CSU PHYSICS COLLOQUIUM

“Time-resolved super-resolution microscopy to image photoluminescence lifetimes and energy transport in semiconductor nanoparticles”

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Abstract

Time-resolved super-resolution microscopy is a technique to image photoluminescence lifetimes and other optical properties of nanoscale emitters with nanosecond time resolution and nanometer spatial resolution. This presentation will discuss the application of this technique to image multi-emitter semiconductor nanostructures in which the proximity of the emitters gives rise to electronic energy transport pathways that can be directly imaged using this technique. Combining this super-resolution microscopy with other nanoscale microscopies (e.g. atomic force and electron microscopy) provides detailed structural information about the relationships between the energy transport properties of the emitters and the structural arrangements of the nanoparticles. Applications of these methods to characterize the optoelectronic properties of nanoscale devices, such as light emitting diodes, will be discussed.

Biography

Professor Van Orden received his B.S. in Chemistry from Brigham Young University in 1990 and his Ph.D. in Physical Chemistry from the University of California at Berkeley in 1996. His Ph.D. research was supervised by Richard J. Saykally and focused on the structure and spectroscopy of carbon and silicon-carbon clusters in the gas phase. From 1996-1999 he was a postdoctoral research associate working on biomedical applications of single molecule fluorescence detection and spectroscopy with Richard A. Keller at Los Alamos National Laboratory. In 1999 he joined the Chemistry faculty of Colorado State University where he has been ever since. His research pursuits involve development and applications of novel techniques for single molecule detection, spectroscopy, and microscopy. Since 2007 he has been a visiting scholar at Stanford University, University of Missouri, Los Alamos National Laboratory, Air Force Research Laboratory, and Naval Research Laboratory.