Athermal Nanophotonic Lasers

Tech ID: 31669 / UC Case 2018-295-0

ABSTRACT

Researchers at the University of California, Davis have developed a nanolaser platform built from materials that do not exhibit optical gain.

FULL DESCRIPTION

The development of commercial scale, high-efficiency, nanoscale lasers for widespread use in various applications has proven difficult to-date. Materials such as silicon have widespread application in optical waveguides and photonic integrated circuits, but have properties that can restrict their usefulness in lasers. Other constraints of creating lasers at nanoscale include materials science limitations and their relative energy inefficiency.

Researchers at the University of California, Davis have designed high-quality lasers that contain nanoscale optical cavities. In addition, the laser's cavity is produced from materials that allow the laser's wavelength to be temperature independent over a relatively wide temperature range. The lasers exploit waveguides and nanophotonic cavities fabricated directly onto silicon or other materials possessing no optical gain. Thus, high-quality CMOS transistors can be integrated into the platform. In addition, the energy efficiency of the lasers designed to-date using this platform can exceed 30%.

APPLICATIONS

- Potential for forming nanophotonic lasers directly on silicon
- New platform for producing athermal lasers

FEATURES/BENEFITS

- Compatible with current silicon CMOS fabrication processes
- Lasing wavelength is temperature-independent over relatively wide temperature ranges

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20240014635	01/11/2024	2018-295
Patent Cooperation Treaty	Published Application	WO 2021/257663	12/23/2021	2018-295

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OTHER INFORMATION

KEYWORDS

Laser, Photonics, optical gain, CMOS, waveguides, silicon

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Communications**
  - Optical
- **Computer**
  - Hardware
  - Other
- **Nanotechnology**
  - Other

RELATED CASES

2018-295-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Higher-Speed and More Energy-Efficient Signal Processing Platform for Neural Networks
- Crystal Orientation Optimized Optical Frequency Shifter
- Hyperspectral Compressive Imaging
- Multi-Wavelength, Nanophotonic, Neural Computing System
- 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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