



Nano carbons for energy storage

November 9, 2016



Cordless 



Mobile 



Facilities 



Personal Transport 

CHARGES
IN JUST
5 MINUTES



Interim round of c.\$5m

- ZapGo Ltd (Zap&Go) was founded in 2013 to develop the next generation of energy storage - Nano carbon supercapacitors
- Nano carbon supercapacitors that contain graphene, charge much faster than lithium-ion (Li-ion) batteries and do not catch fire, so have none of the issues experienced by the recent [Samsung recall](#)
- The IP originates from the University of Oxford in the UK
- Raised c.\$11m and seeking to raise an Interim round of c.\$5m to build a pilot production facility, ahead of an A round in early 2017
- The market points of value are being identified by [McKinsey](#)

2

Our core values

- **Faster charging**
- **Safer** (Doesn't catch fire + exempt from UN 38.3 shipping regulations)

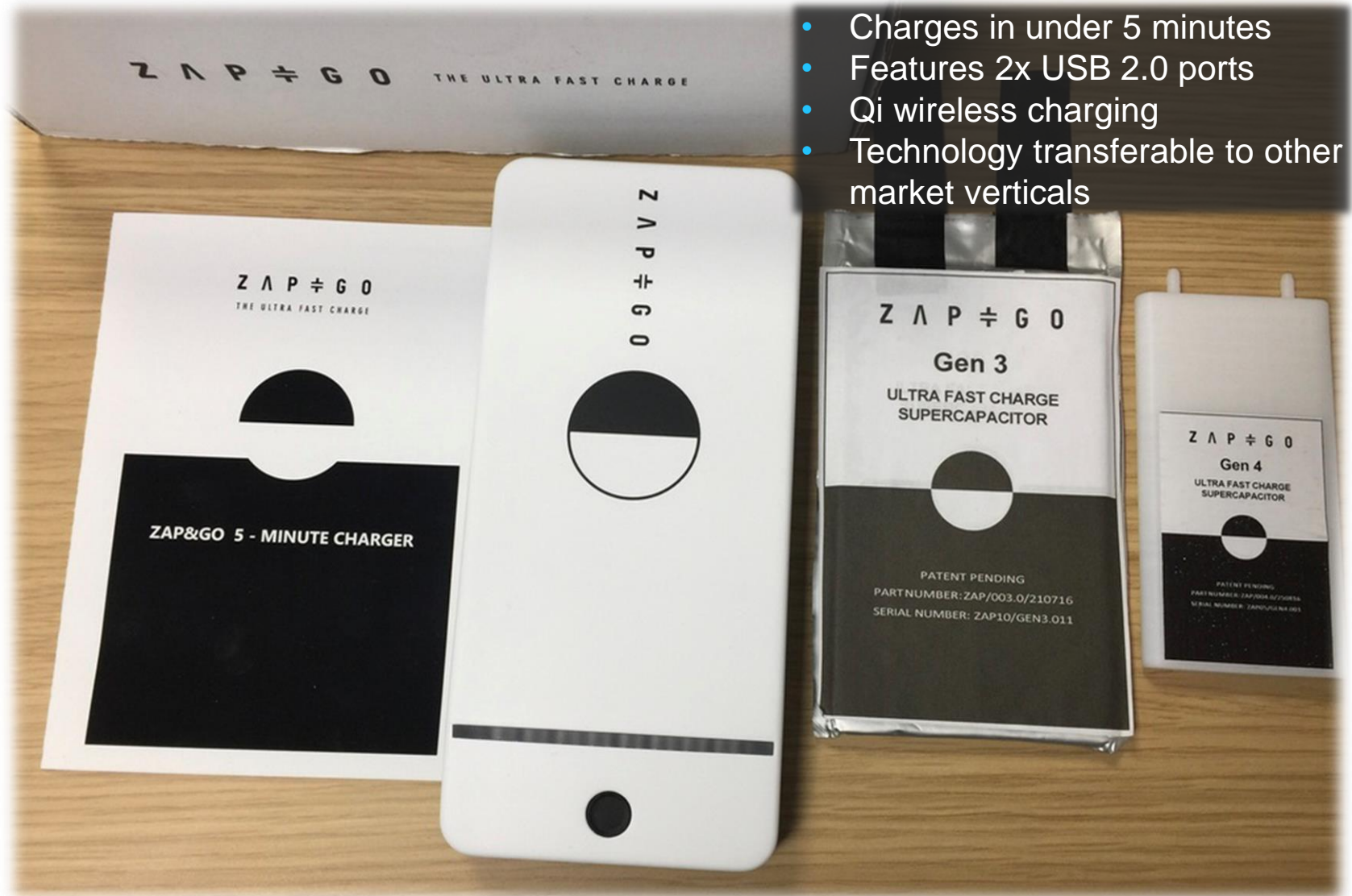


We charge in 5-minutes or less



Zap&Go powerbank proof of concept based on Gen 2

- Charges in under 5 minutes
- Features 2x USB 2.0 ports
- Qi wireless charging
- Technology transferable to other market verticals



