

Sodium Solid Electrolyte Battery Development



Incumbent Li-ion batteries will only get us so far

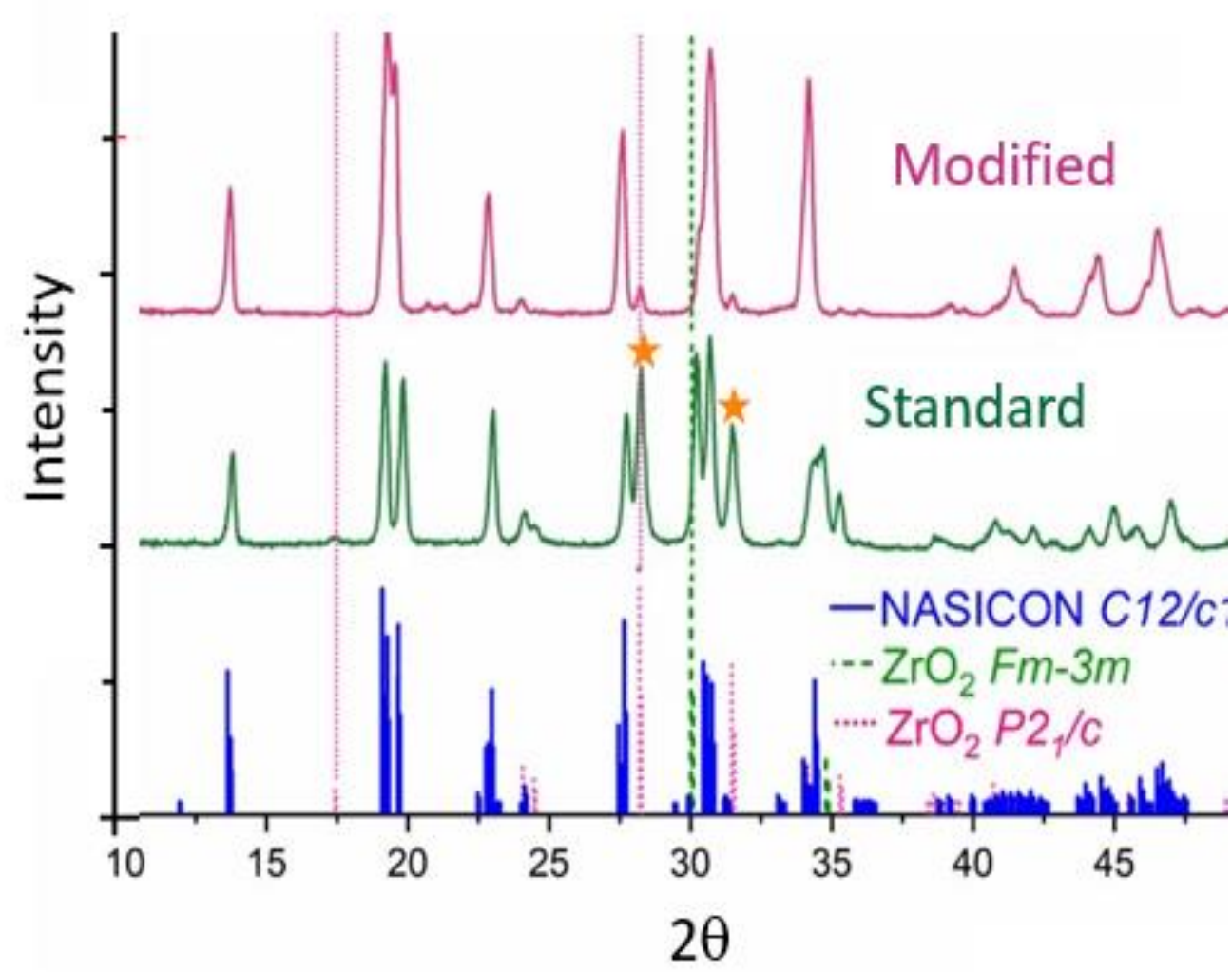
Need for alternative solutions that are longer duration, safer, and lower cost

