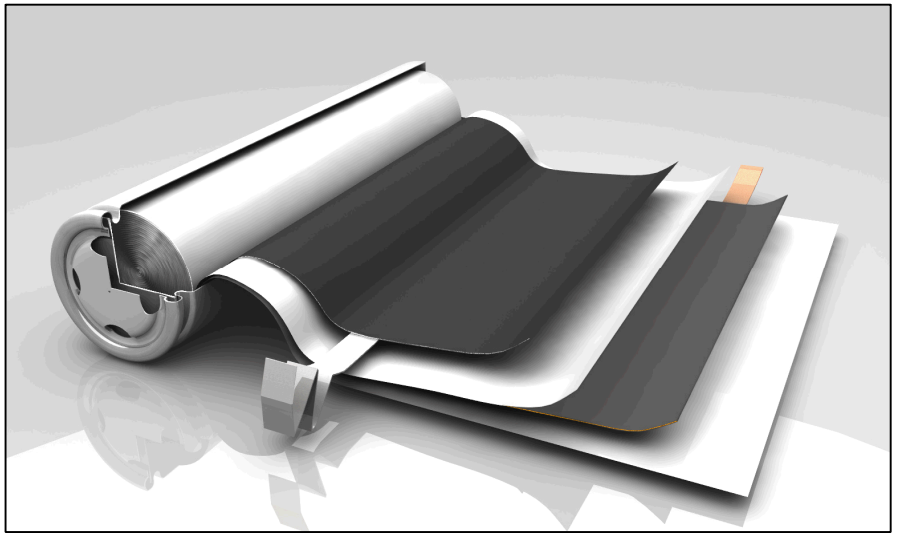
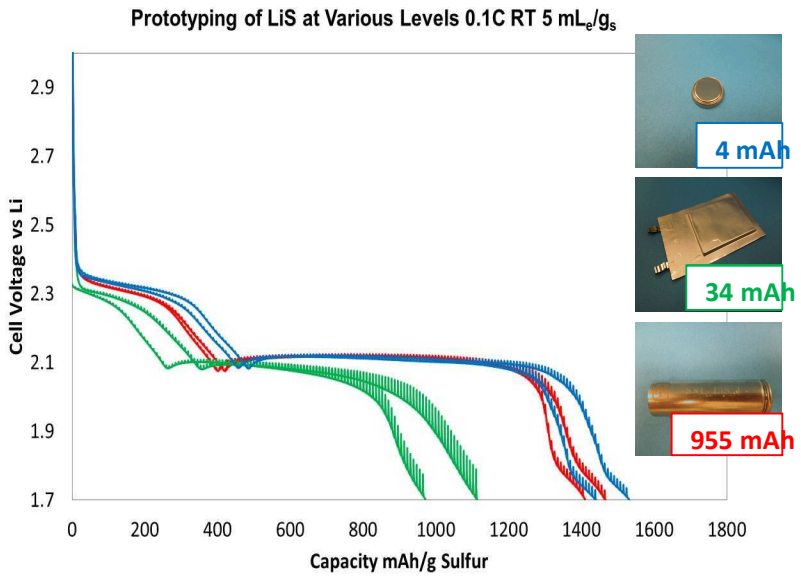
Lithium/Lithium-ion Prototyping

SAND2017-8557PE

Needs for prototyping capabilities:

- Customizable solutions
- Control over materials/processes
- Small lots
- Flexibility and agility across programs and customers



