Ring Resonator-Based Optical Isolator and Circulator

Tech ID: 21295 / UC Case 2010-660-0

BRIEF DESCRIPTION

The first nonreciprocal ring resonator and implemented it in a ring isolator, which has the main advantages of miniaturization and integration with other optoelectronic devices.

BACKGROUND

As electronic devices increase in speed and become more commonly used in optical systems, integration of electronic and optical semiconductor devices has become more common. Such circuits, often called photonic integrated circuits, have found uses in several consumer and commercial applications. Proper integration of optical devices for inter-chip and intra-chip optical interconnections is important in the performance of the final integrated circuit. Some optical components, such as lasers, modulators, and photodetectors, can be monolithically integrated with electronic devices. However, other optical devices, such as optical isolators, are difficult to integrate with other electronic and optical devices.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed the first nonreciprocal ring resonator and implemented it in a ring isolator, which has the main advantages of miniaturization and integration with other optoelectronic devices. The isolator increases stability and reduces noise in optoelectronic circuits due to a high isolation ratio, which is measured at 9 dB in 1550 nm regime. It also has a low insertion loss, making for efficient signal propagation. The ring isolator can potentially be configured as an optical circulator, tunable optical filter, or bidirectional wavelength-selective isolator and integrated with semiconductor lasers and modulators.

ADVANTAGES

- Can be integrated with other optoelectronic devices
- Increased stability and reduced noise in optoelectronic circuits due to high isolation ratio (9 dB isolation ratio achieved in 1550 nm regime)
- Efficient due to low insertion loss

APPLICATIONS

- Integrated optoelectronic circuits
- Optical isolators
- Optical circulators

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OTHER INFORMATION

KEYWORDS

Optical isolator, Optical circulator, optoelectronics, indoptoelec, cenIEE

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Communications**
  - Optical
- **Engineering**
  - Engineering

RELATED CASES

2010-660-0

- Tunable optical filters
- Bidirectional wavelength-selective isolators

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,396,337	03/12/2013	2010-660

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Bonding of Heterogeneous Material for Improved Yield and Performance of Photonic Integrated Circuits
- Epitaxial Laser Integration on Silicon Based Substrates
- A Hybrid Silicon Laser-Quantum Well Intermixing Wafer Bonded Integration Platform
- Integrated Reconfigurable Circulator
- Magneto-Optic Modulator
- Quantum Dot Photonic Integrated Circuits
- Integrated Dielectric Waveguide and Semiconductor Layer
- Orthogonal Mode Laser Gyro
- Loss Modulated Silicon Evanescent Lasers
- Monolithically Integrated Laser-Nonlinear Photonic Devices
- Misfit Dislocation Free Quantum Dot Lasers

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