As the workhorse in the past 60 years, the semiconductor industry, largely based on silicon together with GaAs and InP, has transformed the way we communicate, compute and store information. In the 90s, Gallium Nitride, as a wide bandgap semiconductor (> 2 eV), emerged as the most reliable and energy efficient platform to generate green to UV light, leading an evolution in lighting industry to at least quadruple the electricity-light conversion efficiency. This is significant since over 20% of today's worldwide consumption of electricity is on lighting. Besides lighting, GaN promises energy efficient solutions to transmit electricity and amplifying RF signals, which is also substantial as the generated electricity at power plants goes through a winding path to end devices and today we increasingly depend on wireless communication. To this end, I will discuss our current effort to unravel the potential of GaN electronics. As our handheld phones are more powerful than yesterday’s desktop computer, we wish them to be yet lighter, last longer with more functions. This demands nearly atom-scale electronic switches that can outperform today's 22-nm Si MOSFETs. We have demonstrated tunnel FETs based on III-V semiconductors, one of the most promising replacements. I will discuss the ongoing investigation on the ultimate embodiment using 2-dimensional crystal semiconductors, as well as other interesting applications enabled by this new class of semiconductors.

Bio: Huili Grace Xing is currently a Professor of Electrical Engineering at the University of Notre Dame. She obtained 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 and 2-D crystal semiconductor growth, electronic and optoelectronic devices, especially the interplay between material properties and device developments. More recent research interests include tunnel field effect transistors and THz applications. She is a recipient of AFOSR Young Investigator Award and NSF CAREER Award.

Time: February 21st, 2014, Friday, 3:00 pm - 4:00 pm
Location: ECE 101 (Lankford Lab), Dept. of Electrical and Computer Engineering
Hosted by: Hongxing Jiang & Jingyu Lin