



OFFICE OF  
ELECTRICITY DELIVERY &  
ENERGY RELIABILITY



# Advanced Membranes For Flow Batteries

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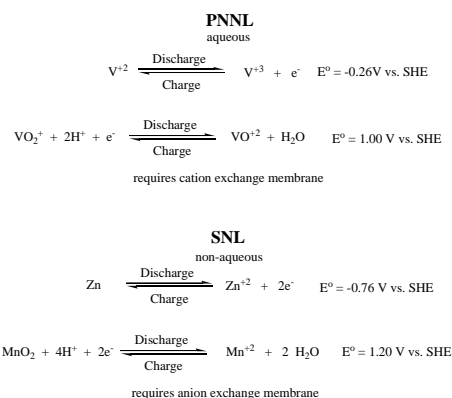
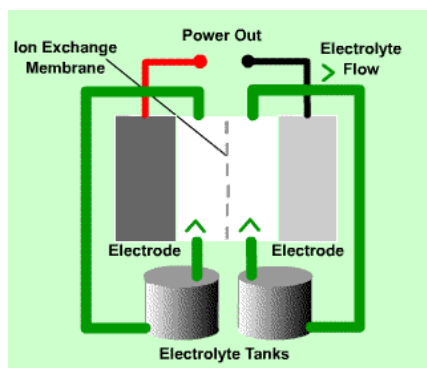
## Purpose

In this project we will design and synthesize hydrocarbon ionomeric membrane separators for the use for various flow battery chemistries in order to improve cell performance, enhance durability and reduce material cost

## Impact on DOE OE Energy Storage Mission

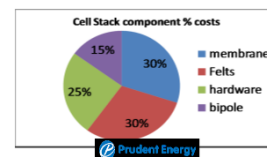
The current state of the art separator, Nafion, while displaying decent performance and durability, cost between \$200-\$400/m<sup>2</sup>. Sandia is developing materials with equivalent or better performance and durability that cost between \$10-\$20/m<sup>2</sup>.

This project is supporting two flow battery efforts funded under the Office of Electricity. The first is SNL non aqueous flow battery program and the second is PNNL traditional flow battery program [current focus is vanadium]

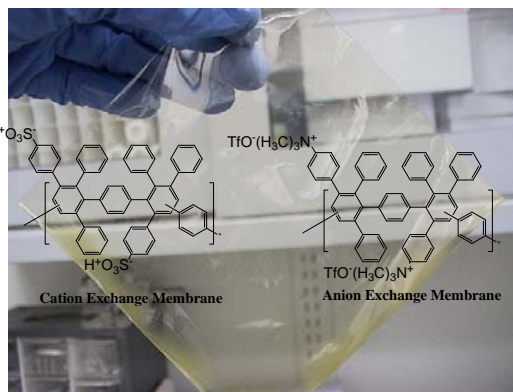


## Membrane Considerations I

- Impermeable to electro active ions
- High ion conductivity
- Electrically non-conductive
- Long lifetime
- Cost!



Sandia has developed and patented novel ionomeric poly(phenylene)s that display superior chemical, thermal and mechanical stability. These films have shown good performance as a separator in both proton and anion exchange membrane fuel cells and also show promise for use in flow batteries.



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