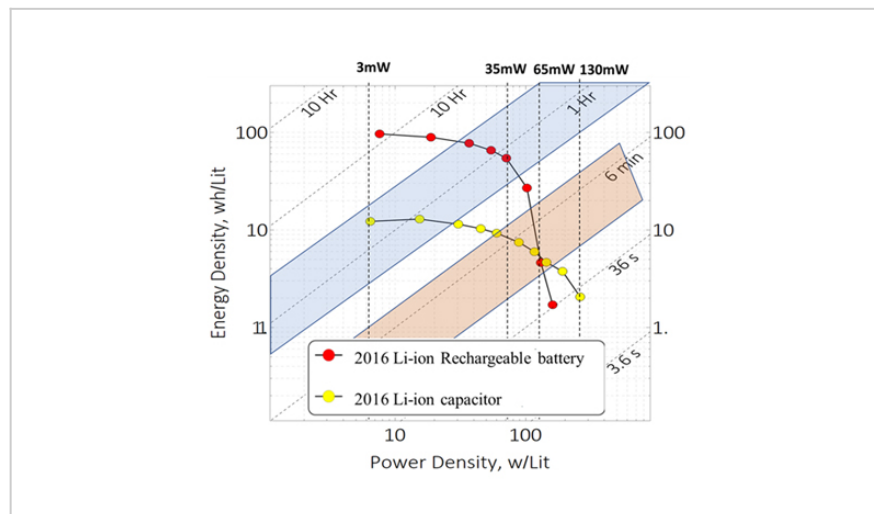


# Method of Making High Volumetric Energy Density Lithium Ion Capacitors

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Invention Prototype vs LIR battery

## Technology Summary

LIC store more energy than EDLC. LIC's advantages of higher capacity, high rate capability and longer cycle life make them attractive as a potential stand-alone energy storage device or in parallel with batteries offering system solution. However, current EDLCs outperform in smaller form factors such as coin cell electrochemical capacitors due to LIC's packaged energy densities limitations. The invention's proprietary cathode material eliminates the need for a current collector in coin cells. These cathodes have a mass loading of 30 mg/cm<sup>2</sup>, which is 3X greater than current EDLC electrodes. The LIC prototype's energy density remained above 10Wh/L until the load current was increased above 10 mA and tapered gradually. The invention's long-term cycling stability operated continuously for almost three times more time compared to the LIR battery (550 to 210 hours respectively).

## Application & Market Utility

The LIC's coin cell prototype demonstrated energy (~ 5 times more than EDLC) while handling load currents (2-5 times that of rechargeable battery of similar form factor) and cyclability about 3 times that of battery. Potential applications include for microelectronics, Internet of Things (IoT), and (wearable) health sensors. The prototypes have been tested in a health sensor platform and in a wide load current capability suitable for 1) on-board CPU Memory backup circuits, 2) smart utility meters, 3) industrial controls, 4) solar battery backups and energy storage.

## Next Steps

Prototype evaluation for specific applications

TECHNOLOGY READINESS LEVEL

4-7

### Seeking

Investment | Licensing | Research

### Keywords

- Lithium ion capacitor (LIC)
- Electric double-layer capacitors (EDLC)
- Lithium-ion rechargeable (LIR) battery
- High energy density
- High pulsed current loading

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