Temperature Self-regulation for Large Format Li-ion Cells

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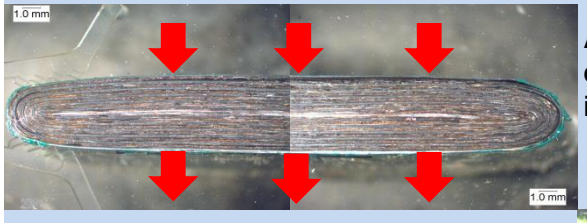
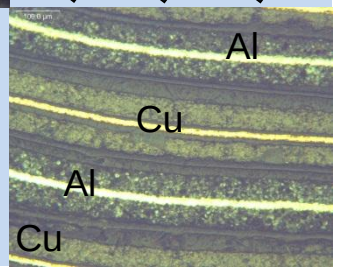
Technology

- **Current cell cooling and temperature control technologies are not efficient for large format cells.**
- **Cooling from the outside surfaces is the least efficient path.**
- **In-plane cooling and temperature control will be 20-30 times more efficient.**
- **The ORNL and Farasis Energy team is developing a new cell design and temperature control technology for large format Li-ion cells.**

Heat Conduction in a Li-ion Cell



Accessing high thermal conductivity Cu and Al is the key!



Measured Thermal Conductivity:
Through thickness ~ 1.5 W/mK
In-plane ~ 30W/mK

A factor of 20 improvement!

Advantage and Differentiation

In-plane cooling and temperature control is not necessary for small Li-ion cells and may not be not cost effective. It becomes an attractive option for large format, high capacity cells. Our approach is to combine modeling, experimental measurements and cell design to show the advantages of in-plane cooling for various applications:

- **Cost-benefit analysis to show potential scale-up industrial applications**
- **Advanced cooling technology to allow more efficient cell temperature control**
- **3D cell performance and thermal modeling to optimize design**

Performance Targets

Metrics	State-of-Art	ORNL/Farasis
Maximum Cell Temperature (25Ahr 5C Discharge)	~45ºC	<30ºC
Cell cycle life (10% drop)	~1000 cycles	~1250 cycles
Pass safety pinch test (ORNL/UL)	~85-90% SOC	100% SOC

Please contact Shaun Gleason (gleasonss@ornl.gov) regarding: r&d collaboration, funding, press