

Hydrogen Generator by Methane Pyrolysis with Carbon Capture (H₂Gen)

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Proposal No: X3.01-9527

Identification and Significance of Innovation

ORBITEC proposes to fabricate, and test a system to provide 99.999% hydrogen by efficiently performing methane pyrolysis.

The system has three unique features:

1. The methane pyrolysis reactor that does not rely on high single-pass efficiencies (which will make the system robust,
2. It incorporates batch processing modes, cleaning cycles, and a carbon capture device (which makes it reusable), and,
3. It uses palladium membrane technology to separate the hydrogen from the methane stream (which makes the H₂ effluent very pure).

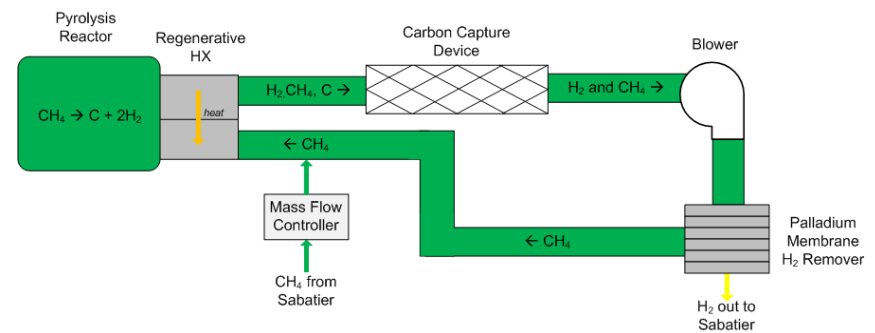
Expected TRL Range at end of contract (1-9): 4

Technical Objectives and Work Plan

The Phase I effort will primarily consist of the fabrication and testing of the primary components of the H₂Gen system.

Specific technical objectives that must be met include:

- Fabricate and test methane pyrolysis reactor
- Conduct gas analysis on reactor effluent
- Fabricate and test carbon removal mechanism
- Fabricate and test carbon capture device
- Test palladium membrane hydrogen remover
- Develop brassboard conceptual design for Phase 2



NASA Applications

When combined with a Sabatier system, the H₂Gen provides near complete closure of the water loop, an extremely important step towards creating a water-based economy for long-duration manned spaceflight.

Non-NASA Applications

The H₂Gen system will provide the same role of closing the water loop for commercial aerospace companies such as Bigelow Aerospace as it would for NASA.

Terrestrially, the H₂Gen can be used to create fuel from a fossil fuel for use in hydrogen fuel cells for power generation.

Contact

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