
Soteria Battery Innovation Group

Challenge: Lithium Battery Fires are Expensive

The Dreamliner Debacle Has Already Cost Boeing \$600 Million



Tim Hether, Alwyn Scott, Reuters
Apr. 18, 2013, 9:37 AM ▲ 2,210

BUSINESS NEWS OCTOBER 11, 2016 / 2:04 AM / A YEAR AGO

Note 7 fiasco could burn a \$17 billion hole in Samsung accounts

World

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Crashed Tesla explodes into a massive fireball

Tesla Adds Titanium Underbody Shield and Aluminum Deflector Plates to Model S

Elon Musk, Chairman, Product Architect & CEO • March 28, 2014

Forbes / Autos

DEC 12, 2011 @ 07:32 PM 18,993 views

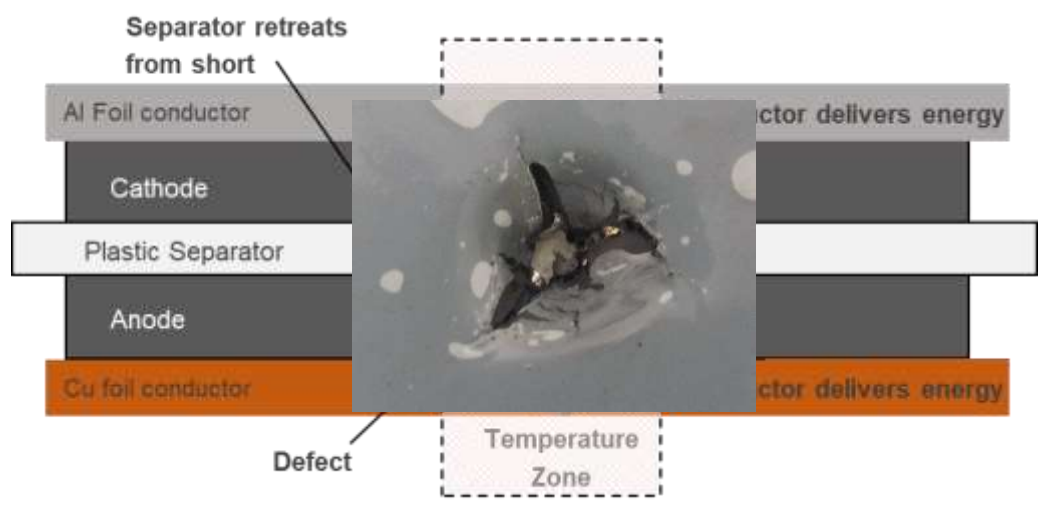
Chevy Volt Battery Fires Threaten All Electric Vehicle Makers, Not Just GM

