

# Fuel Your Sol:

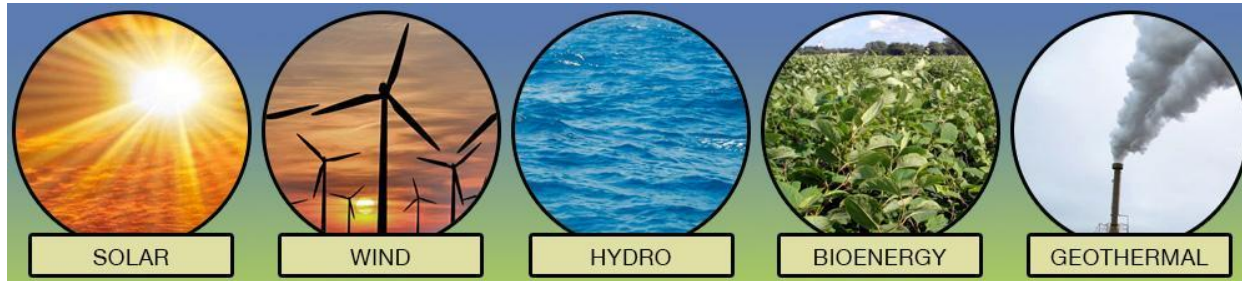
## An Exploration of Renewable Energy Storage

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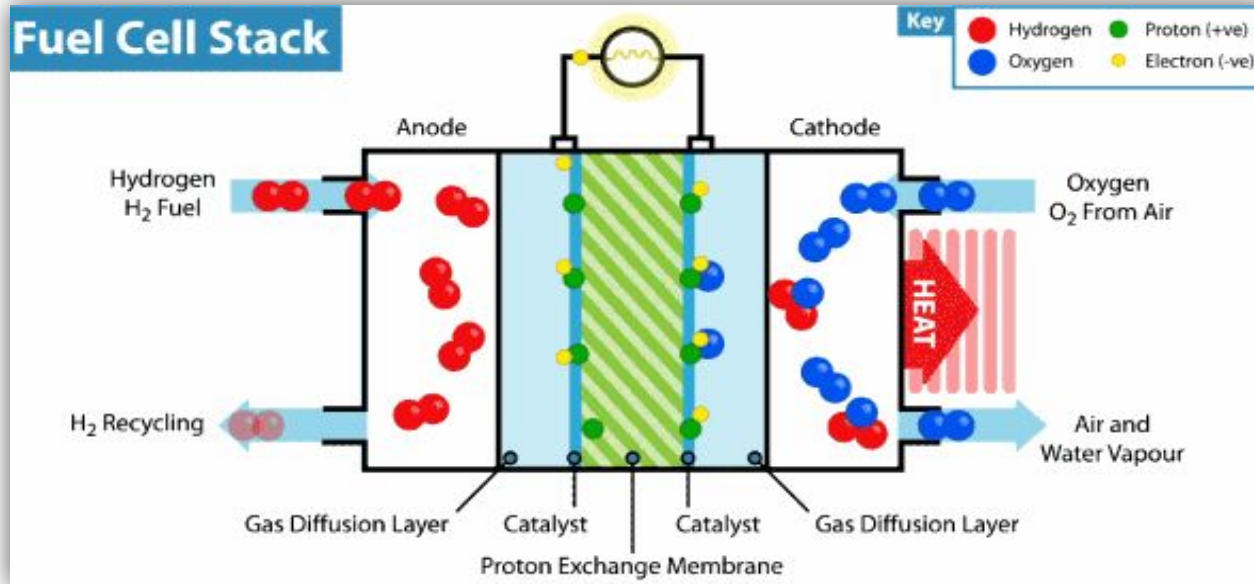


# Background & Direction of Progress

- Previously our team had planned to emplace a stand-alone fuel cell that would serve as a phone charging station
- We now believe that the best course would serve as a power source or an energy storage unit within a larger system.
- We believe that combining our project with the OPV solar umbrella will allow for a much more powerful system

