

Integrated Si Photonics and Optoelectronics for High-Speed Optical Interconnects

Prof. Ming-Chang Lee

EE Dept. and Insti. of Photonics, National Tsing-Hua University,
Hsinchu, Taiwan



Abstract:

Integrated Si optoelectronics and photonics are the key technology platform for developing large-scale integrated optics for high-speed optical interconnects. For example, multi-channel integrated Si/Ge transceivers are recently demonstrated for over 100Gbps data transmission aiming at data centers, high-performance cluster computers, and cloud servers. Meanwhile, these technologies are also exploited for implementing compact sensor chips for biological and chemical detection. In this talk, I will introduce several key Si photonic components developed in my group and fabricated in a CMOS research lab in Taiwan. One of the unique processes called rapid melt growth (RMG) method is introduced for monolithically integrating various monocrystalline semiconductors on Si substrate. This process doesn't require complex epitaxy process steps to deal with the lattice mismatch issue between different semiconductors, and the thermal budget is small, which is most compatible with standard CMOS process. Several devices are presented, including Si/Ge heterojunction waveguide pin¹, Si/Ge butt-coupling waveguide photodetectors².

Biography

Prof. Lee received his Ph.D. degree in electrical engineering from University of California at Los Angeles (UCLA) in 2005. Currently, he is a professor in Institute of Photonics Technologies and Dept. of Electrical Engineering in NTHU. His research interests include photonic MEMS, linear and nonlinear silicon photonics, high-speed Group IV optoelectronics, nanophotonics and microfluidic photonics. He has authored and coauthors over 100 journal and conference papers, including two invited book chapters, and holds many patents in Taiwan and US. Prof. Lee is a member of IEEE, and Optical Society of America (OSA). He received National Tsing Hua University Young Researcher Award in 2010, The 12th Far Eastern Y. Z. Hsu Science and Technology Paper Award and The Young Optoelectronic Researcher Award in Taiwan.

Reference

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