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# University of Miami, Physics Department Colloquium

**Date:** Wednesday, Oct 8, 2025
**Time:** 4:00 pm – 5:00 pm
**Location:** Physics Library – Rm 335, Knight Physics Building

## Organic Ligands and Colloidal Nanocrystal Surface Thermodynamics

**Dr. Jason Calvin**
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**Abstract**

As materials approach the nanoscale, they begin to exhibit size dependent properties. In particular, a larger fraction of atoms that make up the whole of the material are located on the material's surface. Colloidal nanocrystals are commonly synthesized where their surfaces are terminated by organic molecules, often referred to as ligands. In this talk, I will discuss the thermodynamics of the surfaces of colloidal nanocrystals and reactions that occur on their surfaces. In particular, collective effects originating from long aliphatic carbon chains that make up an organic ligand shell will be explored as well as their effect on reaction thermodynamics and the structure of the organic ligand shell. Additionally, tight binding groups at the organic/inorganic interface affect the surface energy of these nanocrystals. Using calorimetry, negative surface energies have been measured in many semiconductor nanocrystals, and implications of these measurements will be discussed.

**Biography**

Dr. Jason Calvin attended Brigham Young University where he worked with Dr. Brian Woodfield to measure low temperature heat capacities of materials. He graduated with his B.S. in Chemistry with minors in Physics and Mathematics in 2018. He then attended the University of California, Berkeley where he worked with Dr. Paul Alivisatos on quantum dot thermodynamics and received his Ph.D. in Chemistry in 2022. After graduation, he worked as a postdoctoral fellow at Harvard University with Dr. Jarad Mason engineering microporous water. He joined the faculty in the Department of Chemistry at the University of Miami in 2025.