NaSICON Powder and Membrane Development

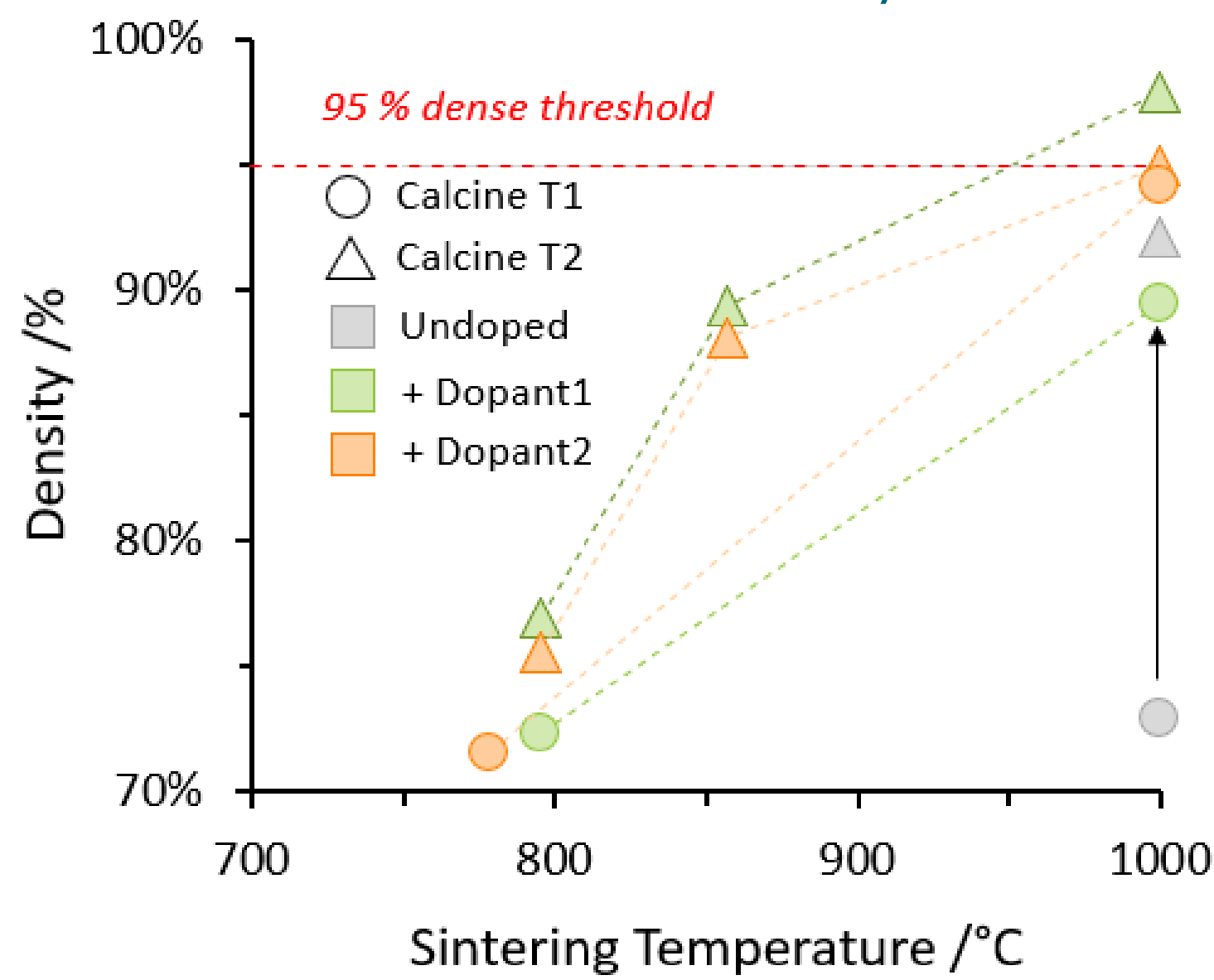
Highly-engineered NaSICON powder

Pilot-scale membrane production (200 substrates/wk.)

