North American Workshop on Silicon Photonics for High Performance Computing
May 17-18 2018, Fort Collins, CO

Benefits and challenges to build robust heterogeneous light sources on silicon

Di Liang
Hewlett Packard Labs, Hewlett Packard Enterprise
di.liang@hpe.com

Abstract – For decades Moore's Law guided exponential growth of computing capacity in Si chips, and generated data was transported globally through long-haul fiber-optic network. They were the hardware backbone to enable the information era which is also promoting a much stronger coexisting tie between electronics and photonics today. When traditional processor-centric computing architecture and copper interconnect both seriously limit the computing and data transport in datacenters and high-performance computers, new memory-driven computing architecture and high-speed optical interconnect are rapidly developed to be their successors.

Silicon photonics, being a relatively young integrated photonic platform, has emerged themselves with promise for higher integration level, smaller footprint, lower power consumption, larger volume throughout and lower system cost than what traditional III-V compound semiconductor counterparts can offer. However, *whether or not* and *how to* integrate light sources on silicon are still critical factors to impact architecture and packaging designs, application scenarioes, overall system performance, and total photonic solution cost. In this talk I will attempt elaborating the benefits and existing challenges to heterogeneously integrate robust lasers on silicon, and how a growing silicon photonics ecosystem can help prevail the challenges.

Bio – Di Liang is a senior research scientist/principal engineer at Hewlett Packard Labs in Hewlett Packard Enterprise. He is a PI for a $10M externally funded R&D program currently, and leads advanced research and product development of heterogeneous/hybrid IIIV-on-silicon integrated photonics for high-speed optical interconnects in HPE's high-performance computing and datacenter business. Prior to joining HP Labs in 2009, he was a research specialist in the Prof. John Bowers group at UC-Santa Barbara where he was a core member in the early stage development of the hybrid IIIV-on-silicon platform. His research interests include high-speed diode lasers, modulators and photodetectors, integrated photonics, heterogeneous and monolithic material integration and nanofabrication technology. He has authored and coauthored over 155 journal and conference papers, five book chapters, and was granted by 13 patents (each with multiple region filing) with another 45+ pending. He received his B.S. degree in Optical Engineering from the Zhejiang University, China, and Ph.D. degree in Electrical Engineering from the University of Notre Dame, USA. He is a senior member of IEEE and a member of OSA.