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"*This is an outstanding book on self-organized 3D integrated optical interconnects tailored for high-performance chip- and board-level photonic communications. The book outlines fundamental and practical challenges of photonic links at these distances and discusses strategies for continued performance and cost scaling. It covers key aspects of the heterogeneously integrated photonic technologies pioneered by the author, who is a leading expert in this area. The presented approaches and in-depth discussions will stimulate further research and development activities in a variety of related topics. The book is designed to meet diverse needs of scientists, engineers, and students in the fields of integrated photonics and solar energy conversion systems. It is thereby a significant and timely contribution that will stand the test of time.*"

Dr. Tian Gu
Massachusetts Institute of Technology, USA

"*Tetsuzo Yoshimura is a visionary, a man who was able to look beyond, to design the future. His pioneering work on SOLNETs has thoroughly investigated the immense possibilities offered by the plasticity of optical nonlinearity, with a practical and pragmatic approach toward the realization of real devices and working circuits. The operating speeds of current computers and the energy efficiency of traditional CPUs have reached physical barriers that can no longer be improved through conventional von Neumann-like architectures. New geometries and innovative data-processing networks are becoming necessary thanks to hybrid technologies that simultaneously employ electronics and photonics. Yoshimura has been able to apply the plasticity of optical nonlinearity in many fields, to show how this technology represents the way toward new computing systems. This book will introduce you to all of this and open your mind to new perspectives and new future technological scenarios.*"

Prof. Eugenio Fazio
Sapienza University of Rome, Italy

Currently, light waves are ready to come into boxes of computers in high-performance computing systems like data centers and super computers to realize intra-box optical interconnects. For inter-box optical interconnects, light waves have successfully been introduced by OE modules, in which discrete bulk-chip OE/electronic devices are assembled using the flip-chip-bonding-based packaging technology. OE modules, however, are not applicable to intra-box optical interconnects, because intra-box interconnects involve "short line distances of the cm–mm order" and "large line counts of hundreds-thousands." This causes optics excess, namely, excess components, materials, spaces, fabrication efforts for packaging, and design efforts. The optics excess raises sizes and costs of intra-box optical interconnects enormously when they are built using conventional OE modules.

This book proposes the concept of self-organized 3D integrated optical interconnects and the strategy to reduce optics excess in intra-box optical interconnects.

Tetsuzo Yoshimura received his BSc in physics from Tohoku University in 1974 and his MSc and PhD in physics from Kyoto University in 1976 and 1985, respectively. In 1976 he joined Fujitsu Laboratories Ltd., where he was engaged in research on dye sensitization, electrochromic thin films, amorphous super lattices, organic nonlinear optical materials, and polymer optical circuits. He invented molecular layer deposition (MLD) and the self-organized lightwave network (SOLNET). From 1997 to 2000, he was with Fujitsu Computer Packaging Technologies, Inc. (FCPT), San Jose, California, where he planned the strategy on 3D integrated optical interconnects within computers. From 2001 to 2017, he was a professor at Tokyo University of Technology, where he contributed to research on MLD-based nanotechnologies and SOLNET-based optoelectronics for optical interconnects, solar energy conversion systems, and cancer therapy. He is currently a professor emeritus at Tokyo University of Technology.

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