

Student Seminar Series

9:45 a.m. Thursday, April 14, 2016 • 331 Smith Hall

Professor
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***Exciton transport in thin films
of semiconducting carbon nanotubes
using 2D white-light spectroscopy***

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Abstract

Thin film networks of highly purified semiconducting carbon nanotubes are being explored for energy harvesting and optoelectronic devices because of their exceptional transport and optical properties. The nanotubes in these films are in close contact, which permits energy to flow through the films, although the pathways and mechanisms for energy transfer are largely unknown.

In this talk, I will report a new method that we have developed for studying solar cell materials, called two-dimensional white light spectroscopy (2D WL). 2D WL spectroscopy uses a broadband continuum as the pump source that enables us to simultaneously examine a spectral range spanning from 500-1400 nm. The 2D WL spectra resolve energy transfer between all possible combinations of excitonic states in the chirality-selected nanotubes, thereby providing an instantaneous and comprehensive snapshot of the dynamical pathways. We observe exciton hopping, exciton dissociation, and anti-correlated energy levels; all of which have important implications in the development of carbon nanotube electronics and optoelectronics.

Host:
Emily Keller



Martin Zanni is the Meloche-Bascom professor at the University of Wisconsin-Madison. He received his Bachelor of Science degree in chemistry and Bachelor of Arts degree in physics from, the University of Rochester with highest honors. Professor Zanni earned his doctorate under Daniel Neumark at the University of California at Berkeley for work on femtosecond photoelectron spectroscopy. He went on to a postdoctoral position, working on 2D infrared spectroscopy, with Robin Hochstrasser at the University of Pennsylvania.

In 2002, he joined the Department of Chemistry at the University of Wisconsin-Madison as an assistant professor. He was promoted to the Meloche-Bascom assistant professor in 2007, associate professor in 2008, and full professor in 2010.

His research interests focus on using a range of 2D spectroscopies to study energy transfer and biophysics. In his time at UW-Madison, he has received numerous awards including: the National Academy of Sciences Research Initiatives award and the Sackler prize in Physical Sciences in 2011, the Presidential Early Career Award for Scientists and Engineers in 2009, and the National Science Foundation CAREER award in 2003. He is currently a senior editor of the *Journal of Physical Chemistry*.