

Fast Charge, High-Energy-Density, Solid-State Battery

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EVs4ALL Program
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Project Vision:

Our unique architecture and mixed ionic-electronic conducting (MIEC) ceramic enable high-energy-density solid-state batteries with unprecedented cycling rates at room temperature and below with no applied pressure

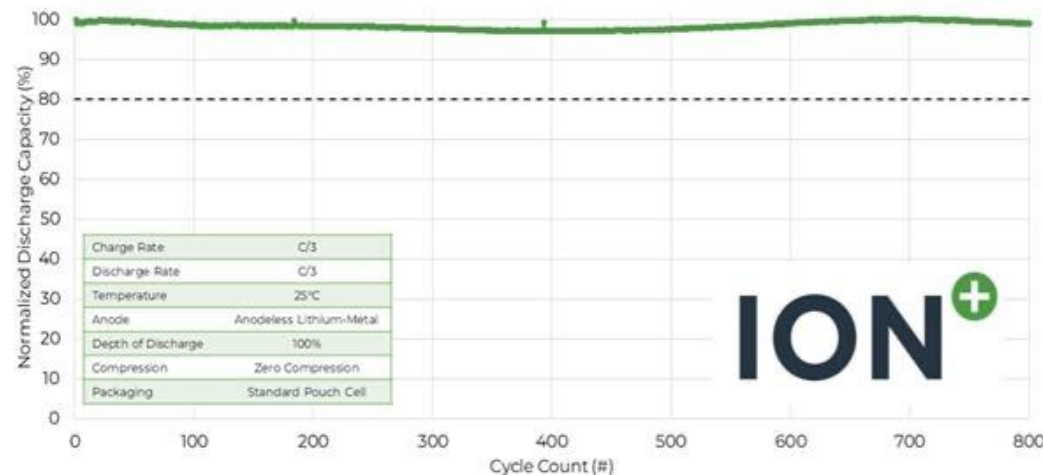
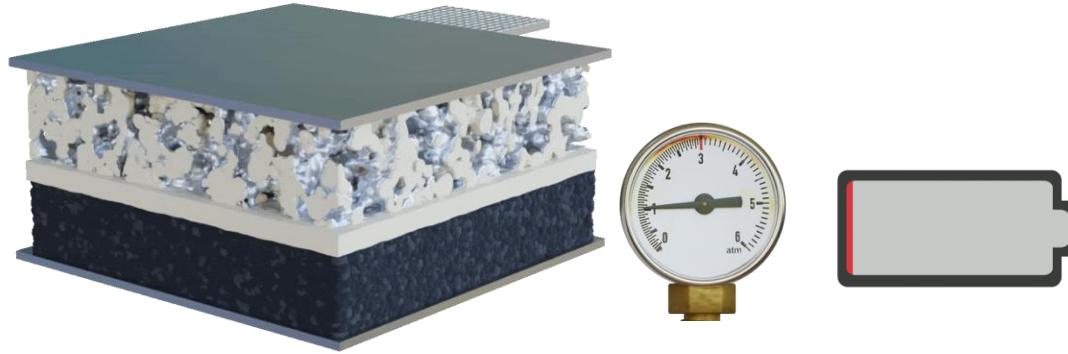


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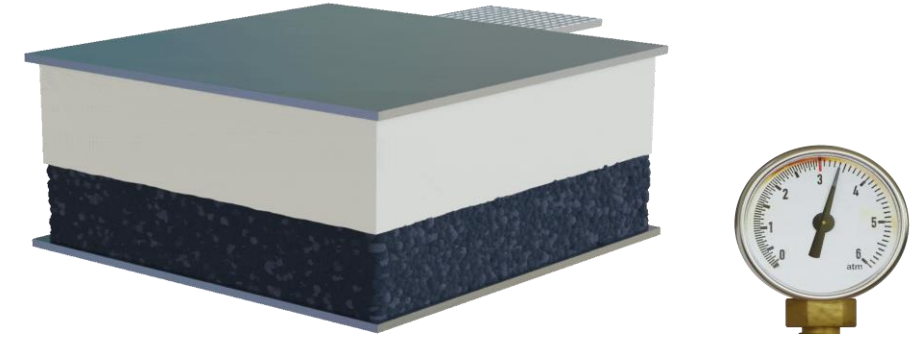


Technology Concept

ION⁺ - Pore Filling 3D Anode Architecture



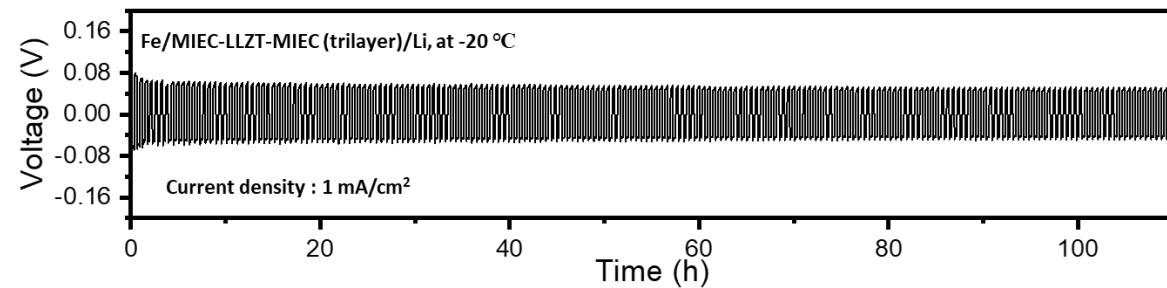
All Other Solid State - Planar Anode Architecture



