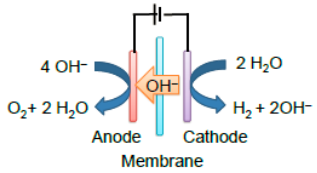
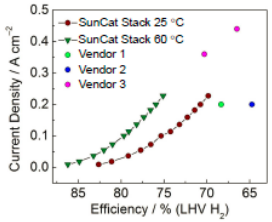
Renewable Fuel from Sunlight and Water

Electrolysis

Electrochemical Cell



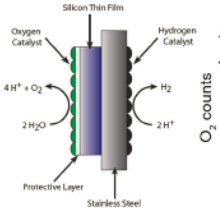
Performance



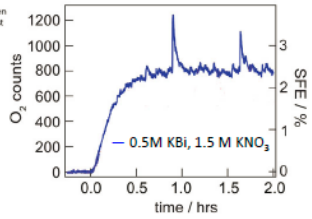
Cell Stack

- 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.

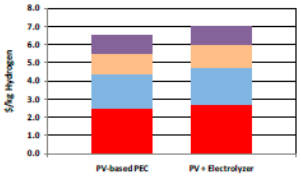
The "Artificial Leaf"



Performance



Cost Analysis



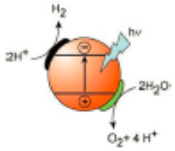
- A triple-junction a-Si solar cell has been integrated with H_2 and O_2 fuel-forming catalysts to form an "artificial leaf".
- This is the first demonstration of direct solar water splitting that integrates: 1) earth-abundant catalyst materials, 2) commercial silicon-based solar cell, 3) benign conditions, 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 H_2 from sunlight and water at transformational cost targets ($2-3 / kg)

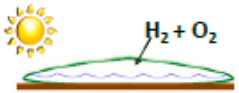
Semiconductor Photocatalyst



- Sunlight creates a wireless current in the photocatalyst particle.
- Electrons and holes are collected by H_2 and O_2 -evolving co-catalysts.

Reactor Configurations

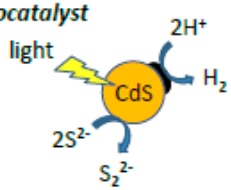
Single -Bed

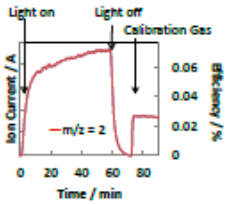


Dual Bed

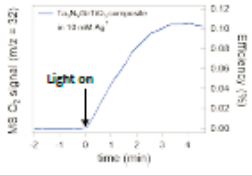
Photocatalyst Development

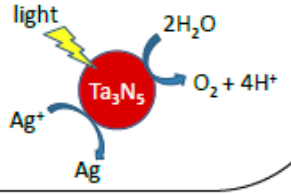
H_2 Photocatalyst





O_2 Photocatalyst





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