Large markets for faster charging, safer & longer lasting batteries



Cordless 



Mobile 



Facilities 



Personal Transport 



\$140bn
IDTechEx:
lithium-ion market by 2026

2015: Gen 1

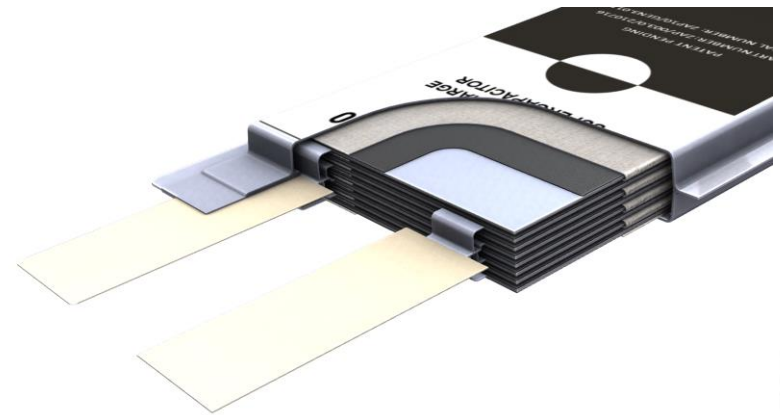
- Fundamental science to prove capability of newly-developed chemical formulations
- Clearly defined roadmap to deliver high performance technology platforms
- Core team established
- Successfully changed form factor from 'industry standard' round cylinder, to a game changing flat 'pouch' cell format



Pouch format of Zap&Go supercapacitor, compared with industry standard 2.7v 'coke can' size supercapacitor

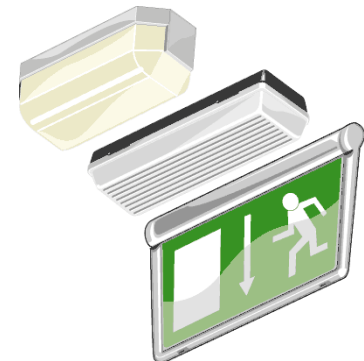
Q3 2016: Gen 2

- Stable, manufacturable pouch cells with fast charge, but limited power delivery
- Designed to be a springboard for developing Gen 3 and to be used in early product capability demonstrators
- First demo applications include:
 - 5-min charger designed & built by Flex
 - Stanley Black & Decker 18v power drill
 - Razor e-scooter



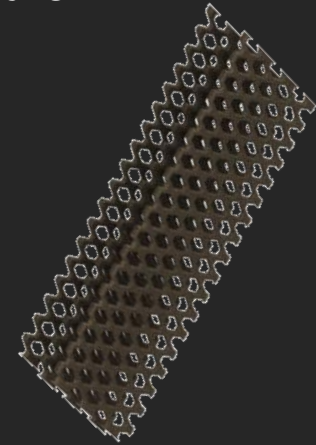
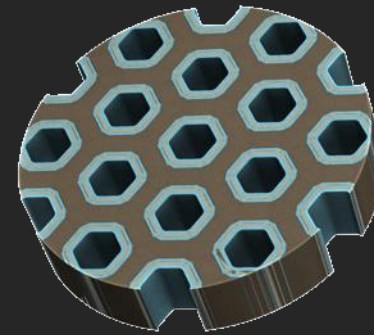
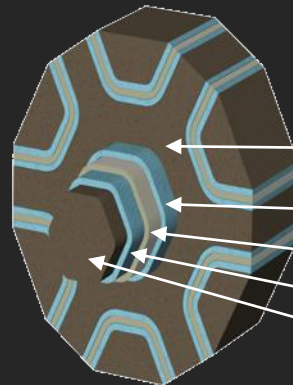
Q4 2016 to Q3 2017: Gen 3

