



CARBON TO METAL COATING INSTITUTE at Queen's University



Dr. Catherine J Murphy

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Friday, April 14th, 2023
11:30AM
Chernoff Hall, Room 117



On the Surface of Things: Ligand Display and Dynamics on Gold Nanocrystal Surfaces

Abstract

In the 5-100 nm size range, colloidal gold and silver nanocrystals exhibit brilliant shape-dependent optical properties that enable applications in chemical sensing, biological imaging, optical displays, enhanced energy conversion devices, mechanically improved polymer nanocomposites and photothermal therapy for thermal ablation of pathogenic cells. It is now well-known that plasmons, coherent oscillations of the conduction band electrons in metals upon resonant illumination, are responsible for these brilliant colors. While it is relatively easy to image the gold core by transmission electron microscopy, it is far more difficult to gain deep knowledge of the organic ligands that surround the nanocrystals in colloidal solution. Described in this talk are experiments to quantify average ligand density and dynamics on gold nanocrystals as a function of nanocrystal size by NMR; individual nanocrystal ligand density mapping by STEM/EELS; and general results in the catalysis space and the biological space that illustrate the importance of the “soft shell” around hard inorganic nanocrystals.

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