

ABSTRACT:

A Golden Time for Nanotechnology

Since the National Nanotechnology Initiative in the United States was announced in 2001, a huge worldwide effort has been undertaken to create nanoscale materials, understand their properties, and apply them in numerous technologies. Gold nanocrystals of controlled size and shape have tunable optical properties that enable new science. Upon illumination with resonant light, these biocompatible gold nanocrystals can not only scatter light but also generate plasmons (coherent oscillations of conduction band electrons). These plasmons, in turn, can produce local electric fields and heat. All these modalities enable gold nanocrystals to serve as excellent contrast and imaging agents in aqueous matrices. In this talk will be described the synthesis and shape control of these nanocrystals; absolute measurements of their absorption and scattering, and their ability to deliver photoelectrons; details of their surface chemistry; their ability to function as molecular sensors and light-triggered delivery agents; and how these nanocrystals impact biological systems at the protein, cell, and ecosystem levels.