BATTERY STREAK

CHARGE LIGHTNING FAST

Nanostructured Energy Storage Materials for Fast-Charging Batteries

NAATBatt Member Presentation
February 2023

The BATTERY STREAK Difference

We store energy as a surface charge instead of through a chemical change

Our technology has:

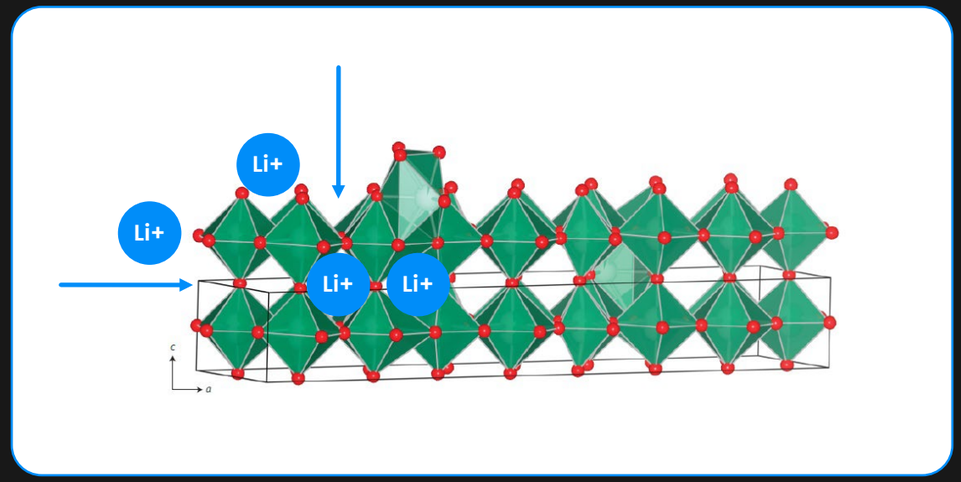
- Sponge-like mesoporous materials, 20-50 nm, and
- A very large surface area per unit volume

Which means:

- Energy storage like a capacitor (surface charge instead of a chemical change) and
- Heat generation and electrode material wear are minimal

Best of all:

- They are a drop-in replacement for existing batteries that
- Are manufactured on Industry standard equipment for both materials and batteries



Nanostructure enables lithium diffusion without phase transition

V Augustyn, J Come, MA Lowe, JW Kim, PL Taberna... - Nature materials, 2013

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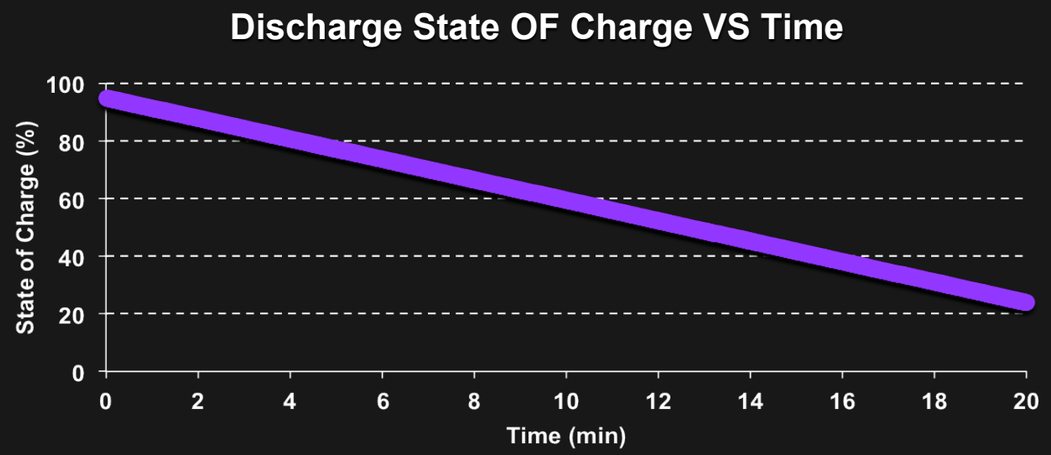
High Power
(Fast Discharge)

Fast discharge outperforms today's lithium-ion batteries

- 2C Discharge
- 60% discharge in 15 minutes
- 2x the discharge power of widely used Panasonic battery[1]



