

Metamaterial Optical Module



Overview

A photonic metamaterial (PM), also known as an optical metamaterial, is a type of material that interacts with light, covering terahertz (THz), (IR) or visible light. The materials employ a periodic, cellular structure. The periodicity distinguishes photonic metamaterials from conventional materials. The periodicity is on a scale that is magnitudes larger than the wavelength of light.

Article Overview

A metamaterial optical module is a device that uses engineered subwavelength structures to manipulate light in ways not possible with conventional materials, enabling advanced optical functions such as flat lenses, cloaking, and analog optical computing.

Overview

A metamaterial optical module leverages optical metamaterials, which are synthetic materials composed of repeating units smaller than the wavelength of light they interact with. Unlike conventional materials, where atoms determine optical properties, the engineered cells in metamaterials act as “artificial atoms,” allowing precise control over light propagation, refraction, and phase. This enables phenomena such as negative refractive index, subwavelength imaging, and light manipulation for cloaking or transformation optics.

Key Features

- **Subwavelength Patterning:** The module's surface or internal structure is patterned at the nanoscale to interact with specific wavelengths of light.



Article Content

2D/2D coupled MOF/Fe composite metamaterials enable robust ultra ...

Here the Authors showcase a microwave absorber design that combines semiconductive metal-organic frameworks

Optical module design resources | TI

View the TI Optical module block diagram, product recommendations, reference designs and start designing.

Optical Metamaterials and Information Metamaterials

In recognition of the great breakthroughs and increasing importance of electromagnetic metamaterials, we organized

Metamaterials in Communication Devices: A Review of

In optical fiber communication, metamaterials are being integrated into fiber-optic systems to

Photonic metamaterial

OverviewHistoryNegative permeability and negative permittivityOptical frequencyEffective medium modelCoupling magnetismDesign and fabricationResearch

A photonic metamaterial (PM), also known as an optical metamaterial, is a type of electromagnetic metamaterial, that interacts with light, covering terahertz (THz), infrared (IR) or visible wavelengths. The materials employ a periodic, cellular structure. The subwavelength periodicity distinguishes photonic metamaterials from photonic band gap or photonic crystal structures. The cells are on a scale that is magnitudes larger th

Focus on Photonic Crystals, Metamaterials and Metasurfaces: From ...

We theoretically and systematically investigate angle-insensitive all-optical diodes using photonic heterostructures composed of

Functional nano-architected mechanical metamaterials and devices

Abstract Nano-architected mechanical metamaterials and devices integrate structural design with nanoscale effects to

Scalable variable-index elasto-optic metamaterials for ...

Elasto-optic metamaterials enable the development of optical devices with a very large lateral area, transverse

Optic Modules Datasheet

Features and Benefits The following table lists the different pluggable optic modules and supported platforms, along with the

Exploring the role of metamaterials in achieving advantage in optical ...

Here, we discuss whether, why, and how metamaterials and metasurfaces could contribute to achieving an "optical

Ultra-broadband actively tunable terahertz modulator based on multi ...

Utilizing a multi-stacked metamaterial (MM) on a flexible substrate, the proposed design offers an ultra-broadband

Imaging with metamaterials

Metamaterials can be dynamically tuned, leading to on-demand optical components that could play an important role

Metamaterial Design and Fabrication for High Performance,

Metamaterial Design and Fabrication for High Performance, Miniaturized Optical Systems Stanford researchers patented a method

Metamaterial integration

In waveguide- and fibre-based optical systems, the incorporation of metamaterials can remove electronic bottlenecks

Si-CMOS compatible epsilon-near-zero metamaterial for two-color ...

Epsilon-near-zero materials are promising to realize ultrafast all-optical devices, but their integration into photonic

Advanced metamaterial waveguide devices for broadband modal and

Subwavelength metamaterials with tailored optical properties are becoming fundamental building blocks for the next generation of

OPTICAL METAMATERIALS: DESIGN, CHARACTERIZATION AND

In this dissertation, I have explored the field of optical metamaterials to address three of the most important applications in optical

OPTICAL METAMATERIALS: DESIGN, CHARACTERIZATION AND

Unique characterization techniques need to be developed as conventional optical microscopy runs out of steam to resolve the fine

Metamaterial | Properties, Applications & Uses | Britannica

metamaterial, an artificially structured material that exhibits extraordinary electromagnetic properties not available or

Photonic Metamaterials for Light Modulation, Energy Saving ...

Photonic metamaterials (PMMs) offer many possibilities to resolve such problems [1, 2]. They are defined as artificial optical

Soft optical metamaterials

This paper reviews different types of soft and reconfigurable optical metamaterials and their fabrication methods,

Optical Metamaterials Could Boost AI Data Centers

Neurophos says it can use metamaterials to build optical modulators—the optical equivalent

Optical Metamaterials | Institute of Applied Optics | University of ...

By designing arrangements of shapes with features that are smaller than a given wavelength, so called metamaterials can be

Reconfigurable metamaterials for optoelectronic applications

Abstract In recent years, electromagnetic characteristics of metamaterials has aroused great interest because of

Optical Metamaterials: Fundamentals and Applications

This book details recent advances in the study of optical metamaterials, ranging from fundamental aspects

Editorial: Tunable and Reconfigurable Optical Metamaterials

Xu et al. presented a review on the experimental progress of tunable metamaterials based on nematic liquid crystals.

Opto-mechanical stacked metamaterials for optical readout millimeter ...

Based on the method, an optical readout millimeter wave array detector is designed. A stacked metamaterial chip is

Optical metamaterials

This Collection invites research in the topic of metamaterials, focusing on the next

Photonic metamaterial

Optical frequency Photonic metamaterial SRRs have reached scales below 100 nanometers, using electron beam and

Contact Us

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