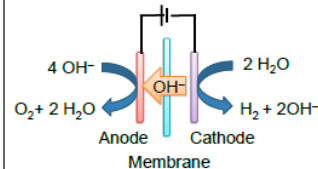


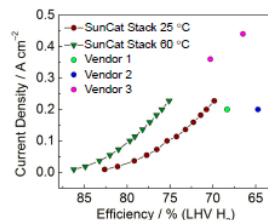
Renewable Fuel from Sunlight and Water

Electrolysis

Electrochemical Cell



Performance

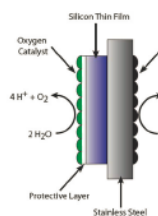
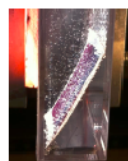


Cell Stack

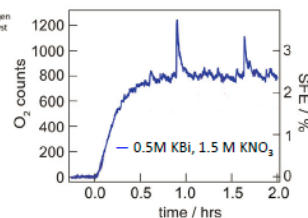


- Electrical energy is used to convert water into hydrogen at the cell cathode and oxygen at the anode.
- Sun Catalytix has successfully developed a 300W-scale prototype electrolyzer stack (left).
- The performance of this prototype compares favorably to commercial systems while using all non-noble metal catalysts, milder conditions than traditional alkaline systems and a low-cost cell design approach.

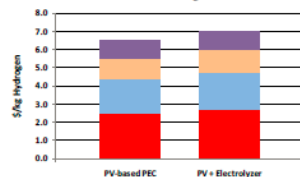
The "Artificial Leaf"



Performance



Cost Analysis



- A triple-junction a-Si solar cell has been integrated with H₂ and O₂ fuel-forming catalysts to form an "artificial leaf".
- This is the first demonstration of direct solar water splitting that integrates: 1) earth-abundant catalyst materials, 2) commercial silicon-based solar cell, 3) benign conditions, 4) wireless operation, and 5) reasonable efficiency.

Reece et al, *Science* 2011, 334, 645.

Solar Hydrogen

Particle-based photocatalysts offer a pathway to the production of H₂ from sunlight and water at transformational cost targets (\$2-3 / kg)

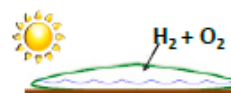
Semiconductor Photocatalyst



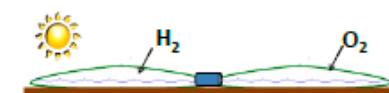
- Sunlight creates a wireless current in the photocatalyst particle.
- Electrons and holes are collected by H₂ and O₂-evolving co-catalysts.

Reactor Configurations

Single-Bed

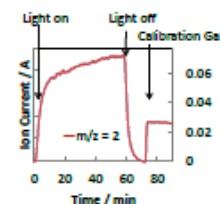
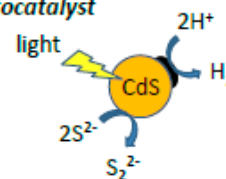


Dual Bed

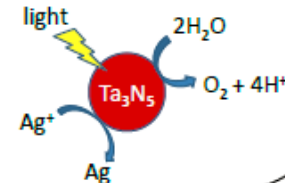
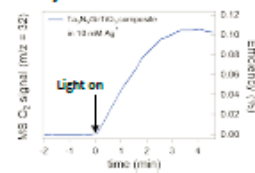


Photocatalyst Development

H₂ Photocatalyst



O₂ Photocatalyst



Advanced Research Projects Agency • ENERGY

Award No: DE-AR0000036

Sun Catalytix