- Development program to evolve from Gen 2 to ultimate optimization of pouch cell format
- Product performance expected to be > 2x Gen 2:
 - 1500F, 3.4V
 - 12 Wh/kg – 2x today's 2.7v best in class
 - 650mAh – 50% of mid life 18650 Li-ion
 - Sub 5 minute charge time
- Suitable for commercial deployment in targeted verticals:
 - Light vehicles
 - Power tools and floor care
 - Vehicle emergency start packs
 - Emergency lighting
 - Solar PV
- Manufacturing release expected Q3 2017, with advanced prototypes for trials and demos late Q1



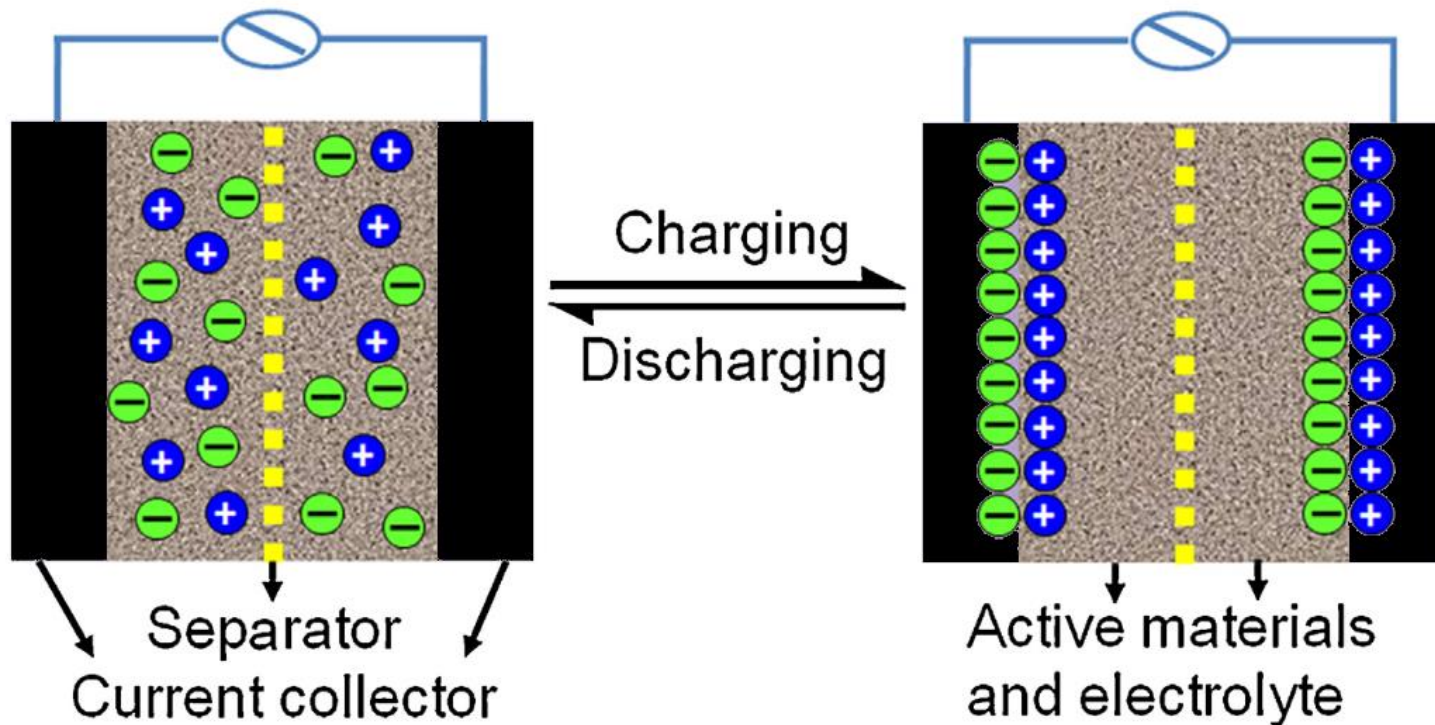
Q4 2016 to Q3/Q4 2018: Gen 4

- Unique “3D Lattice” nano carbon architecture & cell structure
- Polymer gel based electrolytes (solid state cell)
- 24-30 month R&D program
- High performance, stable prismatic cell
- Low production cost
- Target performance to be ~3x Gen 3
 - 3000F, 4.0V or better
 - > 30Wh/kg
 - Sub 5 minute charge time
 - mAh values on par with Li-ion