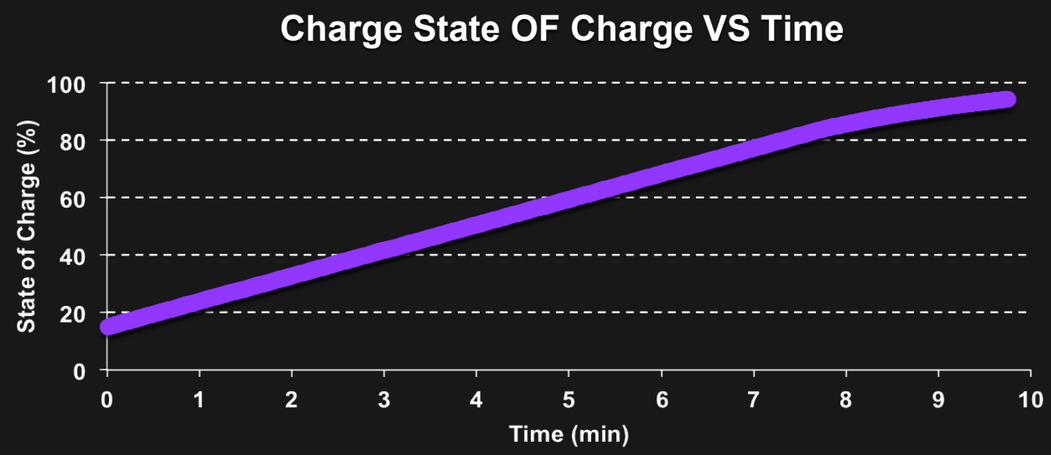
Ultra-Fast Charge

Ultra-fast charge outperforms today's lithium-ion batteries

- 6C Charge
- 50% charge in 5 minutes
- 80% charge in 10 minutes
- 12x faster[2]

Fast charge without the heat

- Less than 8°C/15°F increase versus ambient temp



[1] 2C in Battery Streak compared to 1C for Panasonic 18650 LCO/Graphite
[2] 10 minutes for Battery Streak compared to 120 minutes for Panasonic 18650 LCO/Graphite

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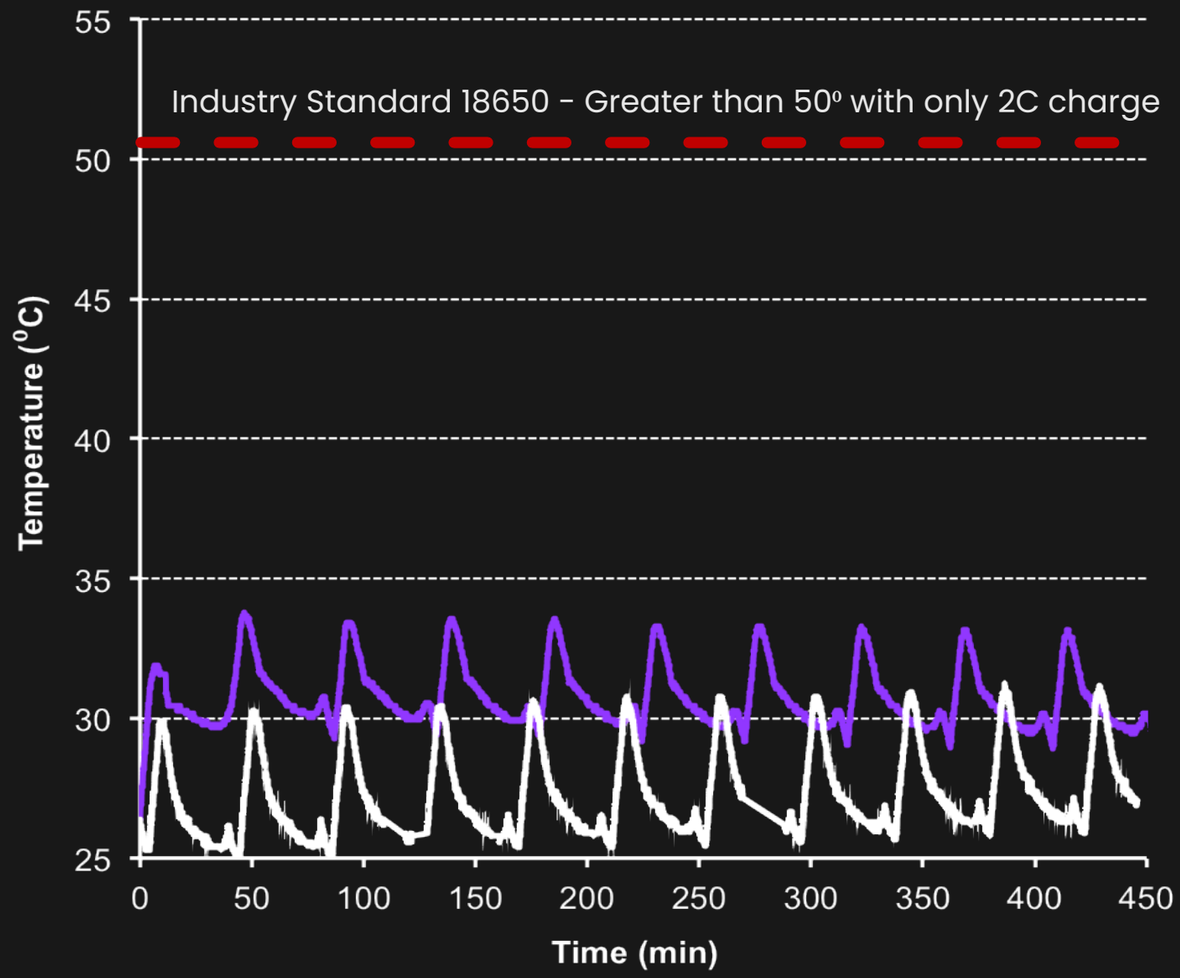
Without The Heat

