IUCRC

CEPS IUCRC

Center for Solid-State Electric Power Storage

NSF IUCRC CEPS

NSF Industry-University Cooperative Research Program

CEPS Director: Alla White-Smirnova

South Dakota Mines — An engineering, science and technology university

Cornell University

Northeastern University

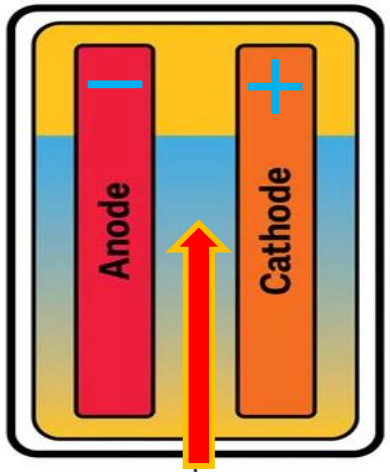
Syracuse University

Mercedes-Benz · Daktronics · Honda · Nissan Motor Corporation · Bry-Air · Black Hills Energy · Nth Cycle · VRC Metal Systems · C4V · Rensberger Technologies · Arbin Instruments · Feynman Energy USA, Inc.

NAATBatt International

NAATBatt Annual Conference
Orlando, Florida
February 17-20, 2025

CEPS focus on next-generation energy storage



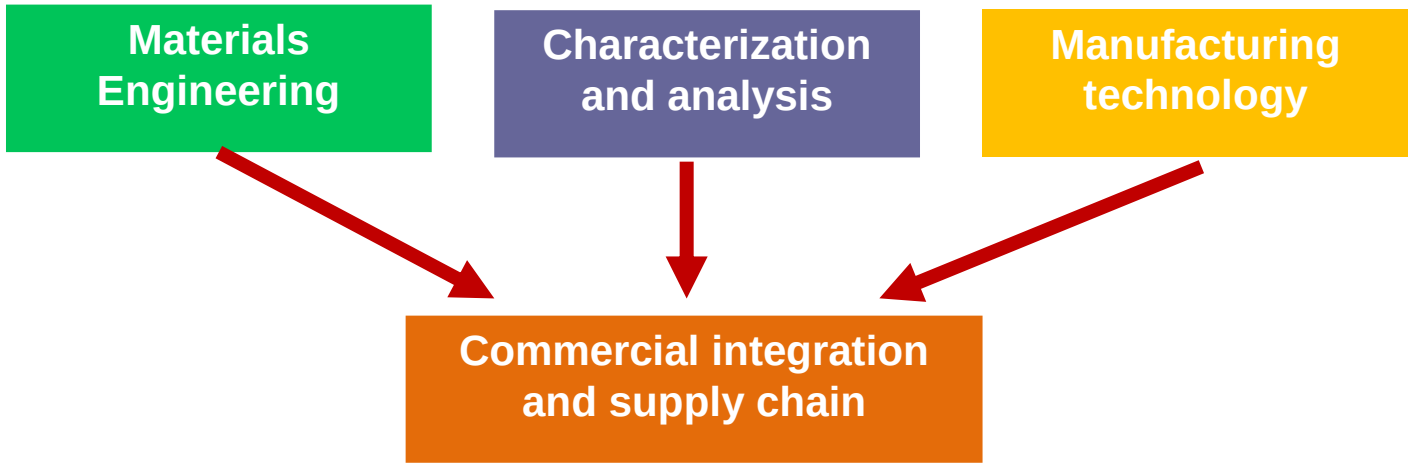
Liquid Electrolyte

Solid Electrolyte

Safe and eco-friendly

- **Lithium-ion/metal battery technology (liquid, ceramic and polymer hybrids)**
  - Safe, high energy/power density, long life, fast charge
  - Require more efforts (CAGR 37% in 2025–2037)
  - No supply chain in the U.S.
- **Sodium-ion/metal battery technology (liquid, ceramic, and polymer hybrids)**
  - Cost-effective (20% vs. LIBs)
  - Available supply chain
  - Safe, operate at sub-zero temperatures
  - Not yet on the U.S. market

NSF IUCRC CEPS Technology Capabilities and Highlights



- Processes at interfaces
- In-situ and operando XRD, XPS, REELS, UV, Raman
- Atomic-level resolution TEM (Talos 2025)
- Dry deposition technology
- Free access to BNL and SLAC facilities
- Battery safety evaluation
- BMS and integration
- Battery recycling

Download our Patents, Articles, and the Book:

https://www.greenceps.com/publications-download

Commercial integration

Battery designs:
- Lithium-ion
- Lithium-metal
- Anode-free LIBs
- Lithium-sulfur
- Sodium-ion
- Sodium-metal

Battery safety evaluation

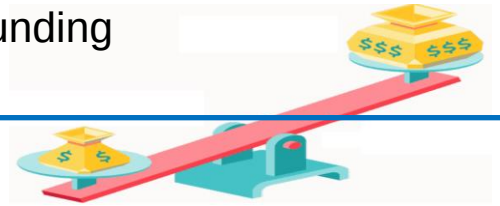
Modelling/System integration (AI/ML)

Battery recycling and lithium extraction

CEPS Value Proposition for Industry and National labs

- R&D projects are proposed by partners
- IUCRC CEPS – federal & international status
- Universities and OEMs perform research jointly
- Long-term partnerships with industry

- High-leveraging of funds from NSF a CEPS members
- Minimal technology risks at low cost ($25-$50K/year)
- Availability of supplemental funding



- NSF-protected IP
- Royalty-free non-exclusive or exclusive licensing
- Tax deduction through foundations/charity

- Energy workforce development
- CEPS-paid PhD Interns ($55K/6month)
- Acquired skills to work with industry partner

- Membership approval is simple: https://www.greenceps.com/membership-agreement
- (not required for national labs)
- IP for CEPS members: https://www.greenceps.com/introduction-to-ceps
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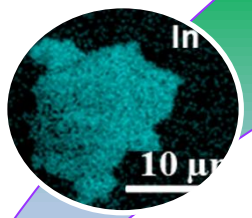
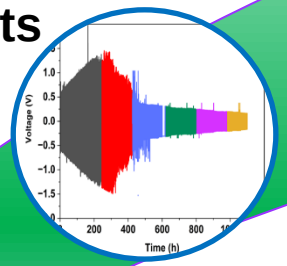
Center targets: from materials to commercialization

Phase I (5 years)

Year 1
- Materials synthesis
  - Electrolytes
  - Cathodes
  - Anodes



Year 2
- Manufacturing of battery components



Year 3
- Infrastructure for processes at interfaces

Year 4
- Infrastructure for cell prototyping

Year 5
- Pre-pilot scale manufacturing
- Commercialization through CEPS industry members
- Acquisition of the congressional funding

We are now accepting proposals for Yr. V (Phase 1)

Acknowledgments and Upcoming IAB CEPS meetings

- NSF IUCRC program ($4.5M)
- NSF Upstate NY “Energy Engine” project ($50M)
- SDBoR Governor’s Research Center ($3.9M)
- Industry partners ($1.3M)

Registration for 2025 IAB CEPS meetings:

- IAB on May 8-9th, 2025 Online (reports Yr. IV / proposals Yr. 5)
- https://www.greenceps.com/iab-registration-may-2025

- IAB on September 29-30th, 2025 at South Dakota Mines
- Projects approval and IAB members’ voting

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www.GreenCEPS.com
Website

We are open to collaboration. Please join CEPS!