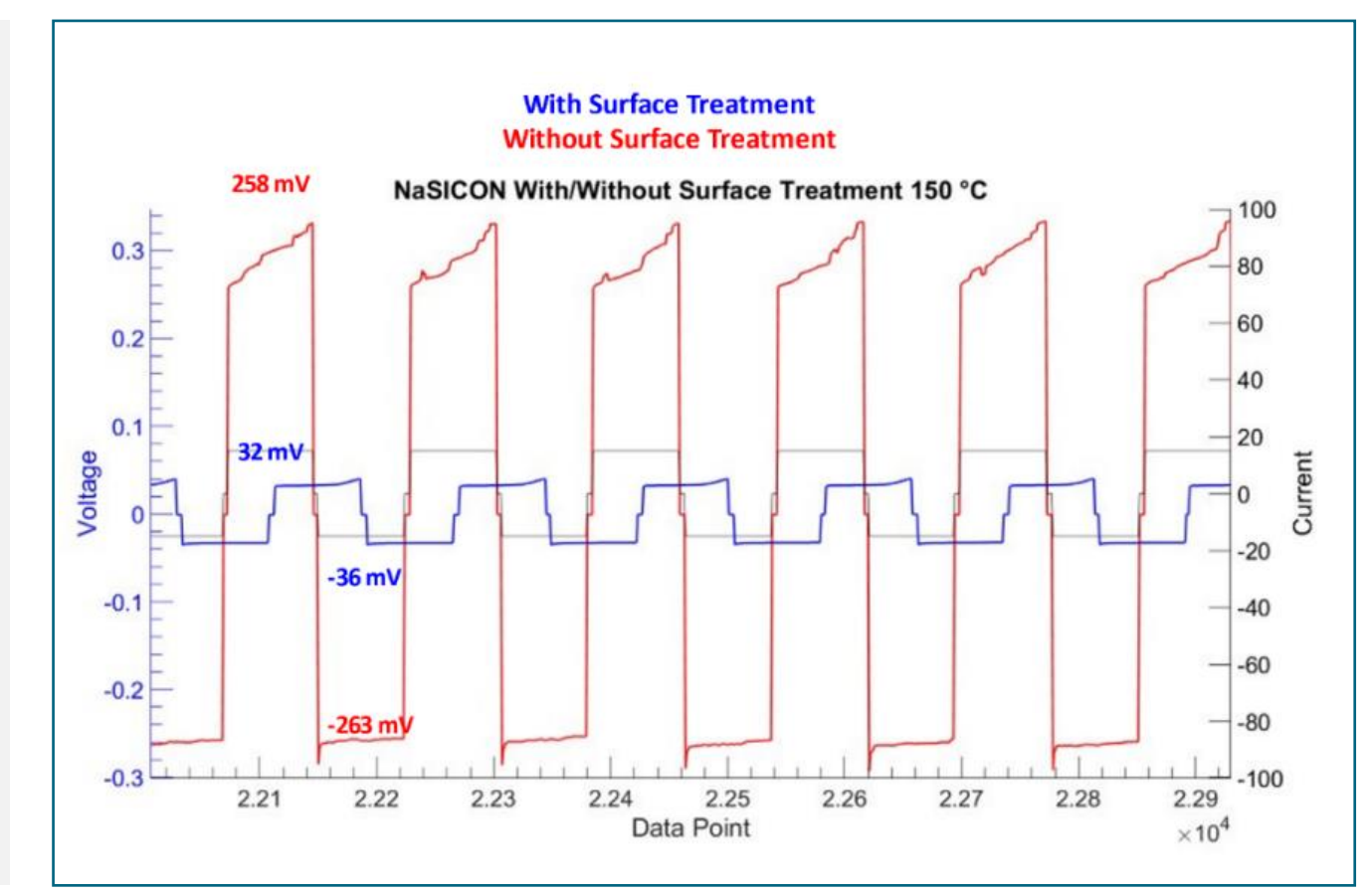
High Purity



Sinterability



Na-metal wetting



20+ years SOFC ceramic manufacturing expertise

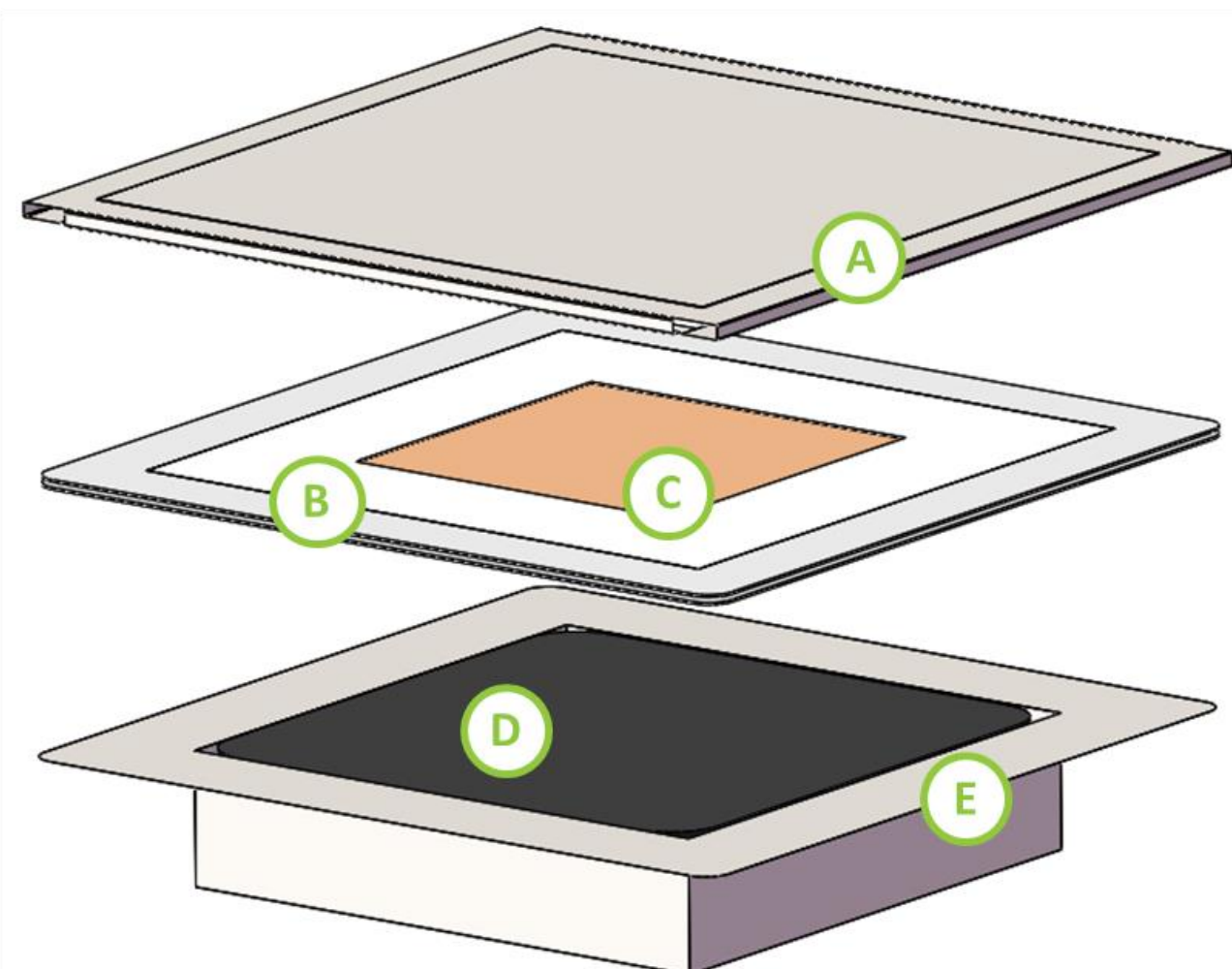
Vertical integration

Production-intent membrane (> 100 cm²)

Defensible IP position

Energy Storage Product Development

Adena is commercializing a long-duration sodium battery energy storage system, that incorporates a low-cost iron and salt chemistry within a planar cell architecture



