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Materials Research Science and Engineering Center

MRSEC SEMINAR SERIES

Energy Dissipation and Conversion in Nanoelectronics: Examples from Graphene to Phase-Change Materials

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Time: 3:00 PM

Location: Marcus Nanotechnology Building

Abstract:
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 dissipation in novel nanoelectronics 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 tuned to partially remove the heat generated during operation. We have also examined the fundamental limits of data storage based on phase-change materials (rather than charge or spin), and demonstrated two orders of magnitude reduction of energy 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 Assistant Professor of Electrical and Computer Engineering (ECE) at 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 he did post-doctoral work at Stanford and worked at Intel on non-volatile memory. He received the Presidential Early Career (PECASE) Award from the White House (2010) and Young Investigator Awards from the ONR (2010), NSF (2010), AFOSR (2010) and DARPA (2008). He is an IEEE Senior member, a member of APS and MRS, and serves on the program committees of APS, DRC and IEDM.