

Low Temperature NH₃ Cracking Membrane Reactor for H₂ Generation

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Project Vision

- ❑ Develop H₂ separation membrane and novel catalyst for low temperature NH₃ cracking
- ❑ Integrate catalyst and membrane into a membrane reactor system
- ❑ Build safe, low-cost, on-demand H₂ refueling stations

Project Impact

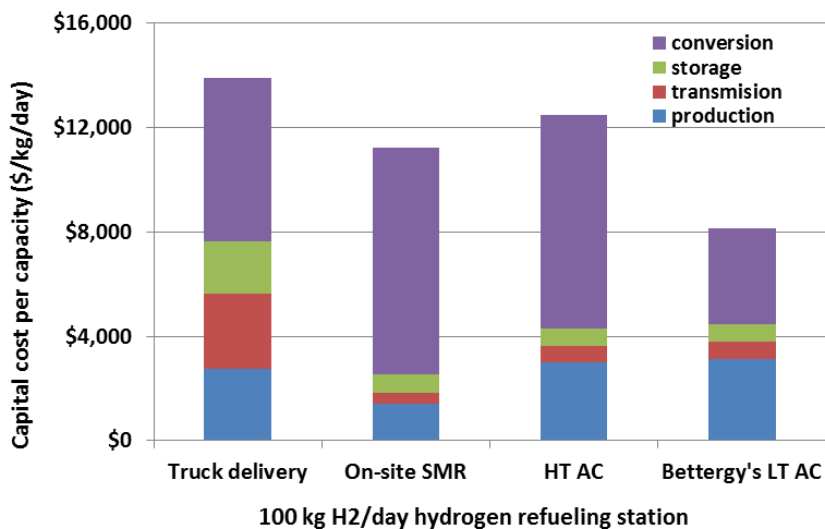
- Reduce cost barriers for H₂ refueling stations
- Reduce GHG emissions
- Maintain US leadership in \$15B fuel cell market



Innovation and Objectives

Innovation

- Innovative H₂ separation membrane and novel catalyst for **low temperature** NH₃ cracking (AC-MR)
- Integration of catalyst and membrane into a membrane reactor system
- Enables small on-demand H₂ refueling stations



Technical Objectives

Phase I -- Confirm the feasibility of **low temperature** AC-MR system

Phase II -- Demonstrate prototype AC-MR producing 10 L H₂/min

Phase IIS -- Establish partnership to commercialize AC-MR technology

Tech-to-Market Strategy

- **Partnership** with NYSERDA, H₂ generation and supply companies, fuel cell and FCEV manufacturers
- **The first market:** existing gas stations, H₂ refueling stations
- License and/or co-development

Innovation and Objectives

Project History

- Bettergy Corp. holds proprietary technologies in zeolite membrane separation and MR field
- SUNY—Buffalo has strong expertise in catalyst synthesis and characterization.



Proposed Targets

Metric	State of the art	Proposed
Temperature	700-1100 °C	<450 °C
Conversion	99%	>99%
Energy efficiency	~60	>80%
Cost per capacity	12,500 per\$/kg/day	8,141 per\$/kg/day
Lifetime	2-5 year	>10 year

Anticipated Challenges

Technical risks	Mitigation
Heat management	Flameless combustion of retentate gas to provide heat
Membrane sealing	Modularized tubular design

Desirable Partnerships

- NYSERDA – supporting green energy in New York State
- H₂ generation equipment manufacturers/suppliers
- Fuel cell manufacturers
- FCEV manufacturers
- Fuel station developers and owners