IGEM Grant Report

X Progress (due January 1) ☐ Annual (due July 31) ☐ Final (due August 31)

IGEM Grant #: IGEM26-001 Principal Investigator: Hui (Claire) Xiong

Name/Full Title of Project: High Energy/Power Layered Oxide Cathode Materials for Sodium Ion Batteries

Submission Date_12/23/2025 Primary Institution: Boise State University

Section 1: Our patented layered transition metal oxide cathodes have demonstrated improved capacity and cycling stability in sodium-ion batteries for large-scale energy storage applications with > 70% cost savings. We aim to move up the current TRL level (TRL 3) to TRL 5-6 through this project where we continue R&D in optimizing the materials composition, structure, and electrochemical properties and utilize industry processes to achieve highly reproducible and mass production for large-scale pouch cell manufacture. Our specific goals are to 1) complete R&D on optimized electrode materials for superior performance; 2) conduct experimentation for optimization of our coprecipitated precursor for improved microstructure and morphology; and 3) assemble pouch cell full cells for electrochemical testing.

Section 2: Accomplishments achieved include R&D on modulation of precursor size, uniformity, and yield for coprecipitation synthesis procedure needed to produce our materials. Experiments in varying composition have been completed. This includes the synthesis, characterization, and electrochemical testing of 10 different compositions. Our plans include expanding our coprecipitation efficiency and reliability, whilst completing electrochemical testing as full cells for our altered Na content samples.

Section 3: Purchase of capital equipment including a pouch cell welder and sealer from MTI for pouch cell assembly. Additional purchase of lab equipment includes an analytical balance, mortar and pestles, bags, spatulas, inert gas, and calibration weights. All of these items are essential for sample preparation and/or storage needs. Plans for additional lab consumables include gloves, coin cell parts, and chemicals required for material synthesis.

Section 4: A startup business has been created to continue pursuing additional funding from the private and public sector as of 07/2025.

Section 5: Faculty: Dr. Claire (Hui) Xiong. Graduate Student: Cyrus Koroni. Efforts: Coprecipitation optimization, Na content synthesis and electrochemical cycling. Undergraduate Student: David Smith. Efforts: Na content synthesis and electrochemical cycling.

Section 6: Continued efforts will be completed for research towards optimized materials whilst focusing on pouch cell production. Efforts towards collaboration with larger companies with more expertise are planned for this upcoming Spring 2025. Continued funding opportunities such as NSF TTP-T are currently being prepared for submission.

Section 7: Expenditure Report – Attached.

BOISE STATE UNIVERSITY

OFFICE OF SPONSORED PROGRAMS

Project Snapshot through 12/22/2025

Grant No.: 3999030 **Start Date:** 7/1/2025
BSU: 2000003533 **End Date:** 6/30/2026

Project Budget	**Budget**	**Expended**	**Encumbered**	**Remaining**
Salary	$47,880.00	$21,004.36		$26,875.64
Fringe	$5,720.00	$1,674.32		$4,045.68
Other Expense	$19,210.00	$6,860.00	$90.00	$12,260.00
Capital	$35,000.00		$35,130.90	($130.90)
Student Costs	$11,890.00	$5,628.00		$6,262.00
Total	***$119,700.00***	***$35,166.68***	***$35,220.90***	***$49,312.42***

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