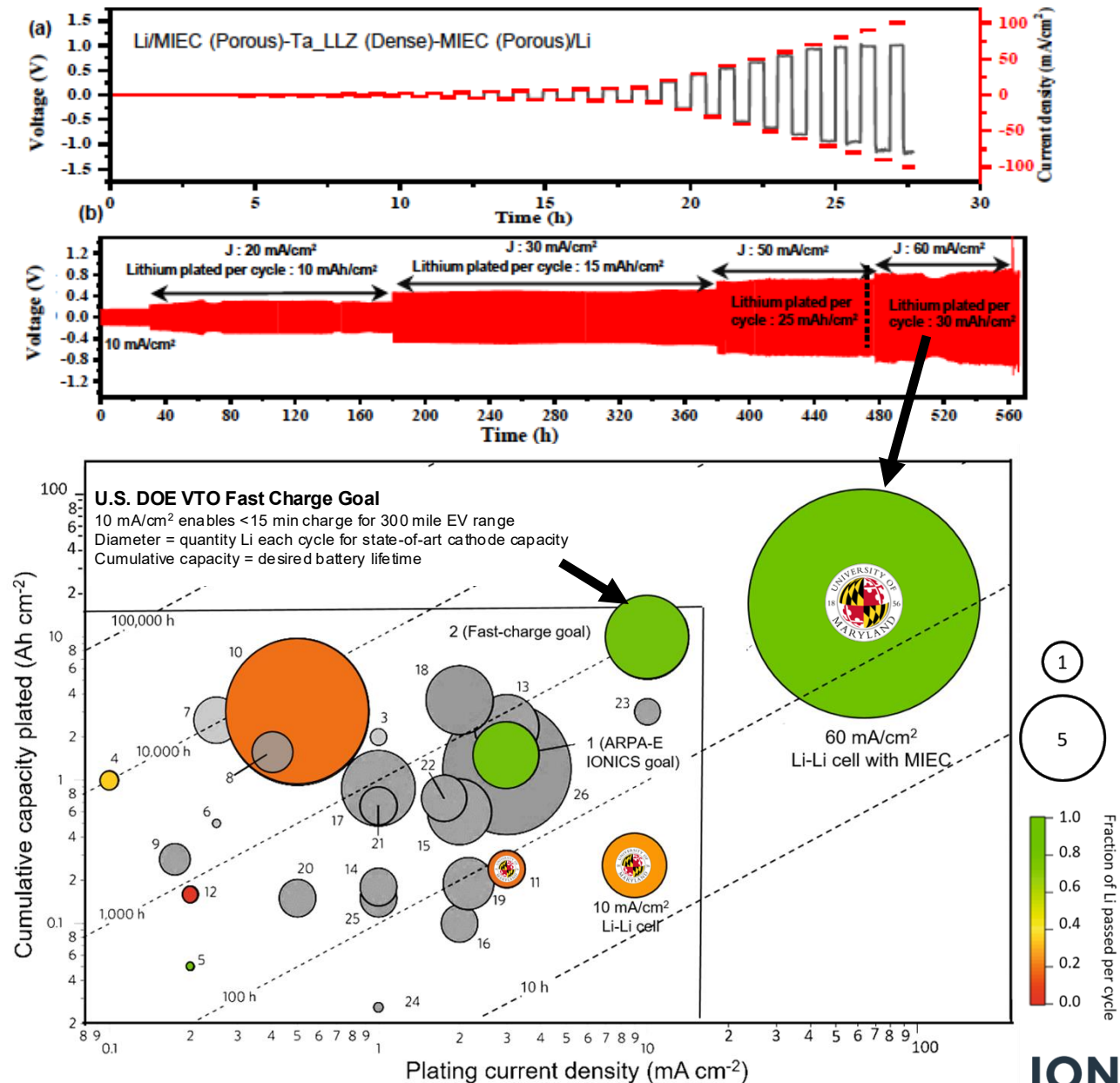
- Patented 3D garnet architecture enables Li-metal anode pore filling at room temperature with no external pressure and no volume expansion
- “Anode-Free” Li-Metal
- 0% capacity fade with no applied stack pressure

Major Technical Highlights – High Rate MIEC

- Our patented structure/materials achieve critical current densities (CCD) of **100 mA/cm²** without shorting
10X DOE Fast Charge Goal for 15 min EV charge
- Only solid-state Li_{metal} technology to **exceed** DOE VTO Fast-Charge goals for current density, per-cycle areal capacity, and cumulative capacity, at **room temperature with NO applied pressure**
- 18.5 Ah/cm² cumulative capacity for 5 mAh/cm² cell corresponds to 3700 cycles. More than one 100% full DoD cycle per day for 10 years

