

## High-performance chip-scale optical interconnects and photonic switching

Tian Gu

Materials Research Laboratory

Department of Materials Science and Engineering

Massachusetts Institute of Technology

[gutian@mit.edu](mailto:gutian@mit.edu)

**Abstract** – We present next generation chip-scale optical interconnects, photonic packaging and switching architectures for high-performance computing and datacenter networks. Ultrahigh capacity short-reach optical interconnects and photonic packaging platforms are demonstrated utilizing single mode polymer waveguide devices, showing low propagation and coupling losses, high-performance signal/power routing, and high-density, broadband, misalignment-tolerant off-chip coupling. Robust flexible waveguide ribbons are demonstrated suitable for dense interconnections across the chip- and board-domains. We further develop high-performance, non-volatile on-chip photonic switching fabrics based on broadband and low-loss optical phase change materials.

**Bio** – Dr. Tian Gu is a Research Scientist at Materials Research Laboratory and Department of Materials Science and Engineering at MIT, where he is a co-Investigator of the Photonic Materials Research Group. His primary research interests involve integrated photonics and nano-optics, focusing on the areas of data communications, computing, metasurfaces, on-chip spectroscopic sensing, flexible photonics, photovoltaics, and 2D materials integrated photonics. He served on program committees for several international conferences. He received his B.S. degree from Beijing Institute of Technology in Electrical Engineering and Ph.D. degree from University of Delaware in Electrical and Computer Engineering. Dr. Gu is a recipient of the R&D 100 Award and the TechConnect National Innovation Award.