

Reading the Spectral Fingerprint of Individual Nanocrystals

Brahim Lounis

Univ Bordeaux, Institut d'Optique & CNRS LP2N, F-33405 Talence, France.

Abstract:

As colloidal nanocrystals are developed for a wide range of diverse applications, it becomes more important to gain a deeper understanding of their properties in order to direct synthetic efforts. Spectroscopically resolved emission from single nanocrystals at cryogenic temperatures provides unique insight into physical processes that occur within these materials. At low temperatures the emission spectra collapse to narrow lines revealing a rich spectroscopic landscape and unexpected properties, completely hidden at the ensemble level. Since these techniques were first used, the technology of nanocrystal synthesis has matured significantly and new materials with outstanding photostability have been reported. In this talk, I will discuss how cryogenic spectroscopy of single nanocrystals probes the fundamental excitonic structure of the band edge, revealing spectral fingerprints that are highly sensitive to a range of photophysical properties as well as nanocrystal morphology. In particular, spectral and temporal signatures of charge complexes (exciton, biexciton and trion) emission will be presented and their relevance to emerging technologies discussed.