Department of
Mechanical Engineering
The University of Hong Kong

DEPARTMENT OF
MECHANICAL ENGINEERING
THE UNIVERSITY OF HONG KONG

SEMINAR

Nonreciprocal photonic devices based on magneto-nanophotonic structures

Date: 17 July, 2024 (Wednesday)
Time: 11:00 a.m.
Venue: Room 7-34 & 7-35, Haking Wong Building
HKU

Speaker: Professor LEI Bi
Department of Electronic Science and Engineering of University of Electronic Science and Technology of China (UESTC)
China

Abstract:

Nonreciprocal photonic devices are a group of photonic devices in which light propagation breaks the Lorentz reciprocal theorem. Optical isolators, circulators, nonreciprocal phase shifters are examples of such devices. Commercial nonreciprocal photonic devices are based on the Faraday effect and bulk magneto-optical single crystals. The development of silicon photonics and optical metasurfaces demands such devices in the nanoscale, which is still one of the major challenges. In this report, I will present our recent progress on nonreciprocal photonic devices using magneto-nanophotonic structures. The talk will include two parts. In the first part, I will introduce optical nonreciprocity in magneto-optical metasurfaces. Strong MO effect and new nonreciprocal photonic effect such as optical gyromagnetism were observed, enabling development of nonreciprocal amplitude/phase gradient metasurfaces and nonreciprocal thermal radiation metasurfaces. In the second part, I will introduce our effort toward silicon photonic integration of nonreciprocal photonic devices. I will show how rare-earth garnet thin films can be grown and pin-point crystallized on silicon waveguides using sputtering and laser annealing, favoring back-end-of-the-line (BEOL) integration. I will also present waveguide integrated optical isolators, circulators and their potential application in FMCW Lidar, laser module and nonreciprocal photonic networks.

Biography:

Lei Bi is a professor in the department of Electronic Science and Engineering of University of Electronic Science and Technology of China (UESTC). He received his B.S. and M.S. degrees in Tsinghua University in 2004 and 2006 respectively, both majored in materials science. He received his Ph.D. degree in MIT in 2011, majored in materials science and engineering. He joined UESTC as a professor in 2013. His research interest includes nonreciprocal photonics, magneto-photonics and optical metasurface. He has authored or co-authored more than 150 papers in peered-viewed journals. He is a senior member of IEEE, and a member of Optica and SPIE.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. X.B. Yin at 3910 2659.