THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT COLLOQUIUM SERIES PRESENTS:

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High Performance Electronics for Communication, Power Management, and Beyond

Our increasing reliance on electricity for functioning in our daily lives leads to an endless quest for energy-efficient and high-performance devices to generate, distribute, store and convert electricity to other forms of energy or information. The III-V nitride semiconductor family is one of the electronic materials that has quickly filled up many voids of human quests Silicon helped to create in the past 30 years or so: solid state lighting, miniature base stations for superior wireless coverage, and all at unprecedentedly high performance. In the past 10+ years, wide bandgap oxides such as Ga2O3 (Eg>4.5 eV), and layered materials such as WSe2 (semiconductor), NbS2 (superconductor) have been touted for applications beyond thin-film transistors. Large-size electronic-grade single-crystalline Ga2O3 substrates can be prepared by techniques similar to that to prepare sapphire and quartz. The facile processes to prepare layered materials and heterostructures have enabled an unprecedented number of scientists and engineers in history to interrogate this material group, aiming to answer what new physics can be found and what new applications can be explored. In this talk, I will discuss several examples based on these materials systems investigated in our group power management, energy-efficient logic etc.

Huili Grace Xing is currently the William L. Quackenbush Professor of Electrical and Computer Engineering, Materials Science and Engineering at Cornell University. She was with the University of Notre Dame from 2004 to 2014. She received B.S. in physics from Peking University (1996), M.S. in Material Science from Lehigh University (1998) and Ph.D. in Electrical Engineering from University of California, Santa Barbara (2003), respectively. Her research focuses on development of III-V nitride, 2-D crystal and oxide semiconductors: growth, electronic and optoelectronic devices, especially the interplay between material properties and device development as well as high performance devices, including RF/THz devices, tunnel field effect transistors, power electronics and DUV emitters. She is a recipient of AFOSR Young Investigator Award, NSF CAREER Award and ISCS Young Scientist Award. She has authored/co-authored 200+ journal papers and 100+ conference proceeding publications including Nature journals, Physical Review Letters, Applied Physics Letters, Electron Device Letters, and IEDM etc.

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