0290-1624

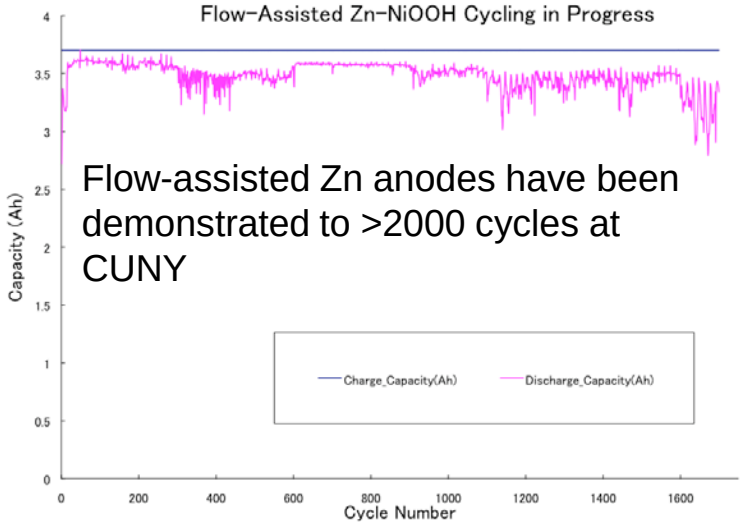
# GRIDS Flow-Assisted Rechargeable Zn-$MnO_2$ Battery /CUNY Energy Institute

## Technology Summary

The CUNY Energy Institute proposes to develop a novel flow-assisted rechargeable zinc-manganese dioxide (Zn-$MnO_2$) battery. Due to low cost basis materials, this battery has the potential to revolutionize the renewable energy industry, offering grid-scale energy storage for < $100 / kWh.

- CUNY's innovation of flow-assist Zn electrodes
- RBC's innovation of Bi-doped $MnO_2$ materials

These overcome long-standing cycleability challenges: Zn dendrite formation and $MnO_2$ irreversibility. Cost targets, cycle life, and power needs are met with these materials when operating at low depth of discharge (DOD), appropriate for stationary grid-scale applications.




Flow-assisted Zn anodes have been demonstrated to >2000 cycles at CUNY

## Key Personnel

CUNY EI: Sanjoy Banerjee, Dan Steingart, Steve O'Brien, Martin Klein

Rechargeable Battery Corporation: Lawrence Tinker, Ramesh Kainthla

The Ultralife Corporation: David Modeen

## Program Summary

Period of performance:
36 months

| | |
|---|---|
| ARPA-E funds: | $3,623,614 |
| Cost-share: | $1,654,016 |
| Total budget: | $5,277,630 |

| | Key Milestones & Deliverables |
|---|---|
| Year 1 | • 5 Ah lab-scale Zn-$MnO_2$ cell, max DOD study<br>• Zn and $MnO_2$ individually, 1000 cycles |
| Year 2 | • Gen 2 5 Ah cell >4000 cycles, >10% DOD<br>• Gen 3 5 Ah cell >2000 cycles, <$100/kWh |
| Year 3 | Subscale battery 1kW for 1 hr >10% DOD |

## Technology Impact

This system is designed as safe and modular, intended to be scaled from home to utility size, appropriate for siting throughout urban areas as needed, to a broad customer base: from the individual consumer with home-scale solar power utilization to power providers. Easily dispatchable electrical storage at < $100/kWh would revolutionize the U.S. grid. Zn and $MnO_2$ are considered primary battery materials, making the project high-risk. By using low DOD, this technology may leapfrog others due to cost.

**Grid-scale battery from extremely low cost materials**