Small Dimension High-Efficiency High-Speed Vertical-Cavity Surface-Emitting Lasers

Tech ID: 22050 / UC Case 2008-464-0

BRIEF DESCRIPTION

A very efficient Vertical-Cavity Surface-Emitting Laser (VCSEL) applicable to optoelectronics, specifically optical interconnects.

BACKGROUND

Oxide apertures within the Vertical-Cavity Surface-Emitting Laser (VCSEL) have been used to minimize power dissipation by constricting current within the lasing modes and guiding laser modes (thereby increasing overlap between carriers and optical modes and reducing sidewall losses). However, these apertures have produced undesirable optical scattering due to their imperfect shape and a larger mode diameter is needed for low optical loss.

DESCRIPTION

Researchers at UC Santa Barbara have designed a Vertical-Cavity Surface-Emitting Laser (VCSEL) applicable to optoelectronics, specifically optical interconnects. The invention uses a thicker oxide aperture with a tapered tip designed to reduce the mode volume with minimal added loss. The parasitics are further reduced by using deep oxidation layers. With these novel features, small-dimension high-efficiency high-speed VCSELs can be achieved.

ADVANTAGES

- Low power dissipation due to:
- Small dimension of <5 μm in diameter
- Reduced parasitic capacitance
- Reduced optical scattering loss
- High bandwidth of at least 15 GHz makes for at least 30 Gbit/s operation
- Improved performance
- High-efficiency and high-speed

APPLICATIONS

- High-speed sensing; High-speed communication
- Optical Interconnects in data centers and computers

PATENT STATUS

CONTACT

University of California, Santa Barbara Office of Technology & Industry Alliances
padilla@tia.ucsb.edu
tel: 805-893-2073.

INVENTORS

- Chang, Yu-Chia
- Coldren, Larry A.

OTHER INFORMATION

KEYWORDS

vcsel, indVCSEL, cenIEE, indaltenergy

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Engineering**
  - Engineering

RELATED CASES

2008-464-0

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,916,768	03/29/2011	2008-464

RELATED MATERIALS

- Efficient, High-Data-Rate, Tapered Oxide-Aperture Vertical-Cavity Surface-Emitting Lasers - 06/05/2009

University of California, Santa Barbara
Office of Technology & Industry Alliances
342 Lagoon Road, ,Santa Barbara,CA 93106-2055 |
www.tia.ucsb.edu
Tel: 805-893-2073 | Fax: 805.893.5236 | padilla@tia.ucsb.edu