Only 8°C/14°F increase above ambient temp while fast charging or discharging

- 25°C/77°F ambient temperature
- 6 Amp charge, 2 Amp discharge
- 6 Amp charge, 10 Amp pulse discharge
- Max temp = 33°C/91°F
- **Less than 8°C /14°F change**
- Similar results when starting at higher ambient temperature



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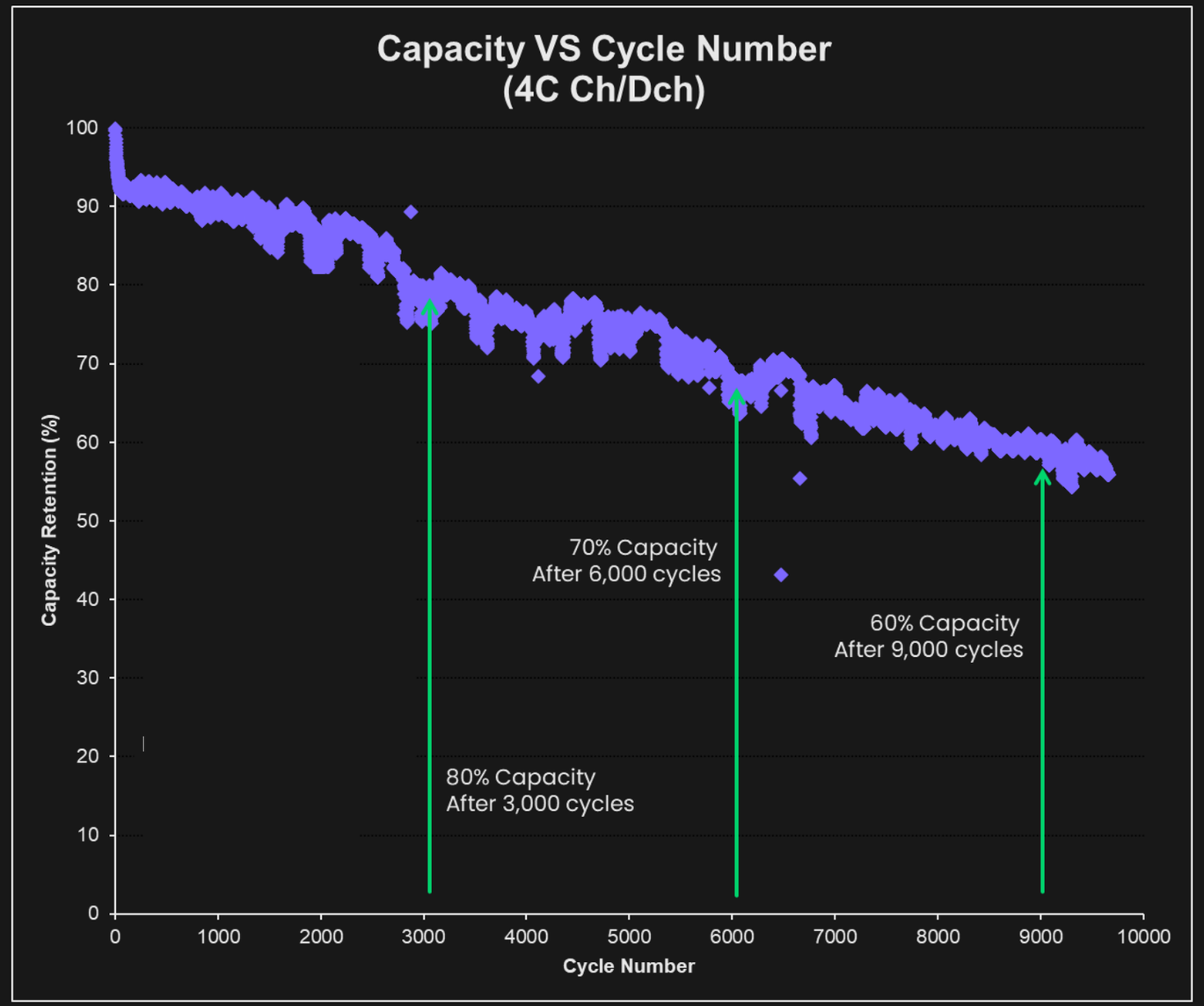
Long Cycle Life

