

Fall 2025 Colloquium

Materials Department

Professor Connor Bischak

Department of Chemistry

University of Utah

Friday, October 10, 2025

11:00 am | ESB 1001



Leveraging Structural Dynamics in Emerging Semiconductors

Static semiconductors, like silicon, powered the first century of semiconductor technology, but emerging frontiers now demand dynamic, adaptable semiconductors. For example, bioelectronics, neuromorphic computing, and reconfigurable photonics require semiconductors that adapt to their environment or change their optical properties on demand. In this talk, I will show how our group probes and then controls structural dynamics in two families of emerging semiconductor materials, conjugated polymer mixed conductors and hybrid metal halides. First, I will show how tuning polymer morphology and ion chemistry dictates how ionic and electronic charge carriers move through conjugated polymer mixed conductors using nanoscale imaging, *in situ* spectroscopies, and high-throughput robotic platforms driven by machine learning. In the second half, I will discuss how we control solid-solid phase transitions in two-dimensional metal halide perovskites and use them to dynamically modulate the chiroptical properties of these materials. Together, these studies illustrate how careful control of structural dynamics unlocks new design principles and device opportunities.

Bio

Connor Bischak is an Assistant Professor in the Department of Chemistry at the University of Utah. He completed his doctoral studies at the University of California, Berkeley and his postdoctoral studies at the University of Washington before beginning his independent career at the University of Utah in 2021. His group studies “soft” semiconductors, especially organic mixed ionic-electronic conductors and hybrid metal halides, where his group engineers structural dynamics, such as ionic motion and lattice reorganization, for emerging technologies.

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