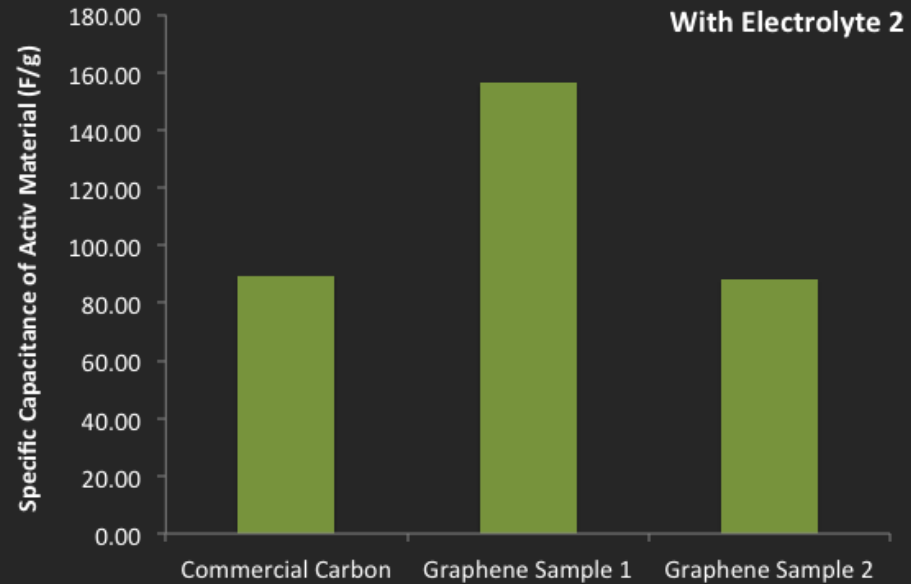
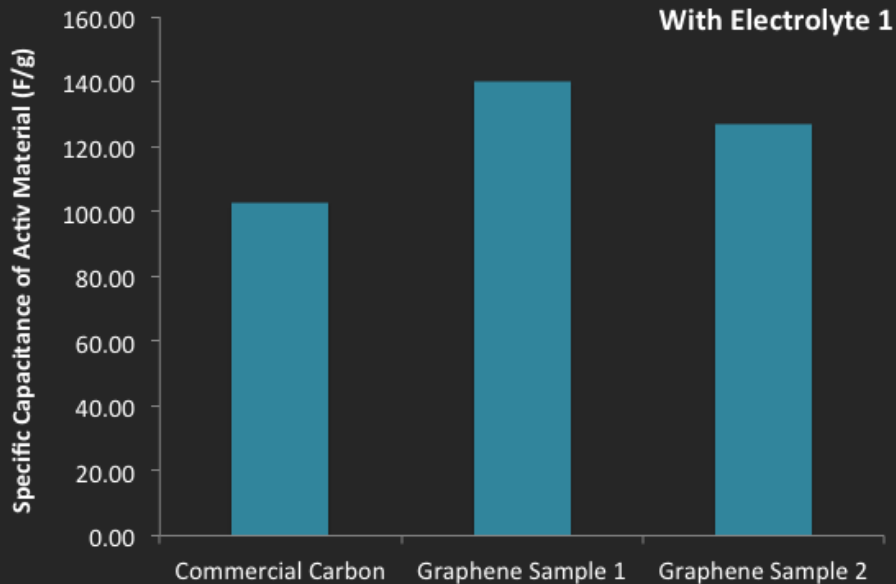
Nano-carbon structured electrode
Electrolyte gel
Membrane
Electrolyte gel
Nano-carbon filler electrode

