Washington University in St. Louis
Office of Technology Management

A HIGHLY EFFICIENT BRINE ELECTROLYZER

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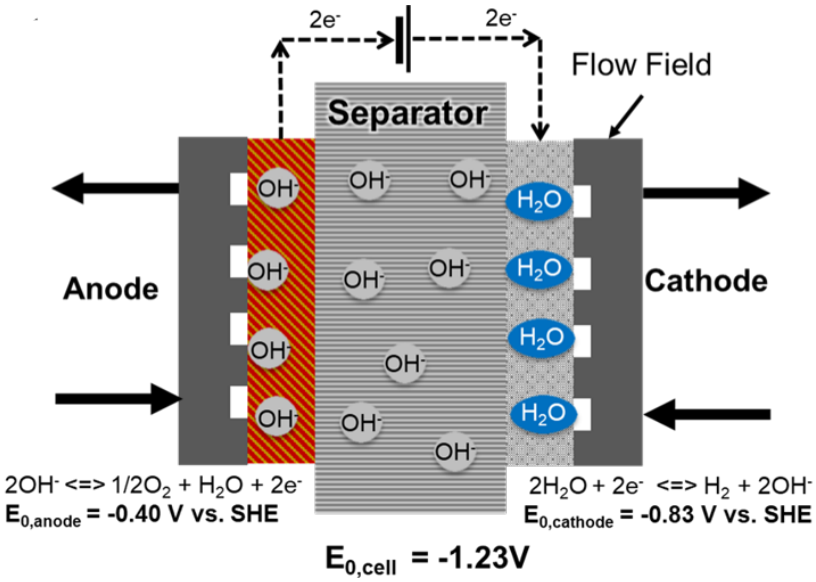
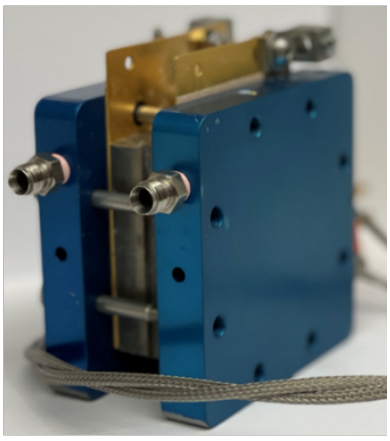
Technology Description

Researchers in the Ramani lab at Washington University have developed an electrolyzer capable of selectively splitting salty or brackish water into ultra-pure hydrogen and oxygen at high operating power densities. Originally designed to tap the perchlorate-rich water on the surface of Mars to produce oxygen and hydrogen fuel, this system can also be used to generate hydrogen fuel and oxygen from saltwater on Earth. This electrolyzer produces >25x the oxygen of NASA's MOXIE unit while consuming the same amount of power and achieves 2x the power density of deionized water electrolyzers.





Stage of Research

The inventors have constructed and evaluated a proof-of-concept electrolyzer that generates 2x the power density of existing AEM-based systems.

Publications

- Gayen P, Sankarasubramanian S, & Ramani VK. (2020). Fuel and oxygen harvesting from Martian regolithic brine. *PNAS*, 117(50): 31685-31689.
- New tech can get oxygen, fuel from Mars' salty water. *The Source*, Washington University in St. Louis.

Applications

- Hydrogen fuel generation from saltwater on Earth
- Oxygen and fuel generation on Mars for interplanetary exploration

Key Advantages

- Has 25x oxygen generation capacity of current NASA system
- Does not require purified water feed
- Can be operated at low temperatures

Patents: Pending

Related Web Links: Ramani Profile & Lab