Photonic Crystal Semiconductor Optical Amplifier



Overview

This project focuses on realizing an important building block for such photonic integrated circuits, namely an ultra-compact semiconductor optical amplifier based on photonic crystal technology that is feasible for dense integration. Optimization of critical parameters to enhance performance is pursued through the utilization of the particle swarm. Like integrated circuit (IC) technology in micro electronics, many applications exploiting photonic technologies can be realized in a compact, power-efficient and cost-effective way by integrating the required functionalities on a single chip (photonic integrated circuit, PIC). Currently, virtually all amplifiers rely on atomic resonances, such as rare-earth-doped fibers, or are based on III-V semiconductors. SOAs operate over wide wavelength bands (e., 1480nm to 1560nm) and are relatively inexpensive, offering substantial gains.

Article Content

Design of photonic crystal semiconductor optical amplifier-based all ...

We propose a design leveraging photonic crystal semiconductor optical amplifiers (PhC-SOA), harnessing its unique capacity to manipulate and govern light at the nanoscale. Optimization

A review of electro-optic, semiconductor optical amplifier and photonic ...

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In this review study the applications of electro-optic Pockels cell-based switches, semiconductor optical amplifier (SOA)-based switches and photonic band gap crystal-based switches in the domain of

Photonic Crystal Semiconductor Optical Amplifier For Next Generation ...

This project focuses on realizing an important building block for such photonic integrated circuits, namely an ultra-compact semiconductor optical amplifier based on photonic crystal

All-band photonic integrated optical parametric amplification

Optical amplifiers are ubiquitous in science and technology alike and are the workhorse of modern long-range communications. Currently, virtually all amplifiers rely on atomic resonances,

Design and analysis of an all-optical NAND logic gate using a photonic ...

The simulation was performed using the photonic crystal-semiconductor optical amplifier (PC-SOA) structure based on the Mach–Zehnder interferometer and nonlinear cross-phase

Design of Photonic Crystal Semiconductor Optical Amplifier With ...

To realize the amplification of the optical signal with polarization independence, a PCSOA is designed with a compensated structure. The cascaded structure leads to a balanced amplification

Semiconductor Optical Amplifier Integrated on Silicon Photonic Chip ...

This thesis explores the performance of a semiconductor optical amplifier that is integrated onto a silicon photonics chip using photonic wire bonds. The remaining sections of the thesis are organized into

160 Gb/s photonic crystal semiconductor optical amplifier-based all ...

The performance of an ultra-fast all-optical logic NOT-AND gate using photonic crystal semiconductor optical amplifiers (PCSOA)-based Mach---Zehnder interferometers is numerically

The Return of Lithium Niobate — From Bulk Modulators

The emergence of thin-film lithium niobate (TFLN) brings this proven material into the domain of integrated photonics, enabling tightly confined waveguides with

Hollow-Core Fibers (HCF): The Next Frontier in Optical

Published by: Research & Development Department, Technologie Optic.ca Inc., September 2025 Table of contents Introduction Hollow-core fiber

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Optical coatings for precision glass and polymer optics, fiber optic devices, crystals, and semiconductors. Designs include optical filters, high power AR and HR laser mirrors, ultralow

Waveguides – optical fiber, fabrication, modes, nano

Waveguides are spatially inhomogeneous transparent structures for guiding light, often used for obtaining strong light concentration over substantial distances.

Fabrication and measurement of a photonic crystal waveguide

A III-V semiconductor photonic crystal (PhC) waveguide is integrated into a semiconductor optical amplifier (SOA); this has the potential to reshape pulses that are distorted and chirped on

Recent advances in photonic crystal optical devices: A review

The discovery of photonic crystals (PhCs) documented by Yablonovitch and John in 1987 has gathered a lot of consideration. Electromagnetic waves disperse within the PhC, for certain

Recent Progress in Photonic Crystal Devices and Their

The research field of photonic crystals (PhCs) remains active on a global scale. PhCs, which are periodic optical nanostructures with the

An ultra-broadband photonic-chip-based parametric amplifier

An optical parametric amplifier based on integrated photonic circuits fabricated using low-loss gallium phosphide-on-silicon dioxide demonstrates improved bandwidth and gain performance

Design and analysis of an all-optical NAND logic gate using a photonic ...

A photonic crystal semiconductor optical amplifier (PC-SOA) exhibits nonlinear performance and behavior in its active region due to changes in the carrier density caused by the

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