

# Ultra-high Capacity Lithium-Air Batteries

Keywords: Lithium-Air Battery, Air Electrode, Carbon Nanotube, Lithium Metal Anode

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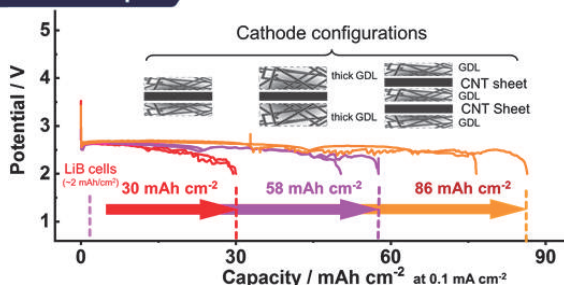
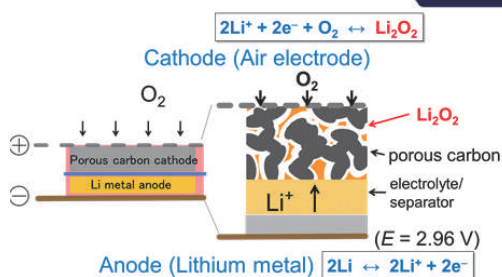
## Background

- Demand of batteries with low cost and high capacity for utilizing renewable energy.
- Development of post lithium-ion battery technology.
- Application of lithium metal as battery electrode material to enhance energy density.

## Aim

- Research and development of "Lithium-Air Battery" that has extremely high energy density (theoretically ~3,500 Wh/kg).
- Breakthrough of battery capacity and cost by the lithium-air battery technology.
- Demonstration of lithium-air battery cells with ultra-high capacity by CNT electrode.

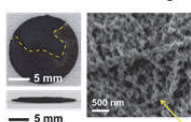
## Advanced Research Topics



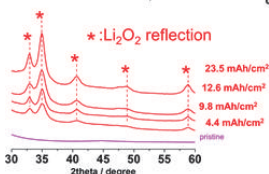
Lithium-Air Battery (LAB).

LAB cells with ultra-high capacity by CNT sheet cathode.

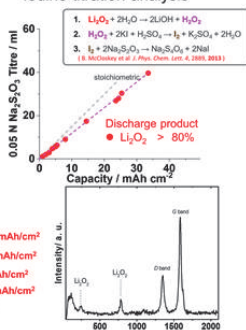
Cathode after discharge



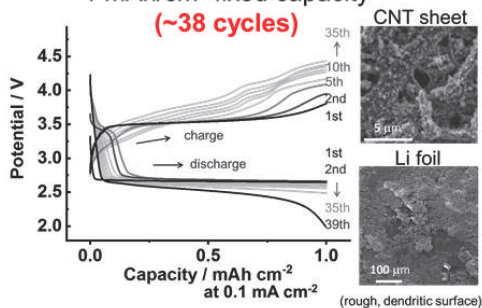
XRD and Raman Spectrum



Iodine titration analysis



1 mAh/cm<sup>2</sup> fixed capacity



Li<sub>2</sub>O<sub>2</sub> as discharge product: ideal battery reaction.

Discharge/charge cycle property.

## Publications

- A. Nomura, K. Ito, Y. Kubo. Scientific Reports (Springer Nature) 7, (2017) 45596.
- A. Nomura, K. Ito, Y. Kubo Meeting Abstracts in 18th International Meeting on Lithium Batteries, #782 (2016).

## Applied area and future prospects

- Lightweight and high capacity battery.
- EVs that can drive >500 km.
- Stationary battery combined with solar power.

## Issues for technology transfer

- Improvement of discharge/charge cycle performance.
- Cell stacking for developing large capacity battery package.
- Oxygen enrichment and humidity controlling system.