



Optoelectronics and Semiconductor Group

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Field of study: Optoelectronic Engineering, Microelectronic Engineering, Electromagnetic Compatibility and Reliability

Key words: Fiber laser, optical amplifier, EO, OE, semiconductor devices

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1.The Subject and Aims of Research

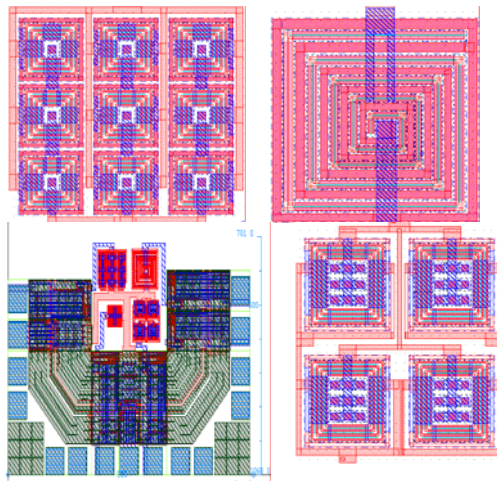
Our research aims at the investigations of topics related to semiconductor devices and electro-optical energy transformation, including their principles, design, simulation, characterization measurement and analysis, electromagnetic compatibility, reliability, and applications. Our researches focus on electro-optical engineering, including fiber laser, fiber amplifier, EO-OE device, and ICs related to electro-optical and opto-electronic applications..

2.Related Recent Research Topics

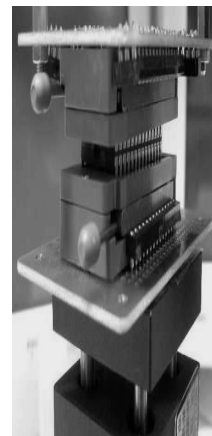
- (1) The design, simulation, and equivalent-electrical-circuit analysis of multiwavelength fiber lasers.
- (2) The design, simulation, and equivalent-electrical-circuit analysis of optical fiber amplifiers.
- (3) The design and applications of opto-electronic devices.
- (4) Optical interconnect and ICs related to electro-optical and opto-electronic applications
- (5) The analysis of optical modulators.
- (6) The EMC, noise and reliability of electronic devices and systems.

□CMOS silicon light emitting and receiving IC design and optical interconnect design:

◇ CMOS Si light-emitting and receiving IC layout design:

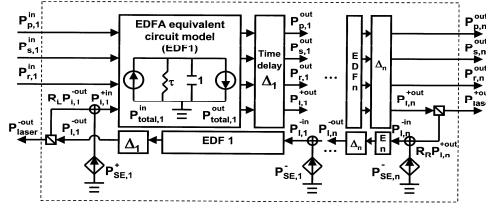
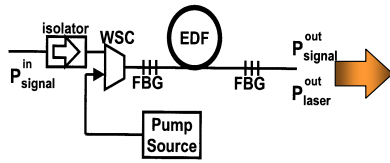


◇ CMOS chip-to-chip optical interconnect design :

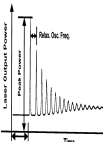
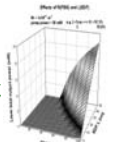


Design and analysis of fiber amplifiers and multiwavelength fiber lasers:

The analysis of fiber laser and amplifier u



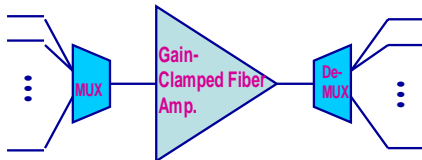
Gain and transient analysis:



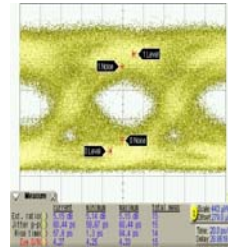
Design of multi-wavelength fiber laser:



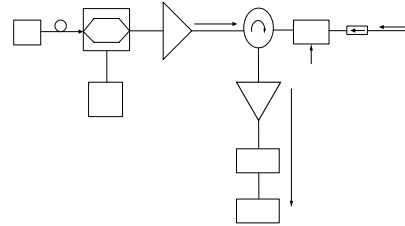
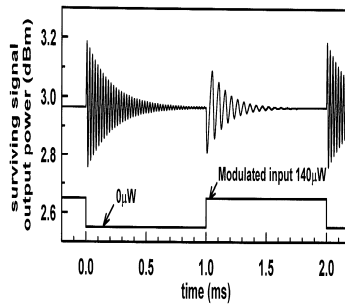
Applications of EO-OE devices and fiber components:



multi-wavelength wavelength conversion:



Dynamic analysis of WDM system



3. Selected Publications and Projects

Publications: "Time-delay circuit model of high-speed PIN photodiodes," *IEEE PTL*, 14(525)2002 ; "Application of SPICE simulation to study WDM and SCM systems using EDFAs with chirping," *IEEE Trans. Education*, 45(238)2002. ; "All Si-based low operating-voltage and low power-dissipation device for optical interface," *IEICE Trans. Electron.* E88-C(1490)2005 ; "Si-based current-density-enhanced light emission and low-operating-voltage light emitting/receiving designs," *Solid-State Electron.*, 49(1172)2005.

Patents: "Method for describing features of erbium doped fiber amplifier by way of equivalent circuit". R.O.C. patent No.196529, Jan 2004- Jan 2023.

Projects: "Dynamic gain control of fiber amplifier in multiwavelength optical network"; "A study of EMI susceptibility in IC"; "Real-time analysis of reliability test"; "A study of the heterogeneous opto-electronic IC for DWDM system."