- (A) Anode**
 - Formed in-situ
- (B) Sealing**
 - Simple, polymer gasket
- (C) Polymer-supported NaSICON electrolyte**
 - Thin, highly conductive NaSICON
 - Mechanically robust
- (D) Iron-based cathode chemistry**
 - Energy capacity controlled by depth

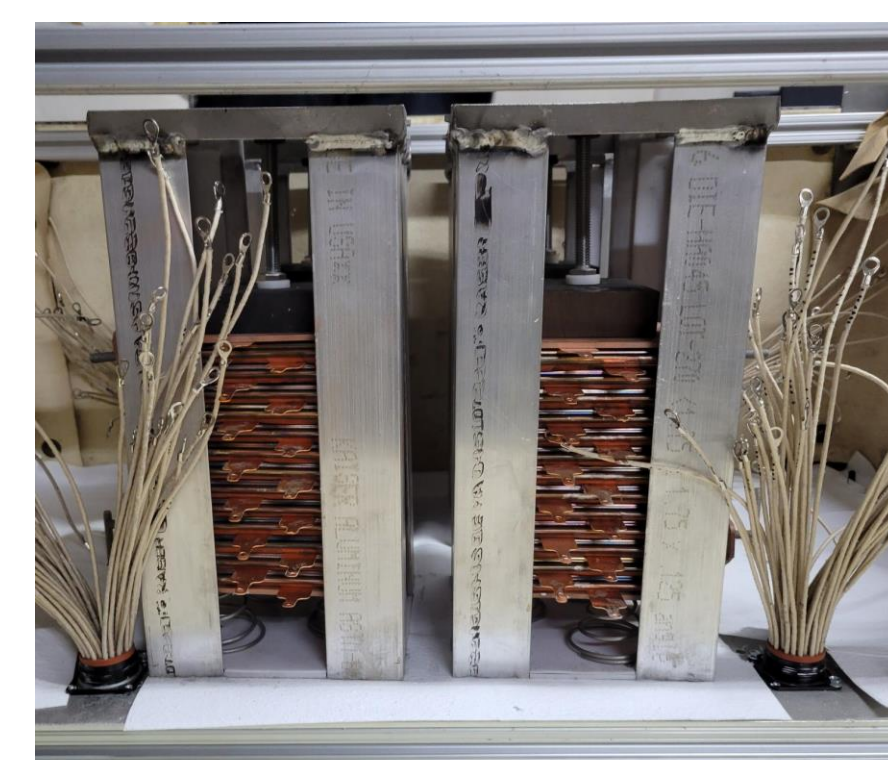
NaSICON membrane
10 cm x 10 cm



Crimped cell
Capacity 8 Ah



Cell cartridges
25 cells/cartridge



Building block module
~ 3.75 kWh



PNNL Collaboration

Faster technical progress

Licensed cathode chemistry IP

Industrialization Partner

Faster and lower CAPEX manufacturing scale-up

Provide initial commercial/industrial customers with a differentiating energy storage solution that serves as a proof-point for utilities



Low-cost



Safe



Sustainable



Reliable



Modular

Acknowledgments

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