

Battery Compression  
Testing System

Enhances battery performance  
using mechanical compression for  
reliable, scalable testing and  
manufacturing

Case ID:

SJSU ID 2024-005

IP Position:

Patent Pending

Development Status:

TRL 6-7: Representative model or  
prototype system, which is tested in  
a relevant environment.

Opportunity

Partners sought for development  
and prototype testing.

Category(s):

Solid-state battery, Battery testing &  
diagnostics, Battery manufacturing  
equipment

Keywords:

Solid polymer electrolytes, Battery  
compression testing, Ionic  
conductivity, Mechanical  
preconditioning, Solid-state batteries

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Technology Overview

- This invention introduces a novel battery compression test apparatus and mechanical conditioning method designed to improve the reliability and predictability of solid polymer electrolytes (SPEs). SPEs, particularly those with non-polymer additives, can degrade due to viscoelastic behavior, mechanical fatigue, and changes in crystallinity. The invention addresses these issues by employing mechanical preconditioning and accelerated life testing.
- A key experimental application tested compressive strain effects on PEO-LiTFSI electrolytes. Results showed a significant reduction in ionic conductivity (up to 34%) due to densification under strain, offering valuable insight into polymer behavior under mechanical stress. The system demonstrated exceptional precision using a Micro-Epsilon laser sensor and TE Connectivity force sensor, yielding highly consistent compression results.

Key Features & Benefits

- Improves SPE consistency and long-term performance predictability
- Enables rapid performance assessments for accelerated R&D
- Compatible with electrochemical, thermal, and optical testing modalities
- Scalable to commercial manufacturing with roller-based configurations
- Enhances the safety and reliability of solid-state batteries

Potential Applications

- Battery R&D and prototyping
- Quality assurance in battery manufacturing
- Life cycle simulation of solid-state batteries
- Automotive and grid-scale energy storage system development
- Materials research for SPE behavior under mechanical stress