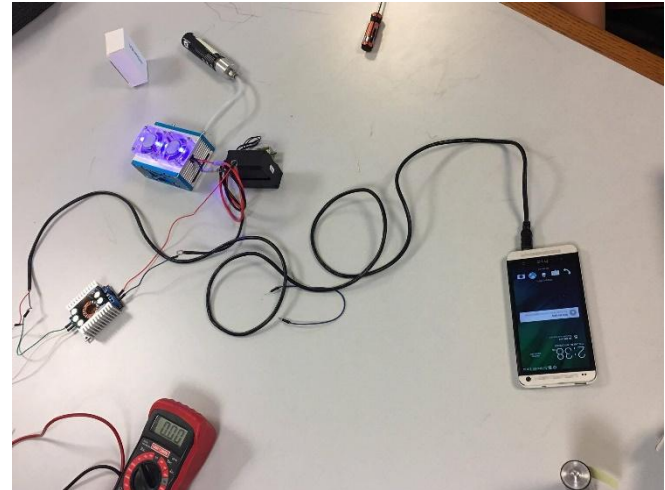


# Hydrogen Fuel Cell: How it works



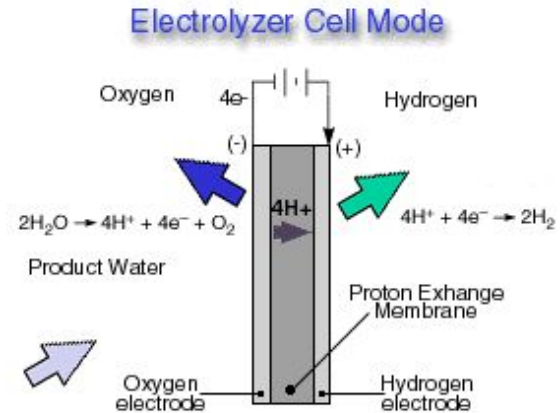
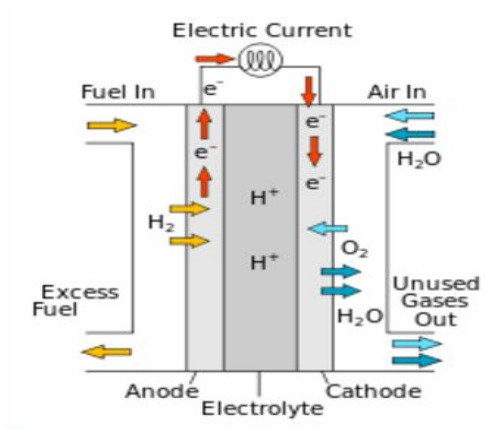
# Plating Design

- With the change to reversibility, needed to redesign the bipolar plates in order to control our flow and maximize time along the Proton Exchange Membrane (PEM).
- Furthermore, even with a plate design, we needed some way to create our own plates: decided on 3D printed plastic plates which we then paint with a conductive paint and then electroplate.

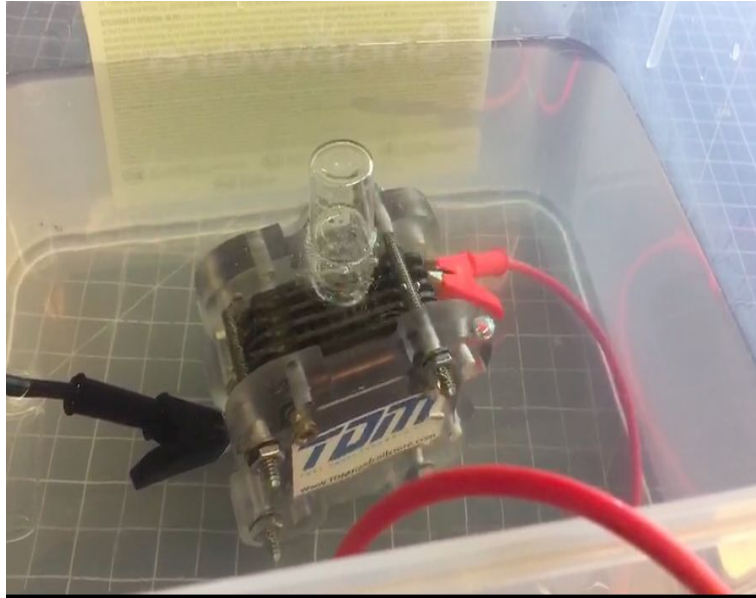


# Reversibility Design

- Started with a fuel cell that only ran the forward reaction, ended up getting new PEM materials in order to allow for a reversible fuel cell.
- However, needed to adapt the plate design and analyze both inputs/outputs of the fuel cell.
  - Since most of the reactants/products are gaseous, it's difficult to isolate/determine the compositions of flows.



