



# Durable Anion Exchange Membrane for High Energy Density Direct Fed Alkaline Fuel Cells

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Clean Energy for Better Life



## Market and Applications

- ❖ High energy density direct liquid ( $\text{NaBH}_4//\text{H}_2\text{O}_2$ ) fed fuel cells for undersea vehicle applications.
- ❖ Direct ethanol fuel cells for UAVs or soldier power. Collaborator: pH Matters, LLC.
- ❖ Other alkaline fuel cells

## Competitive Advantages

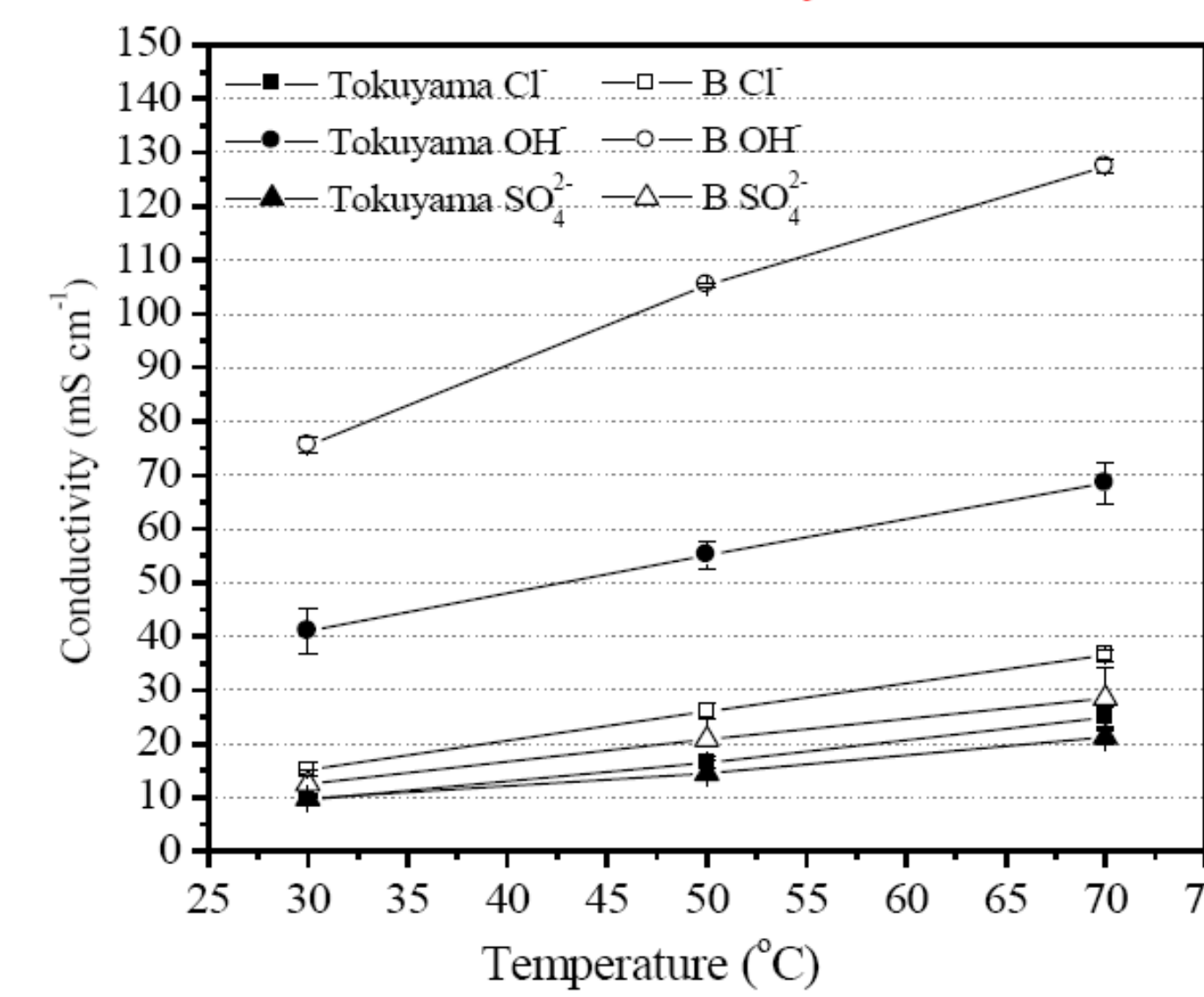
- ✓ High ion conductivity: 70 mS/cm
- ✓ Extremely low ethanol crossover: water/ethanol selectivity over 2000
- ✓ Alkaline stability: > 5000 hrs at 60°C
- ✓ Mechanically strong
- ✓ Much lower cost (\$60/m<sup>2</sup>)
- ✓ 3<sup>rd</sup> party validated (IIT/ONR)



