

# **CORE-CM SEMINAR**

## **Michigan State University**

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### **Revisiting Alchemy: The Search for a Modern-Day Alkahest to Solution Process “Insoluble” Bulk Materials**

In the early 16th century, alchemists began searching for a universal solvent, termed an “alkahest,” that would have the power to dissolve every other substance. Today, we are searching for new alkahests that might have the ability to dissolve normally insoluble bulk materials in order to solution process them into functional thin films, among other applications. Possessing the ability to solution process such materials has important cost ramifications in the deposition of large area thin films for solar cells, flat panel displays, and other applications that require functional interfaces. Prior work in this area has taken advantage of the remarkable solvent power of hydrazine to solution process a very wide range of metal chalcogenides; however, the toxicity and explosive nature of hydrazine make it problematic for scaling. As an alternative, we developed a binary solvent mixture of thiols and 1,2-ethylenediamine that can rapidly dissolve a wide range of bulk materials (elemental sources, metal oxides, metal chalcogenides) at low temperature and ambient pressure, and at relatively high concentrations. This talk will discuss our recent foray into this alkahest chemistry, including insights into the dissolution process, the nature of the molecular solutes, and applications of these inks toward the deposition of functional thin films and as ligands for colloidal nanocrystals.

**Thursday, March 30, 2017**  
**12:00 NOON**  
**Room 1400 – Biomedical & Physical Sciences**  
**Professor Tom Hamann- Host**