

CHM8302 K00: Synthesis and Properties of Lanthanide-based Materials

Professor: Eva Hemmer

ehemmer@uottawa.ca

Lectures: January 07 - February 15 2019

Mondays 1:00 – 2:20 pm

Wednesdays 1:00 – 2:20 pm

Location: 100 Louis Pasteur (CRX) C324

This graduate course will discuss synthesis, characterization, and potential applications of lanthanide-based nanomaterials with a specific focus on their optical properties. Lectures will cover, for instance:

- Introduction to lanthanide-based materials and their optical properties
- Upconversion
- Downconversion
- Downshifting
- The role of the host material
- Color tuning
- Lanthanide-lanthanide energy-transfer
- Lanthanide-non-lanthanide energy transfer
- The problem of low quantum yield
- Power-dependent measurements and what we can learn from them
- Time-resolved measurements and what we can learn from them
- Temperature-dependent photoluminescence – principles and applications
- Advantages and challenges for application in biomedicine and energy conversion technologies
- Molecular upconversion
- ...

The introduction to the lanthanide-specific optical properties and synthesis approaches for lanthanide-based nanomaterials will provide basic knowledge relevant to this emerging field. Besides, examples from the current literature will be analyzed and discussed to foster the student's critical thinking.