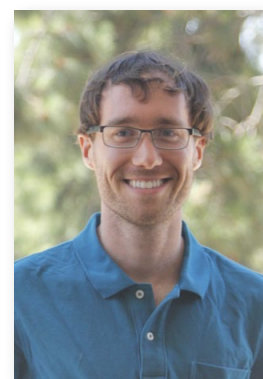


The Future of Batteries is Solid State

April 18, 2023 | 12:00–12:50 pm PST | Quad Auditorium, Bldg #247

Dr. Alexander Dupuy

Project Scientist, Materials Science and Engineering Department
University of California, Irvine



Dr. Alexander Dupuy

Abstract

Dr. Alexander Dupuy is a project scientist in the Department of Materials Science and Engineering at the University of California, Irvine, where he studies the processing, properties, and phase transformation behavior of entropy stabilized oxides. He received his B.S in Mechanical Engineering from the University of California Riverside in 2009. His undergraduate research involved investigating gradient induced inhomogeneity found in the Spark Plasma Sintering (SPS) process. He continued on to receive his M.S in Mechanical Engineering from UCR where he studied pressure induced densification mechanisms in nanomaterials processed using SPS. In 2016 he received his Ph.D. in Mechanical Engineering from UCR. His doctoral work focused on the processing and measurement of optical and ferroelectric ceramics. His research interests lie at the intersection between processing, microstructure, and phase transformations, and their influence on material behaviors.

Biography

While technologically critical, modern Li-ion batteries possess several issues related to safety, performance, sourcing, and manufacturing. Many alternative liquid electrolyte systems, such as Na-ion batteries, have been proposed to solve the issues with Li-ion batteries. While promising, such alternative liquid electrolyte systems are just a technological stop gap, as they will not meet the safety, chemical stability, robustness, and performance demands of future warfighter platforms. Solid-state batteries, which are battery systems that contain a solid electrolyte and solid electrodes, have the potential to meet the Navy's operational energy demands, while also providing additional design benefits over traditional liquid electrolyte batteries. In this presentation, I will introduce solid-state batteries and discuss the technological challenges preventing them from mass scale adoption. Then I will present my own research, which seeks to ameliorate those technological challenges through advanced materials manufacturing and design. While many challenges still exist, it is my hope that this talk presents a promising path forward for solid-state batteries.