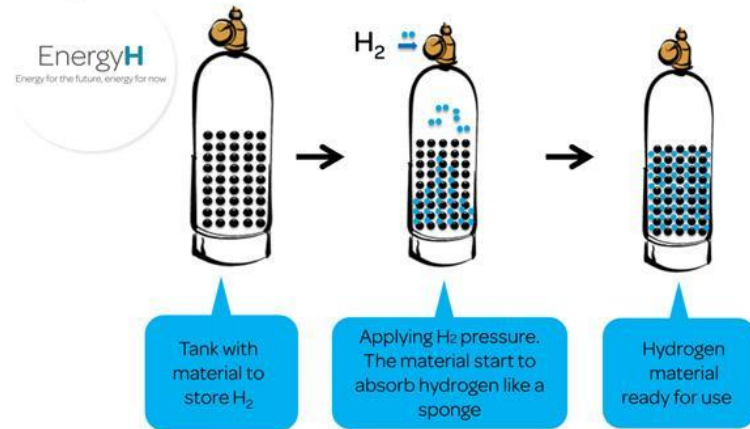
# Reversibility Testing



# Hydrogen Storage

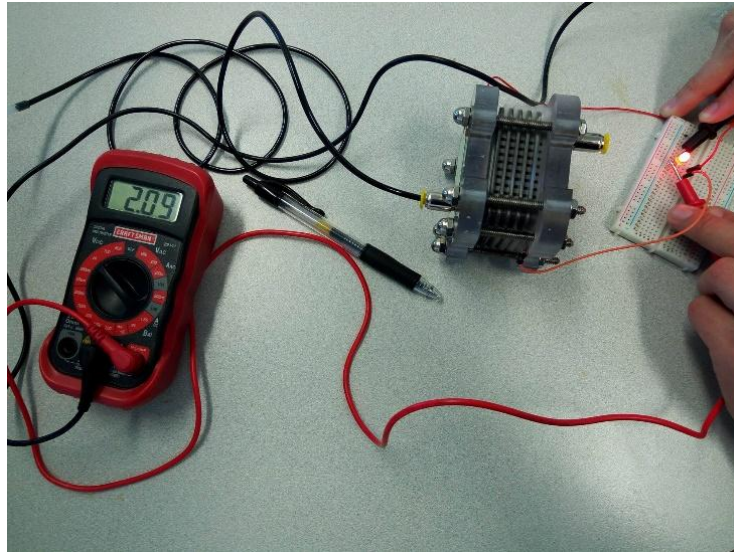
- Operating under the assumption that we are given a gas stream comprising of H<sub>2</sub> gas, we needed to find some easily operable reversible storage method.
- Of those, we only found six storage methods that were possible, and even fewer were feasible:
  - As a pressurized gas
  - As a liquid
  - Adsorbed onto a solid
  - As a metal hydride
  - Complex compounds
  - Oxidation of metals in water

## H<sub>2</sub> storage materials – basic principles



# System Integration

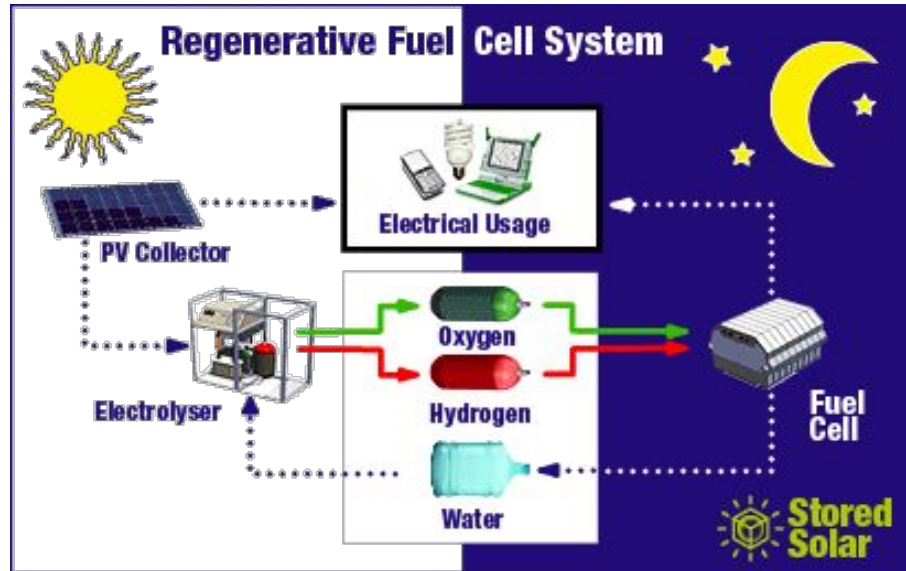
- Had to take down the old solar umbrella since it wasn't operating as it should, ran maintenance to ensure that it was operable.
- Furthermore, have to create a design in order to integrate the fuel cell into the wiring and enable it to charge while the panel is on and provide energy while the panel is off.





# Moving Forward

- Finish determining the composition of input/output streams, control appropriately.
- Design & implement hydrogen storage mechanism.
- Finalize design, work to implement it.
- Contact appropriate people to have it integrated into the current solar umbrella.



# Conclusion

- Renewable energy and energy storage are both topics of concern in the modern day.
- Fuel Your Sol aims to utilize solar power and hydrogen fuel cell technology to address these concerns where we can.
- We want to give members experience working together as a group towards a common goal.



Questions?