While consistently delivering high power and fast charge

- 20% capacity loss after 3,000 cycles
- 30% capacity loss after 6,000 cycles

- Typical cell
  - <1,000 cycles is considered very good with slow charge
  - Cannot sustain a single fast charge



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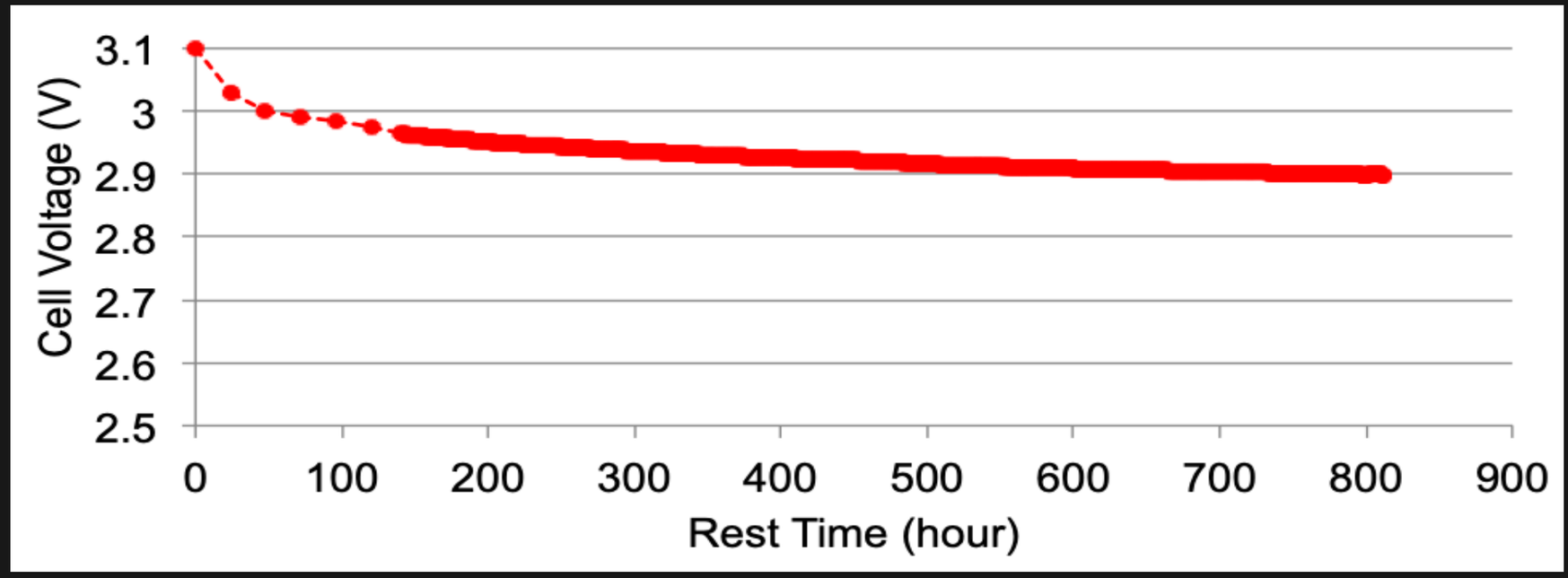
Shelf Stable



