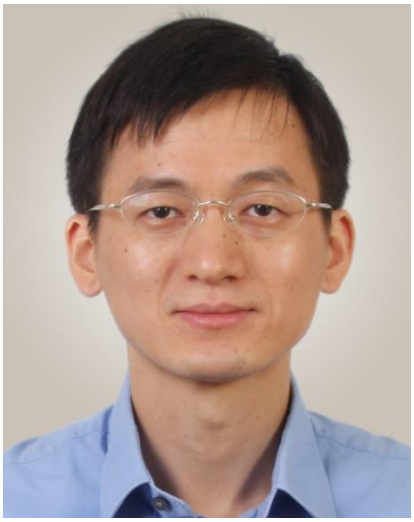
Title: Silicon Photonic Devices Driven by Transparent Conductive Oxides

Abstract:

Transparent conductive oxide (TCO) materials have attracted escalating research interests for integrated photonic devices in recent years due to the extraordinary perturbation to the refractive indices achieved either through oxygen vacancy doping or electrical gating. In addition, TCO materials can be deposited with high quality using DC- or RF-sputtering on various platforms including silicon photonics, which also possess long term stability. Therefore, TCO materials are fully compatible with silicon photonics and has the potential to be readily integrated with existing silicon photonic integrated circuits (PICs). In this talk, I will review recent research progress in my group for the development of TCO-gated silicon photonic devices, including energy-efficiency silicon-TCO photonic crystal nanocavity modulators, silicon-TCO microring resonators with ultra-large E-O tuning efficiency, and broadband plasmonic-TCO electro-absorption modulators. We also achieved 5Gbit/s E-O modulation speed and will also discuss the strategy to further improve the energy efficiency to atto-joule/bit and operation bandwidth above 25 GHz.

Speaker Biography:



Alan Xiaolong Wang is an Associate Professor of the School of Electrical Engineering and Computer Science at Oregon State University. He received his B.S. degree from Tsinghua University, and M.S. degree from the Institute of Semiconductors, Chinese Academy of Sciences, Beijing, P.R. China, in 2000 and 2003, respectively, and his Ph.D. degree in Electrical and Computer Engineering from the University of Texas at Austin in 2006. From January 2007 to August 2011, he was with Omega Optics, Inc., Austin, Texas, where he served as the Chief Research Scientist for multiple government funded Small Business Innovative Research projects. During his research career, he has generated over $7 M dollars in externally-funded research from various government agencies, including the National Science Foundation (NSF), the Air Force Office of Scientific Research (AFOSR), the Defense Advanced Research Project Agency (DARPA), the Army Research Office (ARO), the National Institutes of Health (NIH), the Environmental Protection Agency (EPA), and the U.S. Department of Agriculture, along with several industry sponsors such as Hewlett Packard. He joined OSU as an Assistant Professor in August 2011 and was promoted to Associate Professor in 2017. His current research activities at OSU spans over nanophotonic devices including photonic crystals and surface plasmonics, silicon photonics incorporating emerging functional materials such as electro-optic polymers and transparent conductive oxides, free space optical communication, and various nano-scale optical sensors based on surface-enhanced Raman scattering, infrared absorption, and fluorescence imaging.

He has more than 90 journal publications and more than 100 conference presentations including 16 plenary/invited presentations, and also holds seven granted or pending U.S. patents. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), the Optical Society of America (OSA), and the International Society for Optics and Photonics (SPIE).