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Tutorial

VLSI Photonics: Science and Engineering of Micro/Nano-Photonic Integration

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Abstract

This lecture presents a comprehensive review and overview on the cutting-edge frontier science and engineering of micro/nano-photonic integration for VLSI photonic application. It discusses about the theory, design, fabrication, and integration of micro/nano-photonic devices, circuits, chips, and networks in the form of “VLSI photonic integrated circuits” (VLSI-PICs) and “optical micro/nanonetworks (O-MNNs)” of generic and application-specific nature on a platform called “optical printed circuit boards” (O-PCBs). These systems are designed to be compact, intelligent, high-speed, light-weight, environmental friendly, low-powered, and low-cost as applicable for datacom, telecom, transportation, aero-space, avionics, bio/medical, sensor, and environmental systems. New physics, visions, issues and challenges of the optical micro/nano-optical circuits, networks and systems will be discussed along with the historical perspectives of the electrical technology. Recent progresses and examples will be presented along with the future outlook.



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B.S.E.E. (summa cum laude), Seoul National University, Korea, 1970; M.S., M.Phil., and Ph.D., Applied Physics, Yale University, 1973, 1975 and 1977, respectively, under Prof. John. B. Fenn (Yale Nobel Laureate, Chemistry, 2002) and Prof. Richard. K. Chang (Henry Ford II Professor from Prof. N. Bloembergen, Harvard Nobel Laureate, Physics, 1981). Conducted teaching, research and management at Yale, Princeton, AT&T, ETRI (vice president), KAIST, and INHA in the fields of semiconductor physics, materials, devices, optoelectronics, photonics, and optical communication. Founding Dean, School of Communication and Information Engineering; Dean, Graduate School of the Information Technology and Telecommunications; Founding Director, OPERA (Optics and Photonics Elite Research Academy) and m-PARC (micro/nano-Photonics Advanced Research Center); Vice President, Optical Society of Korea; Founding President, IEEE-LEOS Korea; Founding Director, SPIE-Korea. 240 international refereed SCI-covered journal and review papers; 640 international conference presentations; 100 plenary, keynote, and invited talks in international conferences; Edited books and international proceedings; 120 international patents; 80 services as international conference chair, committee member, and advisor.