



Physical Sciences Seminar

An NMR toolbox to study the surface of nanocrystals; Enabling superconducting, memristive and catalytic applications

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Host: Maria Ibanez

Colloidal nanocrystals are hybrid objects in which the properties of core and surface both determine the characteristics of the entire nanocrystal. The surface is often capped by (in)organic ligands which determine colloidal stability and the physical and chemical properties. As a result, nanocrystal surface chemistry, i.e., the understanding of and control over the ligand shell, has become one of the central themes in nanocrystal research.

Here, we study the organic ligands through solution and solid state NMR spectroscopy. I will first explain the various NMR tools which provide information specific to nanocrystal surfaces. I will also elaborate on the origin of the NMR line broadening of nanocrystal-bound ligands. To illustrate the usefulness of the NMR toolbox, we will work through several case studies on a variety of nanocrystal types. For example, we will discuss the dynamic nature of ligands on CsPbBr₃ perovskite nanocrystals, and the binding motif for dissociated carboxylic acids on metal oxide nanocrystals. The latter motif can be leveraged for catalysis. Furthermore, I will show how surface chemistry can be used to enable superconducting nanocomposites, and nanoribbon memristors. As such, we establish surface chemistry as a key enabler in a variety of applications and NMR as the method of choice for characterizing the surface. This is a versatile field, with fundamental chemistry and spectroscopy leading to exciting innovations in physics and engineering and finally solving real-life problems.

Friday, April 12, 2019 11:00am - 12:00pm

IST Austria Campus Big Seminar room Ground floor / Office Bldg West (I21.EG.101)



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