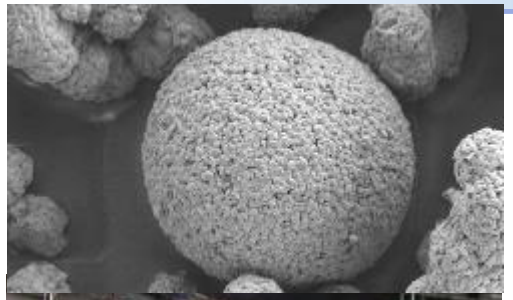
Introduction to CAMX Power



NAATBatt 2020
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www.CAMXPOWER.com

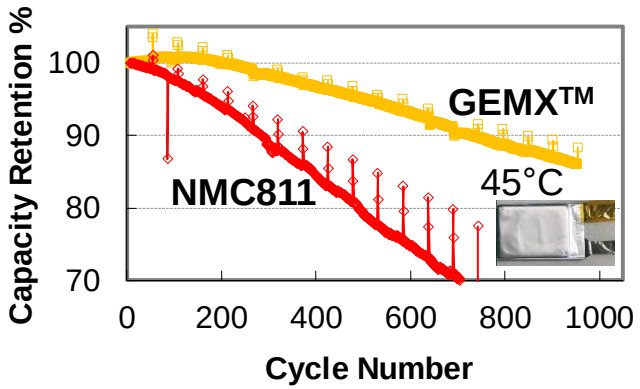
CAMX Power Innovations & Offers:

CAM-7® cathode material platform

- Licensed to BASF and Johnson Matthey (2016)

GEMX™ cathode material platform

- Non-exclusive license to Johnson Matthey (2018)

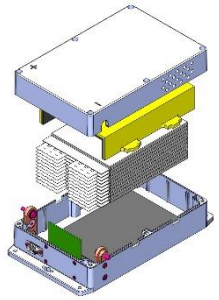


Technologies for detection of internal short circuits in Li-ion batteries

- Cell screening to improve production throughput
- In-pack short detection

Time for detecting 125kΩ internal short circuit	Std. OCV meas.	CAMX Technology
	14 days	< 2 hours

Limited production of specialty Li-ion cells and batteries.



CAMX Power's technology processing is enabled by: facilities, staff, and location.

Materials Development → **Materials Scale-Up** → **Electrode & Cell Development** → **Cell Prototyping &Testing** → **Prototyping of Packs**

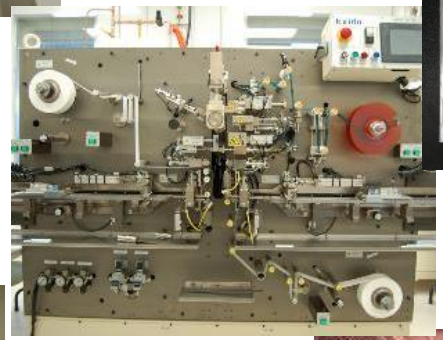
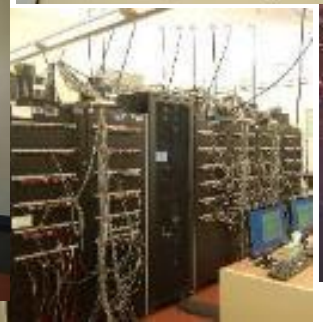