Amazon stops selling some hoverboards over safety

Brett Molina and Elizabeth Weise, USATODAY 6:02 p.m. EST December 14, 2015

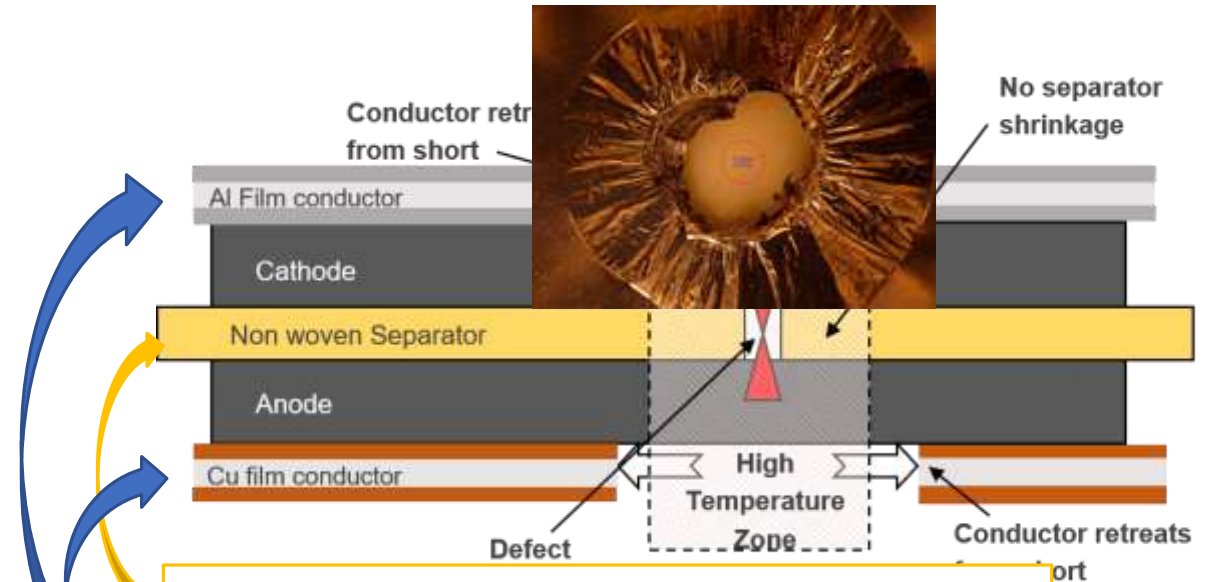
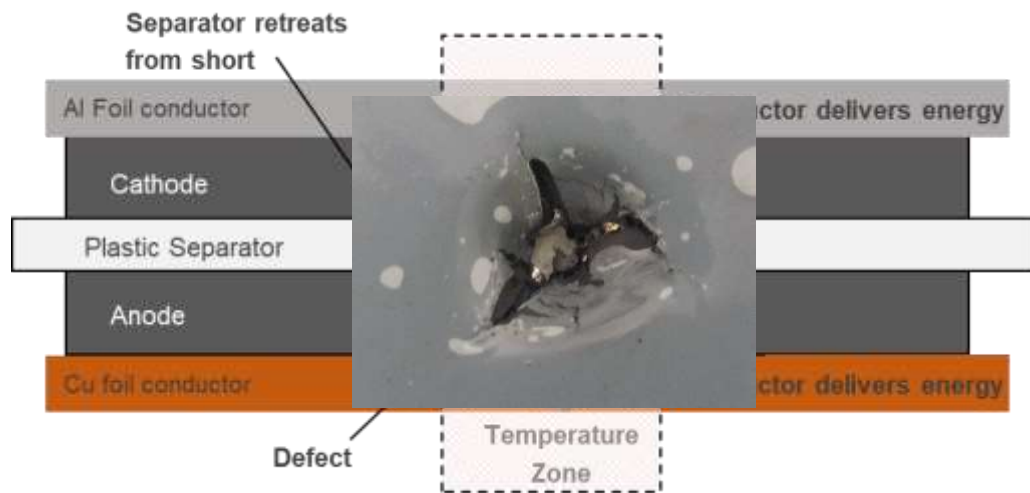


