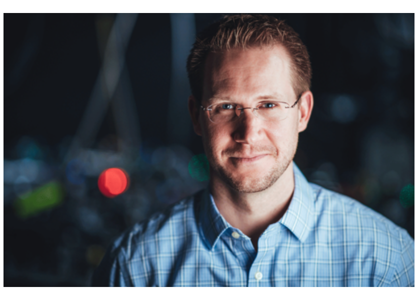
Excitons, Disorder, and Nonequilibrium Transport in Semiconductor Nanomaterials

Abstract

Nonequilibrium dynamics of excitons and charge carriers in nanostructured materials can reveal a wealth of information about the microscopic mechanisms of energy transport in these systems. Using a combination of ultrafast laser spectroscopy, time-resolved optical microscopy, and kinetic Monte Carlo simulation, I will show how these effects manifest in assemblies of colloidal quantum dots (QD) and atomically thin 2D semiconductors, which are promising components of next-generation photovoltaic and lighting technologies. In particular, I will demonstrate the effect of structural and energetic disorder, the role of dimensionality and surface chemistry, and the self-organization of these nanomaterials into ordered superstructures.

Bio

Will Tisdale joined the Department of Chemical Engineering at MIT in January, 2012, where he holds the rank of Associate Professor without Tenure and is currently the ARCO Career Development Professor in Energy Studies. He earned his B.S. in Chemical Engineering from the University of Delaware in 2005, his Ph.D. in Chemical Engineering from the University of Minnesota in 2010, and was a postdoc in the Research Laboratory of Electronics at MIT before joining the faculty in 2012. Will is a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE), the DOE Early Career Award, the NSF CAREER Award, an Alfred P. Sloan Fellowship, the Camille Dreyfus Teacher-Scholar Award, the AIChE Nanoscale Science & Engineering Forum Young Investigator Award, and MIT's Everett Moore Baker Award for Excellence in Undergraduate Teaching.



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Wednesday, January 31, 2018
Cook Hall, Room 2058
3:00 p.m. - 4:00 p.m.