Electric double layer capacitor



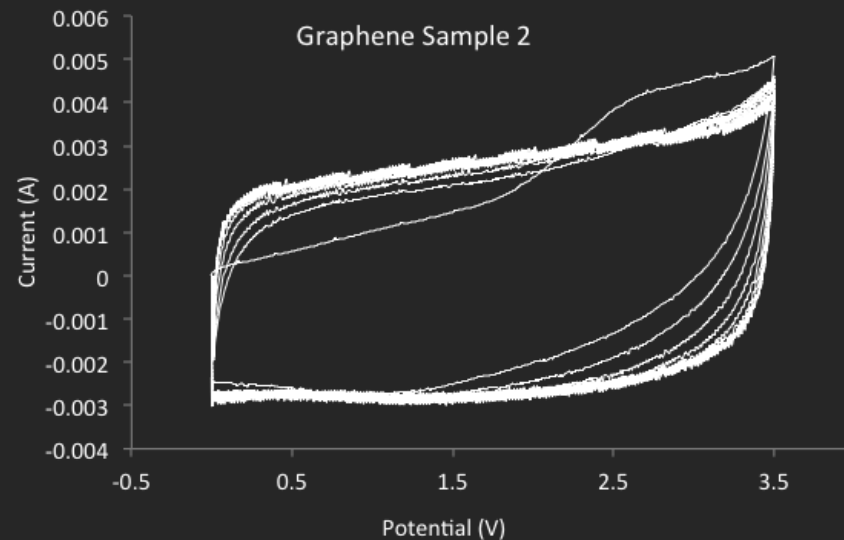
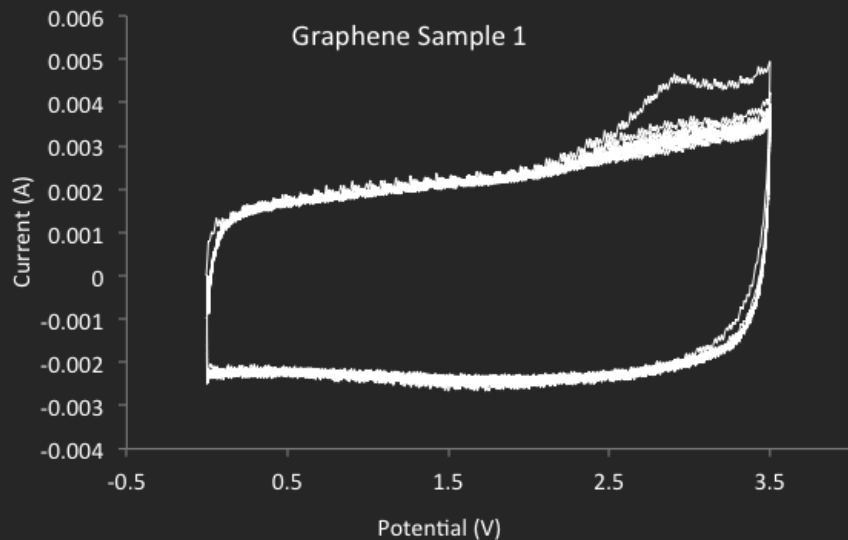
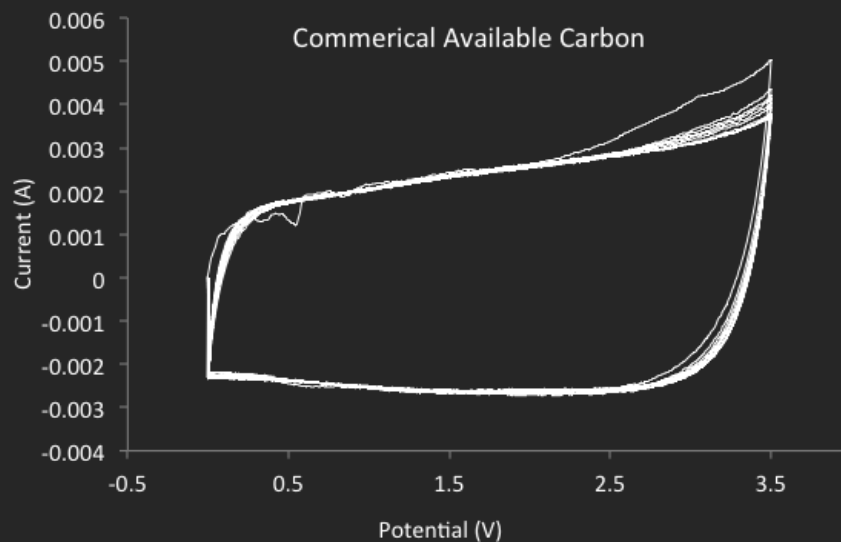
Electrochemical test results

- Three different Activ materials
- Ionic liquid electrolytes
- Cell type – Coin cell



Cyclic Voltammetry plots

- Electrolyte 1 combination
- Cell type – Coin cell



'Project Home' – Pilot facility

- To be housed on Genesis site at Harwell (where Li-ion technology was born)
- World leading R&D facility and dry-room custom designed for nano carbon supercapacitors and high voltage ionic electrolytes
- Fully equipped for development and pilot production of future generations of technology, Gen 4, Gen 5 and beyond
- Quality Assurance laboratories

Use of proceeds :
\$5m to equip first phase



Strategic Partnership with Flextronics 'Project Myriad'

