



MateriALZ Seminar Series

Ferroc Complex Oxides for Next-Generation Applications and Devices

Friday, March 3, 2023, 10:45 am MST

Abstract

Complex-oxide materials possess a range of interesting properties and phenomena that make them candidates for next-generation devices and applications. But before these materials can be integrated into state-of-the-art devices, it is important to understand how to control and engineer their response in a deterministic manner. In this talk, we will discuss some of the state-of-the-art science, engineering, and utilization of complex ferroic materials and their potential for emergent order and phenomena that can enable new device function. We will explore the role of the epitaxial thin-film growth process and the use of epitaxial constraints to engineer a range of systems with special attention to ferroelectric and relaxor materials. In recent years, the use of epitaxial strain has enabled the production of model versions of these complicated materials and the subsequent deterministic study of field-dependent response. Here, we will investigate the potential of ferroelectric materials for non-volatile, ultra-low voltage memory and logic applications, the realization of multi-state/neuromorphic function, and even high energy density capacitive energy storage applications. We will try to introduce the listener to these complex materials and their potential for new applications – in effect working to motivate engineers to explore these materials. The discussion will range from the development of fundamental understanding of the physics that lies at the heart of the observed effects, to an illustration of routes to manipulate and control these effects, to the demonstration of rudimentary solid-state devices based on these materials.

Prof. Lane Martin

Univ. of California, Berkeley & LBL

Lane is a Chancellor's Professor and Chair at UC Berkeley since 2021. He received his B.S. in MSE from Carnegie Mellon University in 2003 and his M.S. and Ph.D. from UC Berkeley in 2006 and 2008, respectively. Following his doctorate, he was a Postdoctoral Fellow in the Materials Sciences Division at Lawrence Berkeley National Laboratory. Lane has published >260 papers, his work has been cited >26,000 times (resulting in an h-index = 73; i10-index = 212), and he has given >165 invited/plenary/keynote talks during his career. Lane's work has garnered a number of awards and recognitions including the Fellow of the ACS, APS, Defense Science Study Group, multiple-time Highly Cited Researcher, IEEE-UFFC Society Ferroelectrics Young Investigator Award, Robert L. Coble Award for Young Scholars from the American Ceramic Society, Presidential Early Career Award for Scientists and Engineers, NSF CAREER Award, Army Research Office Young Investigator Program Award, and others.



In-person: GWC 535; Zoom link: <https://asu.zoom.us/j/4816405849>; Passcode: 10810



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