

Chemistry and Physics of Semiconductor Nanocrystals

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Abstract: This talk describes in broad terms several aspects of nanocrystals: the critical importance of organometallic chemical synthesis, self-assembled materials made from nanocrystals, the simple quantum size and electrostatic model of size-dependent electrical properties, recent DFT advances in understanding electronic structure, the luminescence and “blinking” of single nanocrystals, and EFM (Electric Force Microscopy) determination of the charge of individual nanocrystals.

Dr. Louis Brus’ research is in the physical chemistry of materials, interfaces, nanocrystals, and nanotubes, especially in relation to optical and electronic properties. This work can include theoretical modeling, experimental chemical physics, and synthetic chemistry. His research team tries to understand the size evolution of solid-state properties from molecular properties. He is also seeking to create new materials with nanoscale structure by both kinetic and thermodynamic self-assembly methods. He specializes in interfacial electron transfer, Electric Force Microscopy and Laser Optical Microscopy for observation of single nano-objects. In the last several years, he has developed interests in transition metal oxide nanocrystals, carbon nanotubes, and in Ag nanocrystals as microscopic antennas for local electromagnetic field enhancement.