

ISRU Advanced Alkaline Electrolyzer (AAE) BAA

Ian Jakupca (GRC), Dr. Thomas Valdez (Teledyne Energy System, Inc (TESI))



Project Overview: Develop and Test a Contaminant-Tolerant Water Electrolyzer for ISRU or Terrestrial Applications

Develop and test an alkaline water electrolyzer to produce oxygen and hydrogen from contaminated sources, such as ice mined on the Moon or Mars. Task modifies a TESI commercial electrolysis product to include features that minimize ISRU water processing (clean-up) requirements. The target production rate of $1.1 \text{ kg O}_2 / \text{hr}$ from $6.5 \pm 0.2 \text{ kW}$ electrical power results in 5.6 to $6.1 \text{ kW}/(\text{kg O}_2/\text{hr})$. The stack technology will demonstrate sustained system operation on water with a range of NASA-identified ISRU contaminants.

Technical Approach

- Modify existing COTS product to tolerate NASA-specified ISRU contaminants
- Demonstrate operation of single-cell on pure water and NASA-specified ISRU water
- Demonstrate multi-cell stack and system performance on pure water and on NASA-specified ISRU water
- JPL tests system performance and conducts accelerated life testing (BAA Option 1)

Results/Summary

- Demonstrated resilience to NASA-specified contaminants found in ISRU feedstock
- Multi-cell stacks and system hardware fabrication completed
- JPL started accelerated materials life testing and is preparing test facility for installing TESI electrolyzer test system



TESI Commercial Electrolysis Stack

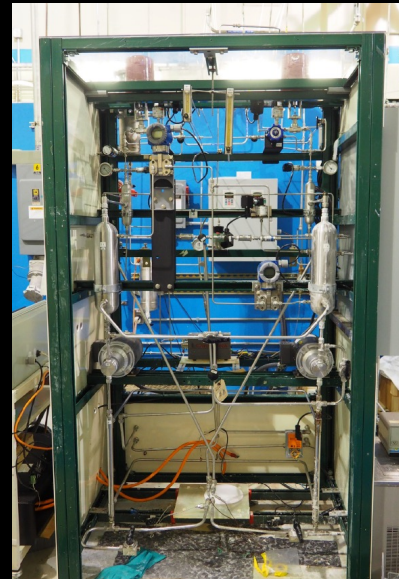
Contributing Partners

Teledyne Energy Systems, Inc (TESI)

Other ISRU BAA Activities (IHOP, etc.)

Infusion and Transition Plan

- ISRU follow-on activities still in formulation
- Continue reducing water clean-up requirements to expand the global participation in the Hydrogen economy by increasing access to 3rd world sites and reducing H₂ production cost towards the Biden Administration's \$1/kg H₂ goal



TESI Electrolysis Stack Test Stand
(at JPL awaiting installation)



10-cell Short-stack