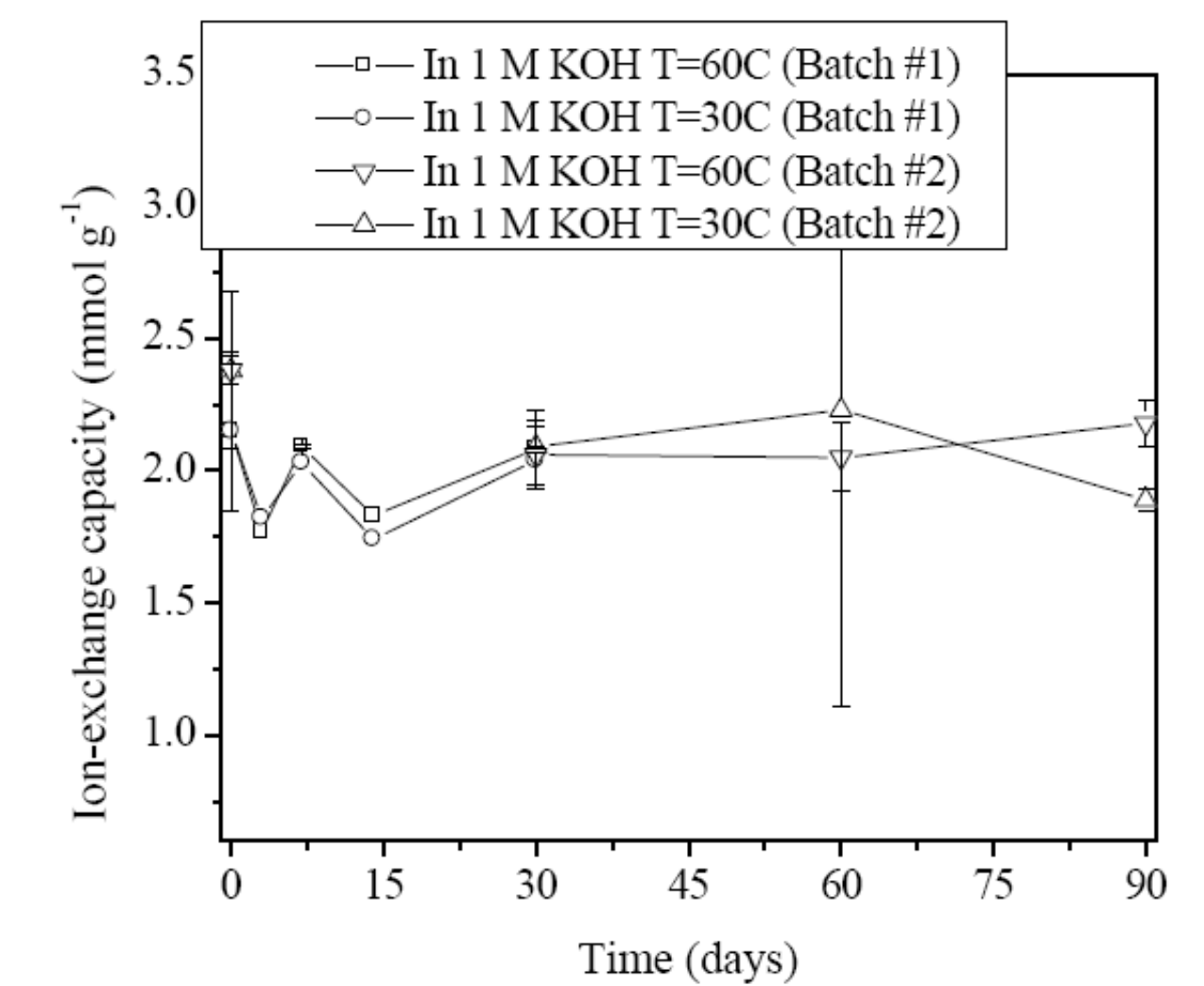
## Comparison Tests:

Tokuyama Membrane vs. B: Bettergy Membrane

Ionic conductivity: Results



Alkaline stability test results for AEM B: Results (Cl<sup>-</sup> ion exchange capacity)



**Ionic Conductivity**      **Alkaline Stability**  
(Courtesy: Dr. Ramani, IIT)

## Other Technologies

- ❖ Ion gate membrane for redox flow batteries
- ❖ Low cost, long cycle life battery for electric energy storage
- ❖ Very high energy density Li-S battery
- ❖ Very high power bipolar battery for sonobuoy applications

## Contacts

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