Development of a CMOS-Compatible, Nano-photonic, Laser

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ABSTRACT

Researchers at the University of California, Davis have developed a new class of lasers and amplifiers that uses a CMOS-compatible electronics platform - and can also be applied to nano-amplifiers and nano-lasers applications.

FULL DESCRIPTION

Nano-photonic signals are important for signal transfers, but finding ways to generate these signals accurately using moderately-priced equipment is a technical challenge. Materials such as aluminum can produce light on the nanoscale, but are expensive for mass scale production. Silicon is the preferred material for optical waveguides and integrated circuits for this reason. However, techniques to force silicon to generate signals on the nano-scale have not been successful without expensive and complicated methods of fabrication.

Researchers at the University of California, Davis have developed a method of producing an integrated circuit capable of generating nano-photonic signals more cheaply and efficiently than previous techniques. Through micro-transfer printing or wafer bonding, nano-scale layers can bond onto silicon without the typical optical gain. This technique creates a circuit that is compatible with complementary metal-oxide-semiconductor (CMOS) electronics and can produce nano-scale signals from microchip scale electronics. Additionally, the electronics can be made temperature independent by selecting materials for production that possess thermo-optical coefficients that cancel each other.

APPLICATIONS

- Nanoscale lasers and amplifiers
- Producing nano-photonic signals more economically than current options

FEATURES/BENEFITS

- Can fabricate nanoscale lasers from materials possessing no optical gain
- Temperature independent electronics
- Can be combined with a de-multiplexer to achieve a narrow linewidth and low noise multi-wavelength laser array

PATENT STATUS

Patent Pending

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OTHER INFORMATION

KEYWORDS

Nanophotonics, CMOS, Lasers, Amplifiers, Water bonding, Mirco-transfer printing

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Communications**
  - Networking
  - Optical
- **Computer**
  - Other
- **Nanotechnology**
  - Electronics
- **Semiconductors**
  - Design and Fabrication

RELATED CASES

2020-510-0

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
- 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
- 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
- All-To-All Interconnection With Wavelength Routing Devices
- 3D Photonic and Electronic Neuromorphic Artificial Intelligence
- Adapting Existing Computer Networks to a Quantum-Based Internet Future

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