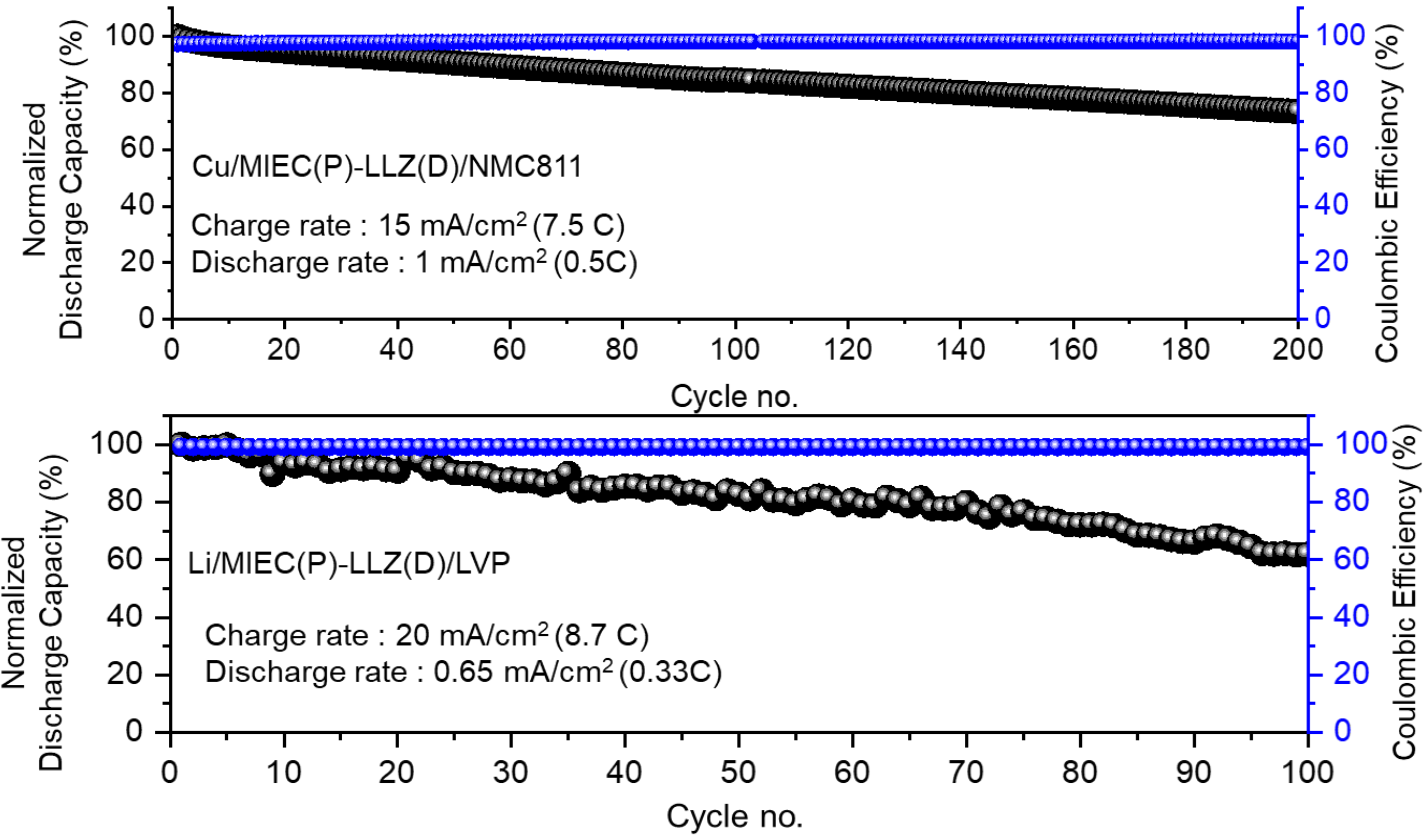


- Now have demonstrated stable "anode-free" high rate 1 mA/cm² Li_{metal} cycling at low temperature -20°C



Major Technical Highlights – Cathode Selection

- Technology is cathode agnostic
- High-rate $\sim 20 \text{ mA/cm}^2$ full-cell cycling demonstrated with multiple cathodes
- Currently evaluating LMR cathodes with theoretical cell energy densities $>500 \text{ Wh/kg}$



Team and Potential Partnerships



Eric Wachsman

Develop MIEC materials and structures at the R&D level



Paul Albertus

Develop cell performance models



Greg Hitz

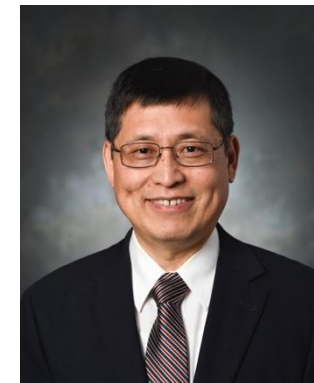
Develop manufacturing and scale-up cell size/capacity to demonstrate 10 Wh cells



Liz Santori



Eric Lind



Chao-Yang Wang

Develop pack temp control for ION cells



Potential Partnerships: High energy cathode/catholytes and pack integrators