

Distinguished Speaker
Chemistry Invited Faculty Seminar
Tomorrow (Friday) January 11 at 3:30 PM in HEC 125
Please note the room.



Dr. Catherine J. Murphy
Professor and Larry Faulkner Endowed Chair
Chemistry Department
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Host: Dr. Gang Chen

**Gold Nanocrystals:
Physics, Chemistry, Biology, and Ecology**

Abstract

Gold nanocrystals of controlled size and shape have tunable optical properties that enable new science. Upon illumination with resonant light, these gold nanocrystals generate plasmons (coherent oscillations of conduction band electrons). These plasmons, in turn, can produce local electric fields and heat. In this talk I will discuss four short stories about gold nanocrystals and their plasmons. In “Physics” I will discuss how molecules experience the local electric field provided by illuminated plasmonic nanorods. In “Chemistry” I will discuss how the surface chemistry of the nanocrystals can be tuned with both hard and soft shells, and how the particular chemistry at the surface dictates molecular function. In “Biology” I will discuss how these nanocrystals interact with biological fluids and living cells; and in “Ecology” I will discuss how these nanoparticles are distributed in an estuarine ecosystem as a function of surface chemistry.

Biography

Catherine J. Murphy holds the Larry R. Faulkner Endowed Chair in Chemistry at the University of Illinois at Urbana-Champaign. She earned two B.S. degrees from Illinois (chemistry and biochemistry) in 1986, and her Ph.D. from Wisconsin in 1990. After postdoctoral fellowships at Caltech, Murphy began her independent career as an assistant professor of chemistry at the University of South Carolina in 1993. After

promotions to associate and full professorships at South Carolina, she was recruited back to Urbana-Champaign in 2009.

Her laboratory has pioneered the colloidal synthesis of shape-controlled gold and silver nanoparticles in aqueous solution. In the 5-100 nm range, gold and silver exhibit brilliant shape-dependent optical properties that enable applications in chemical sensing, biological, imaging, mechanically improved polymer nanocomposites, and photothermal therapy for the ablation of pathogenic cells. She has coauthored over 240 peer-reviewed papers that have been cited 35,000 times, and has delivered more than 360 invited lectures.

Murphy's honors include the TREE (Transformational Research and Educational Excellence) Award from the Research Corporation for Science Advancement (2015), the Carol Tyler Award of the International Precious Metals Institute (2013), and ACS Division of Inorganic Chemistry's Inorganic Nanoscience Award (2011) and numerous young investigator awards. She is a Fellow of the American Chemical Society, the Materials Research Society, the Royal Society of Chemistry, and the American Association for the Advancement of Science. She was ranked #32 in Thomson Reuters Sciencewatch List of "Top 100 Chemists for the Decade 2000-2010" and #10 on their list of "Top 100 Materials Scientists of the Decade 2000-2010." In 2015, she was elected to the U.S. National Academy of Sciences. From 2006 to 2010, Murphy was a Senior Editor for the Journal of Physical Chemistry. She became the Deputy Editor of the Journal of Physical Chemistry C in 2011.