Tuesday, September 25, 2018, 12:30 pm
Seaver Science Library, Room 150
SSC Auditorium next to the library

Professor Janet Macdonald

Department of Chemistry
Vanderbilt University

Synthesizing Nanoparticles for Green Energy: New Chemistry from the Core to the Surface

Since our community began focusing on the “bottom-up” synthesis of nanoparticles and nanomaterials, our synthetic control has developed from control of the size of spherical, single component nanoparticles, to materials of increasing compositional complexity and structural design. In the Macdonald research laboratory, we strive towards new nanocrystal chemistries that will facilitate goals in green energy applications such as photocatalytic water splitting and photovoltaics.

Our chemical journey has caused us to make fundamental discoveries about surface chemistry, crystalline order and reactivity. Our efforts have focused lately on a new binding mode of thiols on nanoparticle surfaces, that makes particles less prone to oxidation or ligand loss, and improves electron transfer in photocatalytic reactions. Even more challenging, we have developed ligand chemistries that facilitate hole and electron transfer from quantum dots.

In other projects, we study the formation mechanism of metal sulfides in nanocrystal synthesis, paying particular attention to organic transformations that happen in the reagents. The knowledge is used to gain control of the crystalline phase that results, especially in iron and copper sulfides and copper selenides, preparing metastable phases never seen before in the bulk.

Hosted by Professor Richard Brutchey

The scientific community is invited

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