

# JEFFREY I. ZINK INORGANIC CHEMISTRY SEMINAR



## Prof. Joshua Goldberger

Department of Chemistry and Biochemistry, Ohio State University

### “New Directions in Layered, Anisotropic Materials”

**Abstract:** Layered and 2D materials are currently one of the most well-studied classes of solid-state compounds, due to the plethora of unique physical phenomena found in these materials coupled with advances in the characterization of structure and properties down to the single layer scale. Here, we will describe our recent work in the synthesis, properties, and applications of layered materials that exhibit n-type conduction and p-type conduction simultaneously across different crystallographic directions. Recently, we discovered that  $\text{NaSn}_2\text{As}_2$ , a 2D van der Waals material, simultaneously exhibits p-type conduction along the in-plane direction and n-type behavior along the cross-plane direction, a phenomenon we define as “goniopolarity”. We will establish the origin of this exotic behavior as well as the chemical design principles for creating new goniopolar materials, which has allowed us to significantly expand the number of materials that exhibit this phenomenon. Finally, considering that almost all modern electronic devices require the integration of p-type and n-type regions for functionality, we will show that the unique charge separation in goniopolar materials can overcome limitations of energy-harvesting technologies ranging from thermoelectrics to photocatalysis.

**Meet the Speaker**  
11:00 a.m. | YH 3096

**Wednesday, September 28<sup>th</sup>, 2022**

**4:00 p.m. | YH4222 - Collaboratory  
Yoo Seminar & Conference Room**

UCLA College | Physical Sciences  
**Chemistry & Biochemistry**

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