Less than 10 mV loss per 100 Hours

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Competitive Landscape

White/Blue= Chemistry Yellow = In Development

Chemistry	Nominal voltage (V)	Operating Range (V)	Gravimetric Energy Density (Wh/kg)	Volumetric Energy Density (Wh/L)
LCO	3.6	3.0 – 4.2	367	1327
LFP	3.3	2.5-3.65	374	1097
Gen III	2.6	1.5 – 3.2	288	933
Gen II	2.2	1.0 – 3.2	262	1124
LTO	**2.4**	**1.8 – 2.85**	**180**	**702**

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Competitive Landscape - Cells

Cathode/Anode	Charge Time (min)	Discharge Power (W/L)	Charge Power (W/L)	Format
LCO	120	676	338	Cylindrical
LFP	15	240	960	Cylindrical
Gen III	**<10**	-	-	-
Gen II	**<10**	**1040**	**1600**	**Pouch**
LTO	6	850	850	Pouch

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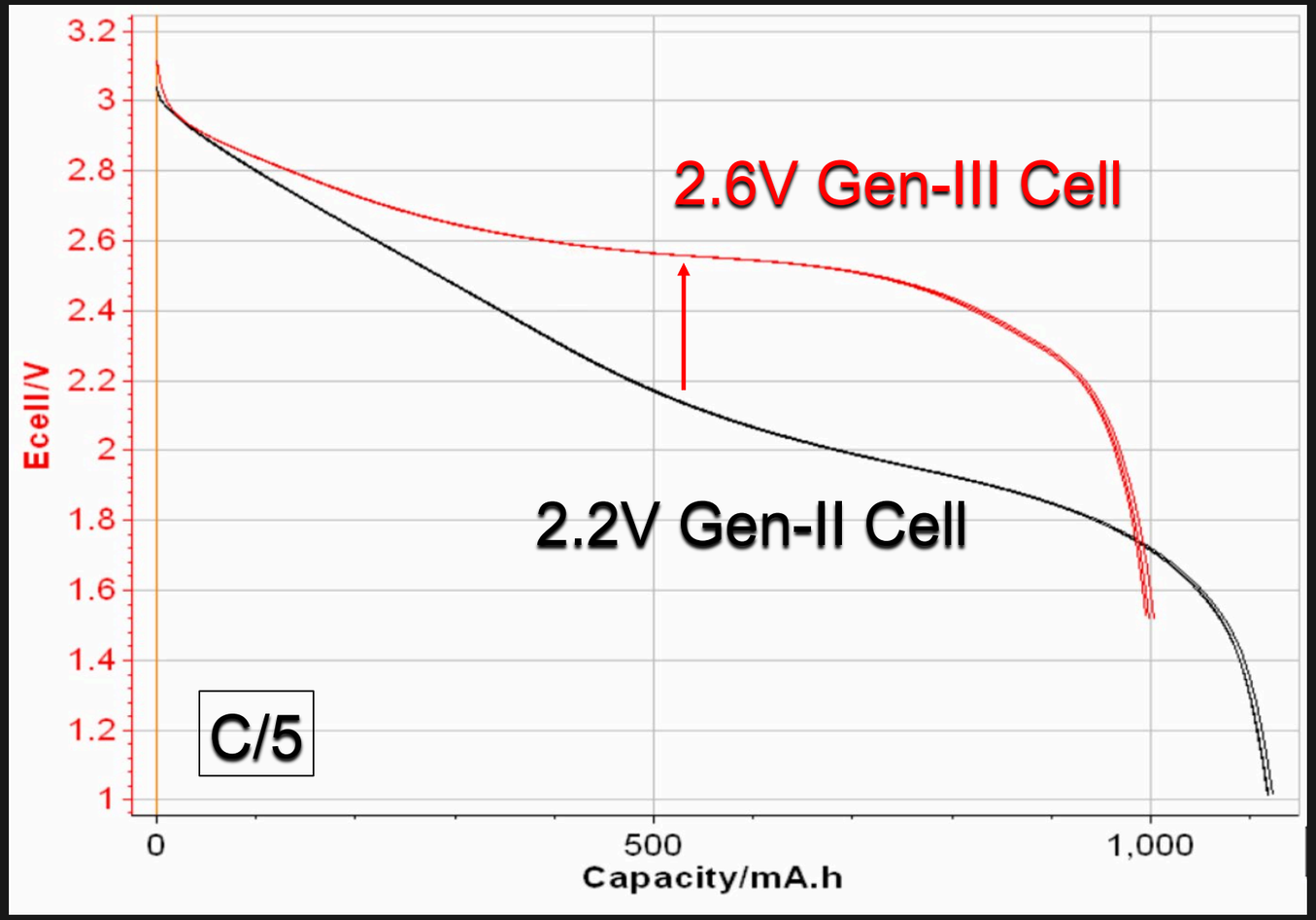
Gen-III Prototype Cell vs Gen II

Gen-III prototype cell uses cobalt/nickel-free electrodes with higher cell voltage.