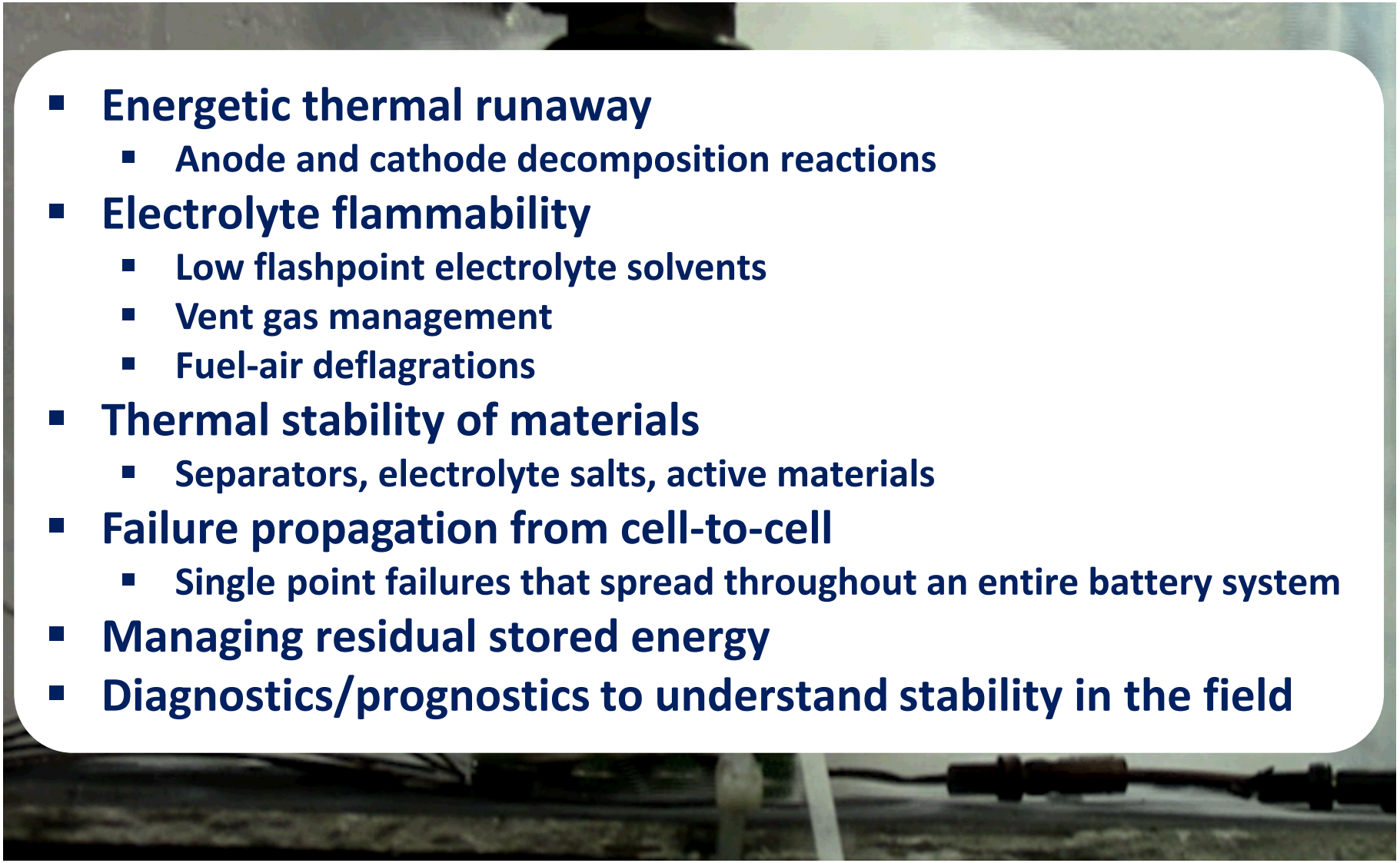


Prototyping for advanced materials development

- Cradle-to-grave development of advanced materials
- LiS 18650 development: Realization of nearly the theoretical capacity in spiral wound 18650 cell formats (60% active material)

Lithium-Ion Battery Challenges

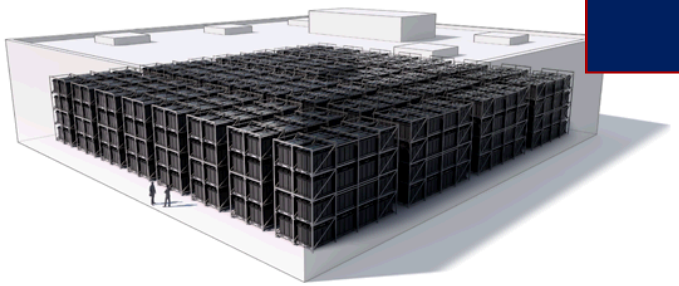
Sandia National Laboratories



- **Energetic thermal runaway**
  - **Anode and cathode decomposition reactions**
- **Electrolyte flammability**
  - **Low flashpoint electrolyte solvents**
  - **Vent gas management**
  - **Fuel-air deflagrations**
- **Thermal stability of materials**
  - **Separators, electrolyte salts, active materials**
- **Failure propagation from cell-to-cell**
  - **Single point failures that spread throughout an entire battery system**
- **Managing residual stored energy**
- **Diagnostics/prognostics to understand stability in the field**

Advanced Battery Diagnostics

Transportation



Grid Storage

Advanced Battery Diagnostics

Development of advanced diagnostics for ***battery health and stability***

Predict *life, performance, and safety issues*

Inform *vehicle occupants, workers, and responders*