Magne-optical modulator integration

Article Overview

Integrated magneto-optical modulators combine magneto-optic materials with photonic waveguides to enable low-power, high-speed optical modulation, suitable for cryogenic and silicon photonics applications.

Overview

Magneto-optical modulators exploit the magneto-optic effect, where the refractive index or polarization of a material changes in response to a magnetic field, to modulate light in integrated photonic circuits . Unlike conventional electro-optic modulators, these devices can be current-driven, making them compatible with superconducting circuits and low-impedance systems, particularly at cryogenic temperatures below 4 K .

Integration with Photonic Platforms

Integration typically involves bonding a magneto-optically active crystal, such as cerium-substituted yttrium iron garnet (Ce:YIG), onto a silicon waveguide resonator or Mach-Zehnder interferometer . A conductive layer near the magneto-optic material generates a magnetic field when current is applied, modulating the optical signal propagating through the waveguide . This approach allows for compact, low-loss, and scalable integration on silicon photonics platforms, avoiding issues like plasma free carrier absorption that affect semiconductor modulators at RF frequencies .

Performance and Advantages...

Article Content

(PDF) Magneto-optical modulator for superconducting digital output ...

Integrated magneto-optic modulators are an attractive but not fully explored alternative to electro-optic modulators. This

Integrated non-reciprocal magneto-optics with ultra-high ...

Here we propose a new approach to encoding optical weights for in-memory photonic computing using magneto-optic

Magneto-Optic Modulator

This technology can be effectively used as a low-loss electro-optic transducer and for sensing. The integration, the

Recent Progress in Electro-Optic Modulators: Physical

Electro-optic modulators (EOMs), serving as indispensable components within photonic integrated circuits,

Silicon photonic modulator circuit with programmable intensity and ...

They encode an electrical waveform onto an optical carrier. However, their performance is often limited by inherent electro-optic

Integrated non-reciprocal magneto-optics with ultra-high ...

Researchers demonstrate optical weights for in-memory photonic computing using magneto-optic memory cells

Title: A low-power integrated magneto-optic modulator on silicon for ...

In this work, we demonstrate the first high-speed magneto-optic modulator operating at temperatures as low as 4 K. This device is

The magneto-optic modulator

An electric current creates a magnetic field that changes the optical properties of a synthetic garnet. Scientists refer to

The future of optical modulators and integrated photonics

Optical and photonic modulators are technologically advanced devices that enable the manipulation of light properties—such as

An integrated magneto-optic modulator for cryogenic applications

In this Article, we report a high-speed MO modulator operating at temperatures as low as 4 K. The device is created by combining an

A comprehensive survey on optical modulation techniques for

Advancements in photonics across telecommunications, sensing, and data processing have elevated optical

Integrated optical transceivers: architectures, key technologies, and ...

In this review, we systematically explore their development through three aspects: transceiver architectures, key enabling

Magneto-Optic Effect and Modulator Basics | RF Wireless World

Explore the fundamentals of magneto-optics, including the effect itself and how magneto-optic modulators function as optical isolators.

Modulators in Silicon Photonics—Heterogenous Integration & and

The article below presents a review of current research on silicon photonics. Herein, an overview of current silicon

Graphene-based magneto-optical THz modulator with 100% depth of ...

The lack of efficient devices to manipulate THz waves have challenged conventional modulation methods in the THz

Title: A low-power integrated magneto-optic modulator on silicon

So far, only electro-optic modulators have been shown to work at low temperature3–8, and the use of magneto-optic effects in

A low-power integrated magneto-optic modulator on ...

Here, we present the first demonstration of an integrated current-driven modulator based on the magneto-optic effect

Magneto-optical garnets in photonic integration

Optical waveguides and modulators form the backbone of modern integrated photonic systems, enabling precise

Integrated-optical modulators

Integrated-optical elements are usually provided with optical fibres particularly in optical communication technology. To achieve a

A Sub-Picojoule per Bit Integrated Magneto-Optic Modulator on

In this paper, the performance and energy efficiency of a novel MO modulator at room temperature are for the first

Magneto-optic Modulators and Sensors

The magneto-optic spatial light modulator has several unique features that enable it to find many useful

An Integrated Photonic Magneto-Optomechanical Modulator for

We demonstrate a fully integrated magnetooptomechanical MEMS modulator for current-induced optical switching in high-EMI

Fiber-Based Magneto-Optic Sagnac Optical Modulator

In this paper, a fiber-based, magneto-optic (MO) optical modulator based on Sagnac interferometry is proposed. The system uses a

Magneto-Optic Modulator with Unit Quantum Efficiency

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Integrated magneto-optical modulator

By selectively modifying one or more of the direction, orientation and/or amplitude of the magnetic field, a corresponding change in

An integrated magneto-optic modulator for cryogenic applications

Here we report an integrated current-driven modulator that is based on the magneto-optic effect and can operate at tempera-tures as

An integrated magneto-optic modulator for cryogenic applications

An integrated magneto-optic modulator for cryogenic applications Paolo Pintus 1,2, Leonardo Ranzani 3, Sergio Pinna1, Duanni

Magneto-optic in-fiber micro modulator

In recent year, there is a tendency towards construction of optical integrated devices that are able to inter-manipulate

High speed silicon optical modulators: Applications, technologies and ...

High speed silicon optical modulators: Applications, technologies and integrations Abstract: Silicon optical modulators,

Magneto-optic fiber Sagnac modulator based on magnetic fluids

A magneto-optic modulator with a magnetic fluid film inserted into an optical fiber Sagnac interferometer is proposed.

Magneto-optical modulator for superconducting digital output interface

We propose an ultrafast magneto-optic (MO) modulator for the SFQ-to-optical digital interface. Our MO modulator is based on the

How magneto-optical modulators work

Learn how magneto-optical modulators work, their applications in data storage and sensing, and the different types of

Integrated Electro-Optic Modulators: Progress, Challenges, and ...

Electro-optic modulators are essential components in modern communication systems and are additionally expected to play an

Integrated magneto-optical modulator

In some embodiments, the integrated optical modulator provides phase modulation of the optical signal. In other embodiments,

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