

Crystal Orientation Optimized Optical Frequency Shifter

Tech ID: 27333 / UC Case 2017-363-0

ABSTRACT

Researchers at the University of California, Davis have developed an optimized frequency shifter and polarization converter for power reduction.

FULL DESCRIPTION

Optical frequency shifters have a wide variety of applications including heterodyne sensors, atomic interrogation, light detection and coherent optical communications. For these applications, the frequency shifters need to achieve near complete carrier suppression and high conversion efficiency. Current methods include electro-optic modulation and mechanically rotating half-plate frequency shifters, neither of these methods can attain high-speed frequency shifts and both consume large amounts of energy. There is a need for frequency shifters that can attain high-speed frequency shifts and achieve near complete carrier suppression with a high conversion efficiency.

Researchers at the University of California, Davis have developed an X-cut Y-propagating crystal frequency shifter and polarization converter to reduce power consumption. The X-cut Y-propagating crystal orientation makes it possible to reduce power consumption by eight times. The Integrated polarization converter and frequency shifter also allows for high-speed frequency shifts. Finally, the waveguide structure nulls the intrinsic birefringence in the material, achieving near complete carrier suppression.

APPLICATIONS

- ▶ Highly efficient, compact frequency shifter and polarization converter

FEATURES/BENEFITS

- ▶ Reduces power consumption by 8x
- ▶ Integrated polarization converter and frequency shifter
- ▶ Waveguide structure designed to null intrinsic material birefringence
- ▶ Can be integrated with optical components such as lasers

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,203,528	02/12/2019	2017-363

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OTHER INFORMATION

KEYWORDS

polarization converter, X-cut Y-propagating crystal, frequency shifter

CATEGORIZED AS

- ▶ **Optics and Photonics**
 - ▶ All Optics and Photonics
- ▶ **Communications**
 - ▶ Optical
- ▶ **Sensors & Instrumentation**
 - ▶ Other

RELATED CASES

2017-363-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Higher-Speed and More Energy-Efficient Signal Processing Platform for Neural Networks
- ▶ Hyperspectral Compressive Imaging
- ▶ Multi-Wavelength, Nanophotonic, Neural Computing System
- ▶ Athermal Nanophotonic Lasers
- ▶ Ultra-High Resolution Multi-Platform Heterodyne Optical Imaging
- ▶ Multi-Wavelength, Laser Array

- ▶ Optical Interposers for Embedded Photonics Integration
- ▶ Ultrahigh-Bandwidth Low-Latency Reconfigurable Memory Interconnects by Wavelength Routing
- ▶ Development of a CMOS-Compatible, Nano-photonic, Laser
- ▶ Energy Efficient and Scalable Reconfigurable All-to-All Switching Architecture
- ▶ Compressive High-Speed Optical Transceiver
- ▶ All-Optical Regenerators
- ▶ Tensorized Optical Neural Network Architecture
- ▶ Silicon Based Chirped Grating Emitter for Uniform Power Emission
- ▶ Energy-Efficient All-Optical Nanophotonic Computing
- ▶ 3D Photonic and Electronic Neuromorphic Artificial Intelligence

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