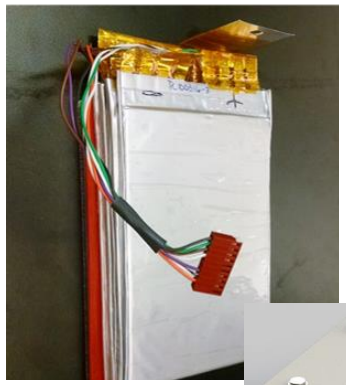






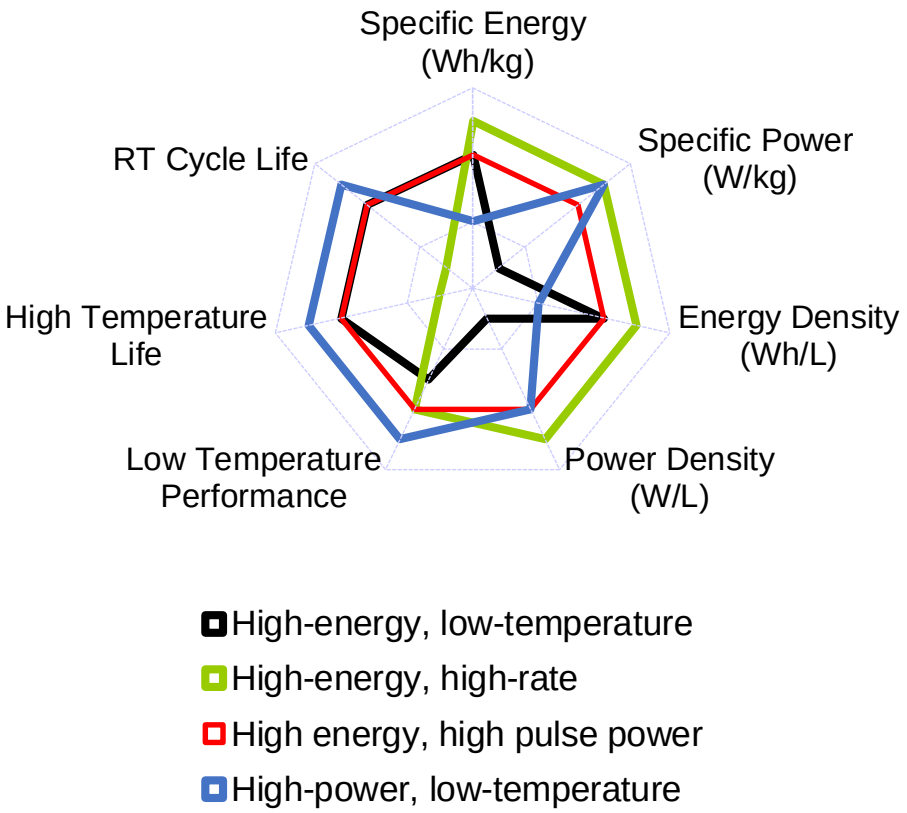


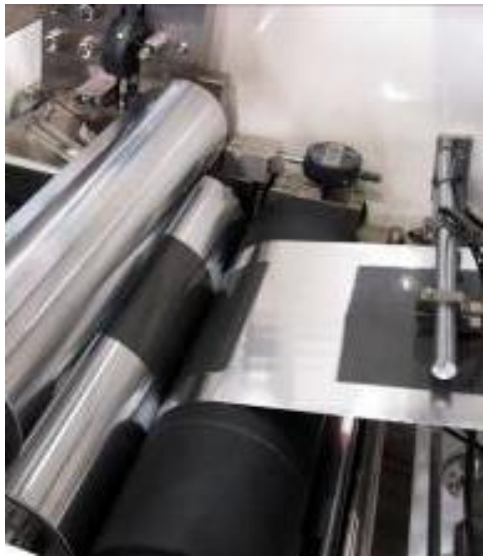
By combining GEMX cathodes with different anode, electrolyte, and separators, we have been able to develop Li-ion cells with a wide range of attributes not available in COTS cells today.

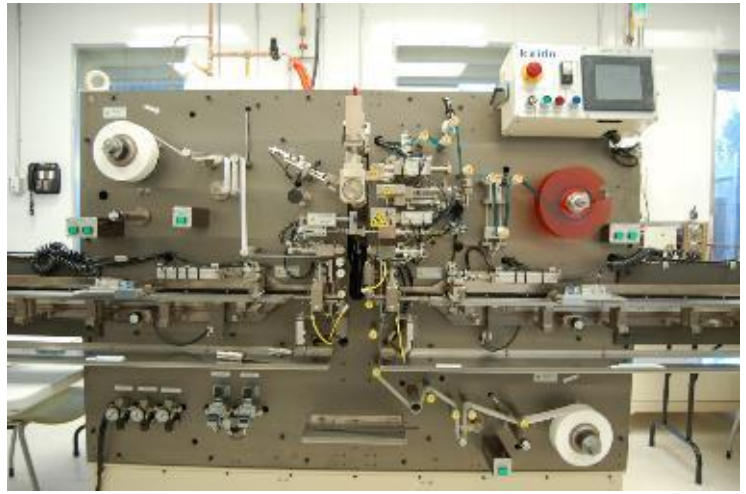
Combining GEMX cathodes with suitable cell components can deliver performance not possible with COTS cells.



Cell Design	Cell Type	Key Attributes	Potential Applications
gLNO/LTO: CELX-RC™	Pouch	• Very long life • Zero-V storage • Charge & discharge at -50°C	• Ultracap-replacement • Vehicle structural battery • Lead acid replacement - 6T battery • BB2590 – fast charge
gLNO/Gr-Si	18650	• High pulse power over wide SoC • 800 W/kg, 10 s pulse at 10% SoC • Long life	• Military robots • Applications that require energy and power
gLNO/Gr	18650	• -40°C discharge operation • Long life	• Military rifleman radios • BB2590
gLNO/Si	Pouch	• High energy and high power • Excellent power delivery at -40°C	• Missions needing very high energy and power

CAMX Power operates a Li-ion cell prototyping facility to support the development of Li-ion materials, cell and pack technologies, and battery safety solutions.





- <u>Flexibility in cell formats</u>
  - Cylindrical
  - Wound prismatic
  - Stacked prismatic
- <u>Flexibility in electrode design</u>
  - High energy
  - High power
- <u>Flexibility in active materials:</u>
  - Anodes: Gr, Si, LTO
  - Cathodes: CAM-7, GEMX, LCO, NCA, NCM, LCFP
- <u>Upgrades in the works</u>
  - 21700 cylindrical cells
  - Scaling-up production capacity

Materials synthesis starting from precursors to cathode materials at small-scale, and scaled-up synthesis in the pilot plant.

Precursor Synthesis

Small-Scale Cathode Powder Synthesis

~ 100 g/batch

Mini-Plant Cathode Powder Synthesis

~ 20 kg/wk.

Pilot-Plant Cathode Powder Synthesis

~ 50 t/y