveguides, also known as slab waveguides, are a fundamental component in the field of photonics. These structures are

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(PDF) Progress in Planar Optical Waveguides

Due to the field enhancement effect of the hollow-core metal-cladded optical waveguide chip, massive nanoparticles in

Feb 13, 2026

The Role of Planar Waveguides in Sensing Applications

In integrated optical sensors, planar waveguides are used as input devices. These waveguides are optical structures that confine the

Nov 10, 2025

Fundamentals of Optical Waveguides

Planar Optical Waveguides circuits and semiconductor lasers. Generally, rectangular waveguides consist of a square or rectangular

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Planar waveguide | Description, Example & Application

Planar waveguides are typically made from materials such as silica, silicon, polymers, or other semiconductors.

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PLANAR OPTICAL WAVEGUIDES

Recent advances in opto-electronics and electro-optics have opened the infrared and visible part of the electromagnetic spectrum for

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Waveguide (optics)

Optical waveguides can be classified according to their geometry (planar, strip, or fiber waveguides), mode

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