Separator Failure: Fire



Separator Failure: Fire

Fuse Stops Ignition: No Fire

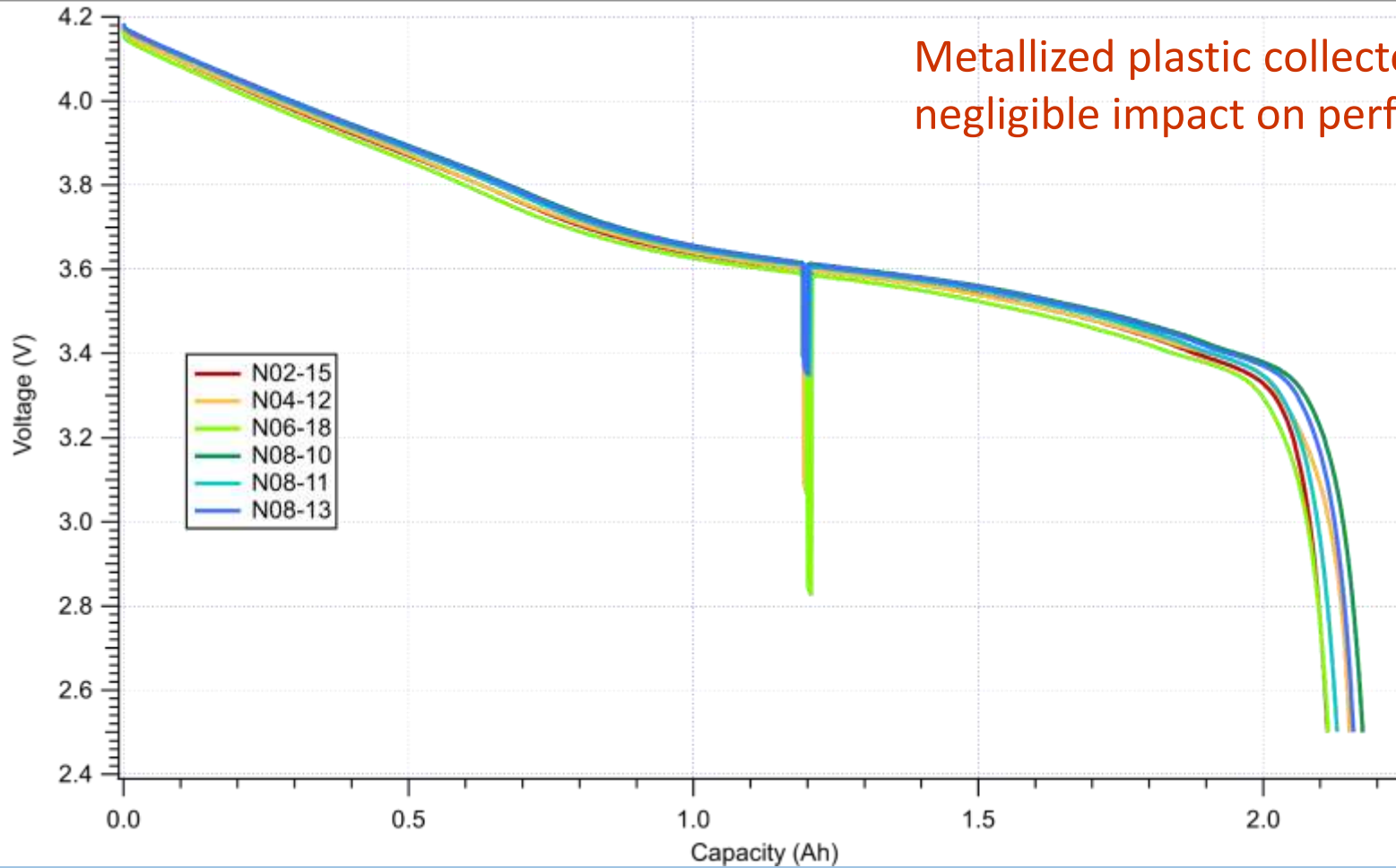


Separator never melts or shrinks

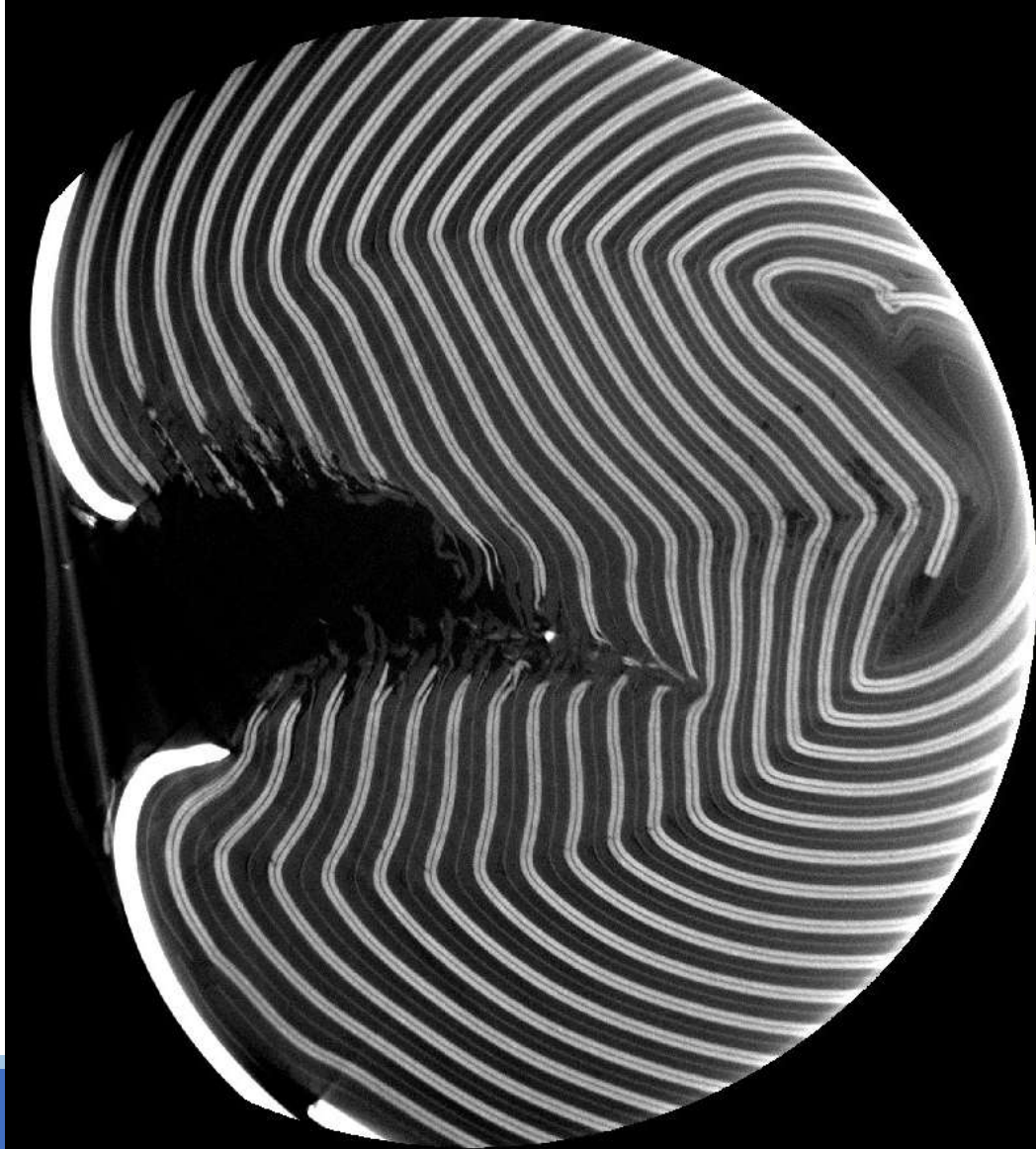
Metal layers fail like a fuse



Cell Design Discharge Curve



Run 80 – N05-07 Soteria Al & Cu Collectors (cont.)



Fine focused CT image with 5.5 micron resolution

- Both plastic collectors are visible
 - Cathode is bright layer with thin dark line in middle
 - Anode is dark layer with thin brighter line in middle
- Collector appears missing near nail impingement interface
 - Only active material left dangling
- Nail impingement causes several additional creases in the JR

2.1 Ah Cell – 100 % SOC (4.2 V)

Standard materials

Without ISC device

Do polymer collectors help protect against mechanical induced thermal runaway?

Thermal runaway propagates almost immediately.



Cell type: Li-ion 18650

Capacity: 2.1 Ah

State of charge: 100 % (4.2 V)

Bottom vent: None

Wall thickness: 250 μm

Orientation of cell: Upright (vent at top)

Location of ISCD radially: None

Location of ISCD longitudinally: None

Side of ISCD in image: None

Separator type: Normal

Positive current collector: Normal

Negative current collector: Normal

Location of FOV longitudinally: Middle

Frame dimension (Hor x Ver): 2016 x 1111 pixels

Pixel size: 10 μm

Notice the 'spring-back' as the metal CC's split around the nail.



2.1 Ah Cell – 100 % SOC (4.2 V)
Al coated polymer current collector
Without ISC device

Do polymer collectors help protect against mechanical induced thermal runaway?

No thermal runaway propagation.

Notice that there is no 'spring-back' as the polymer CC travels with the nail.



Run 72



License to Best Advanced Materials Suppliers & Set Standards

OPEN MARKET APPROACH

To license the Soteria battery technology to the best advanced materials companies

To develop a set of aggressive test standards that highlight the advanced safety performance of the Soteria battery architecture

To get those standards adopted in electronics, electric vehicles, energy storage and the broader lithium ion battery industry

CONSORTIUM MEMBERS



Awards: Most Fundable and Innostars



Entrepreneur Magazine Most Fundable Companies
→ #1 out of 2500 applicants
→ published Entrepreneur Magazine Oct 24

Innostars (by US China Innovation Alliance)
→ #1 Advanced Materials



Thank you!
