

## Technology Area: High Power Density SOFC for Aerospace Applications

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- Description of Technology: High Power Density Solid Oxide Fuel Cell
  - Novel cell and stack design engineered to surmount materials issues limiting current state of the art SOFC's. Uniquely configured to operate at high power densities. New scalable material processes developed for fabrication.
- Potential Applications: Industry and technology applications for distributed power. High power cell, exceptional power density  $\geq 1\text{kW/kg}$ . Light weight/low volume and modular for aerospace. Portable for land-base applications.
- Relevance to Space Exploration: Human habitat; fuel generation
  - Mars: SOFC runs on CO/CO<sub>2</sub> to produce power and O<sub>2</sub>; CO/O<sub>2</sub> fuel
  - Lunar: SOE (electrolyzer) produces *pure* O<sub>2</sub> from CO<sub>2</sub> gas and/or H<sub>2</sub>O vapor. Can run in SOFC mode with same electrodes, utilizing H<sub>2</sub> or hydrocarbon gases and O<sub>2</sub> to produce electrical power + heat.
- Industry Co-developers and Industry Consumers:
  - Space act agreements: SOFCo, CWRU
  - Collaboration discussion scheduled: ENrG
  - Discussion/co-proposal: Lockheed Martin
- Current TRL Level: 3-4;
- Technical Risks Associated with Implementation:
  - mechanical robustness; long term durability in aggressive space environment. Low risk aero and ground applications implementation

