Mechanical Engineering Department Seminar

3:35pm March 13, 2013
1130 Mechanical Engineering

Energy in Nano-electronics: Examples from Graphene to Phase-Change Materials

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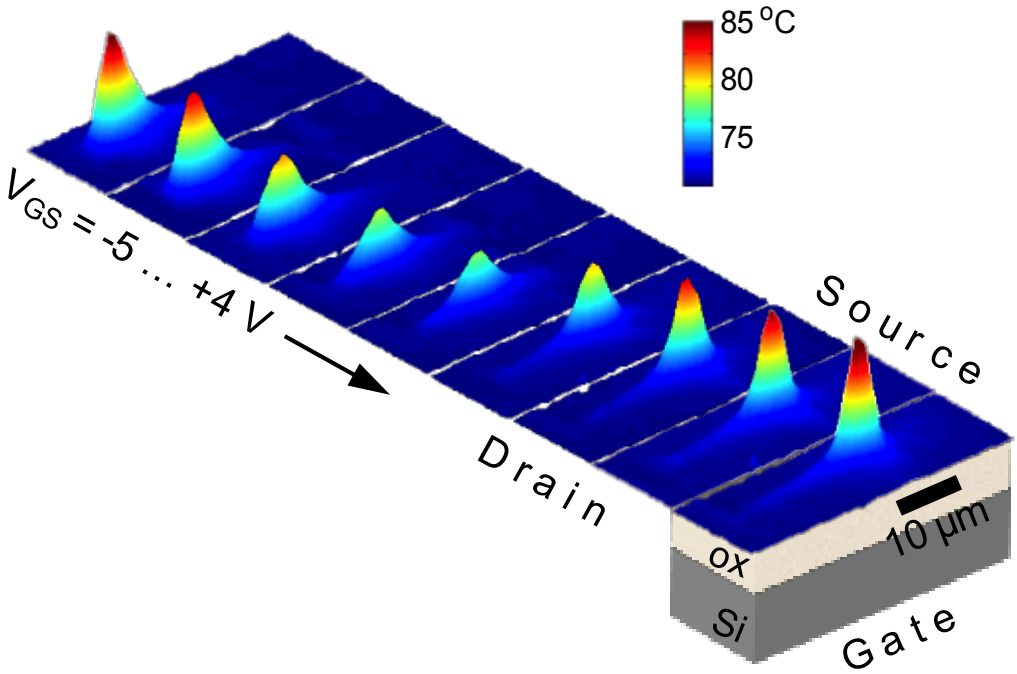
Energy dissipation and conversion are important for the design of low-power electronics and energy-conversion systems. This is also a rich domain for both fundamental discoveries as well as technological advances. This talk will present recent highlights from our studies of energy dissipation and usage in novel nano-electronics based on graphene and phase-change materials. We have investigated both Joule heating and Peltier cooling in graphene electronics, and found that the latter could be used to partially mitigate the heat generated during circuit operation. We have also examined fundamental limits of data storage based on phase change (rather than charge or spin), achieving energy dissipation two orders of magnitude below industry state-of-the-art, approaching femtojoules per bit. The results suggest new directions to improve nanoscale energy efficiency towards fundamental limits, through the design of geometry and materials.



Bio: Eric Pop is an Associate Professor of Electrical and Computer Engineering (ECE) at the University of Illinois Urbana-Champaign (UIUC). His research interests lie at the intersection of nanoelectronics and nanoscale energy conversion systems. He received his Ph.D. in EE from Stanford (2005), the M.Eng./B.S. in EE and B.S. in Physics from MIT. Prior to joining UIUC in 2007, he did post-doctoral work at Stanford and worked at Intel on non-volatile memory. His awards include the Presidential Early Career (PECASE) Award (2010), Young Investigator Awards from the ONR, NSF, AFOSR and DARPA (2008-2010), several best paper/poster and teaching/advising awards. He is an IEEE Senior member, a member of APS and MRS, and has been serving on the program committees of the DRC, APS, and IEDM conferences.