- Strategic partnership with Flextronics - \$22m investment in volume manufacturing facility for Zap&Go supercapacitors
- Sites identified in Mexico, Arizona & Texas
- Planned opening Q3 2017
- Volume ramp from 100,000 to 1 Million a month by end of 2017
- Underpins & adds value to both businesses

flex
LIVE SMARTER



Technology roadmap – Gen 4 goal is parity with Li-ion* by 2018

2016

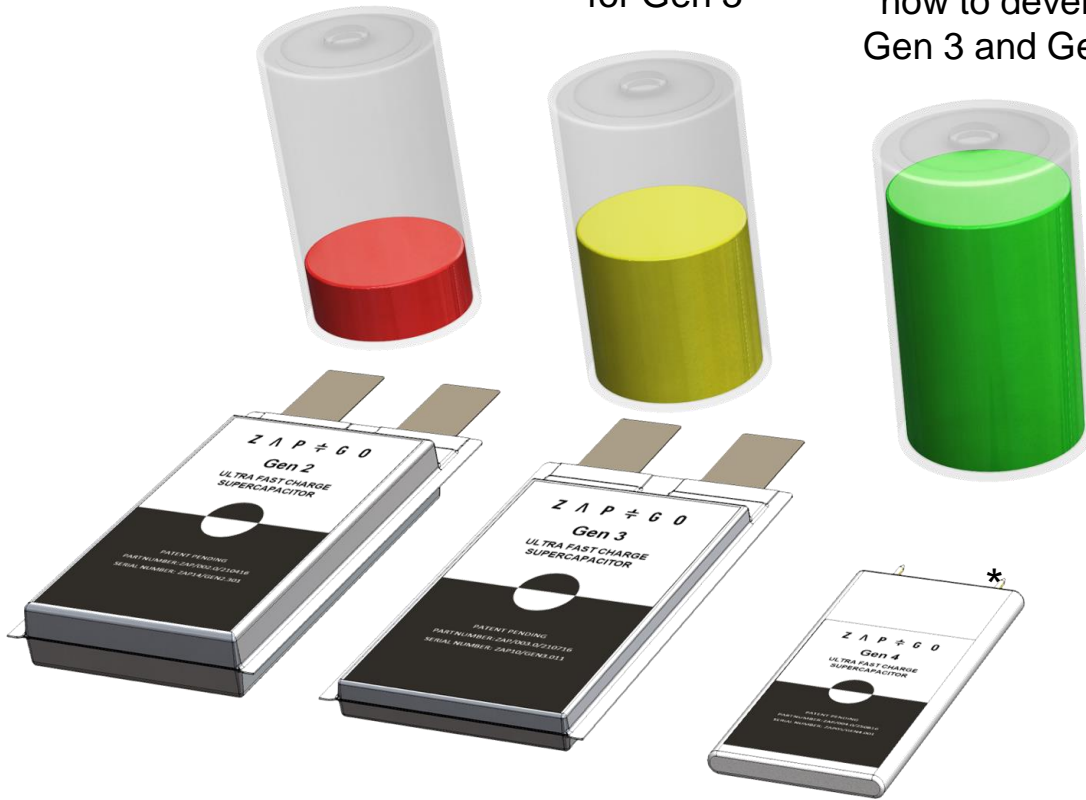
Completed and building prototypes now with Gen 2

2017

Flex to invest \$22m to build production line for Gen 3

2018

\$5m Interim Round needed now to develop Gen 3 and Gen 4



*Gen 4 goal will be equivalent to the power (mAh value) of a good quality 18650 Li-ion cell at 250 charge/discharge cycles c.1750mAh



Stephen Voller – *Founder & CEO*



Tim Walder –
Chief Finance Officer



Simon Harris – *President Asia Pacific & Marketing Director*



David McTuck – *Chief Operating Officer*



David Welsh PhD –
Non-Executive Directors



Charles Resnick – *President, US Operations*



Greg Osborn – *Business Development, US Operations*



Paul Blackmore – *Chief Manufacturing Engineer*



Marappa Rajendran – *Principal Scientist*



Madhuri Dutta – *Research Scientist*



Nazanin Rashidi – *Research Scientist*



Mike Rigg – *Electrical Engineer*



Vince Rosso – *Project Engineer*



Rob Dix – *CAD Design Engineer*



Léa Bescond – *Digital Marketing*



Gayle Baker – *Office Manager*

www.zapgo.com

madhuri.dutta@zapgo.com