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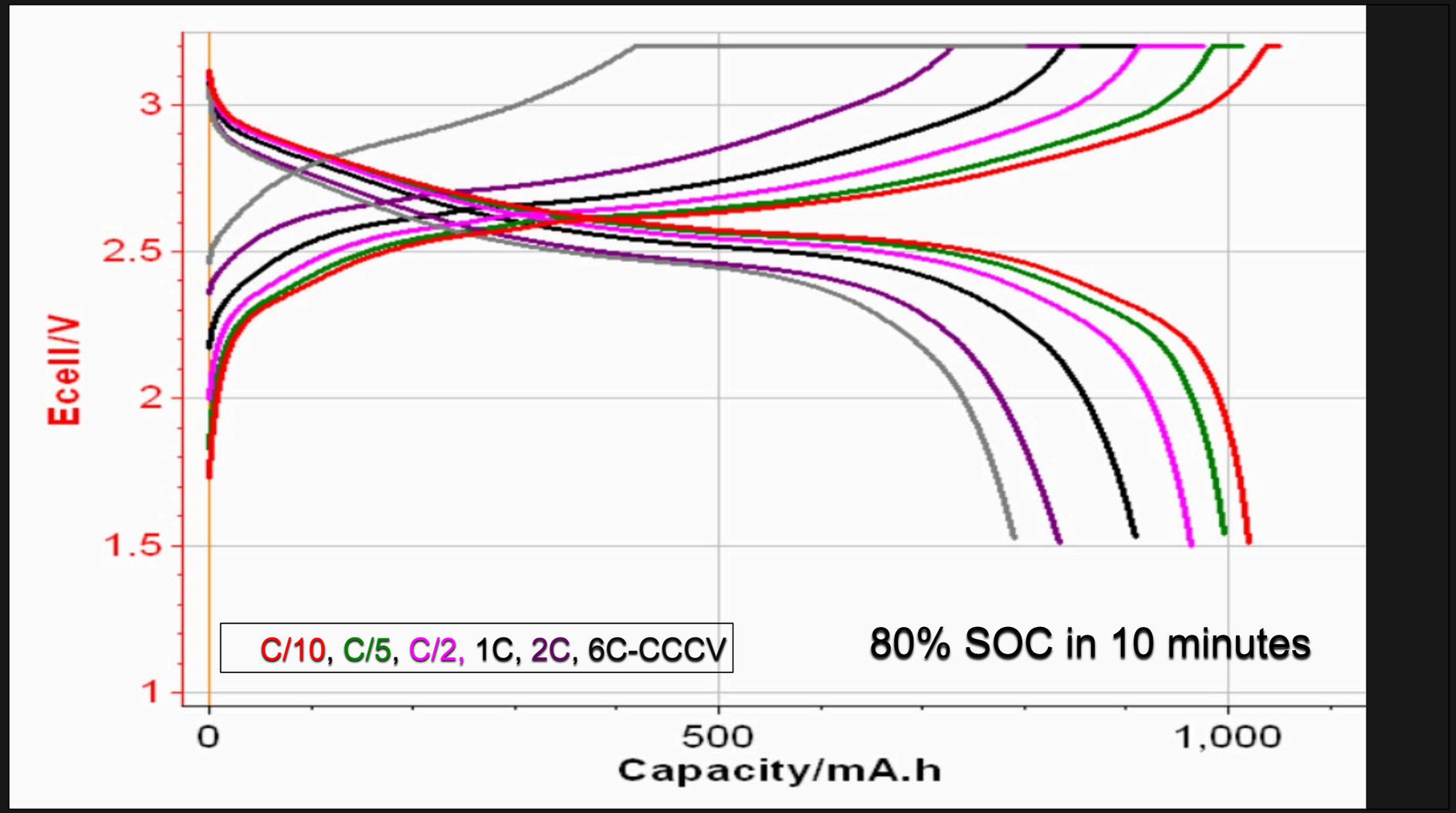
Gen-III Prototype Cell Capable of 10 min Charge



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Partnerships

NAATBatt INTERNATIONAL

Soeria™ Consortium Member

NSF

CBMM | Niobium Nb

ACT ONE VENTURES

Ucla®

FATHOMWERX

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Thank You For Your Time

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