
In-memory photonic-electronic computing platform for accelerating AI

Institute of Microelectronics, Singapore

Bowei Dong

Email: dong_bowei@ime.a-star.edu.sg

AI has been deployed by the majority of Tech Giants (Microsoft, Amazon, Google, Meta) and penetrated deeply into our daily lives by providing AI-generated contents and accelerating scientific discoveries. However, the size of AI models is growing exponentially, requiring processing hardware that can provide higher computing performance beyond current CMOS electronics. Photonic computing is a promising solution for its high bandwidth, high energy efficiency, and low latency. In this talk, we will discuss how photonic in-memory computing is realized by using novel functional materials integrated with photonic platforms, how photonics and electronics are interfaced to improve photonic in-memory computing, and how computing architectures are designed to leverage the advantages of photonics. Figures of merits achieved by current photonic computing systems will be discussed and compared to state-of-the-art electronics, followed by a discussion on the challenges to improve photonic computing systems.



Short Bio:

Bowei Dong received his B.Sc. (2015) in Physics and Mathematics from Nanyang Technological University, and Ph.D. (2019) in Electrical Engineering from National University of Singapore. He spent two years at University of Oxford as a postdoctoral fellow (2021-2023). His PhD thesis focused on mid-infrared integrated photonics, and postdoc research centered around photonic computing. In December 2023, he returned to Singapore and worked as a senior scientist and principal investigator at the Institute of Microelectronics (IME), A*STAR. He was a recipient of A*STAR Young Achiever and A*STAR International Fellowship.