

# AFRL

## ADVANCED SPACE CRAFT ENERGETIC NON-TOXIC (ASCENT) GREEN MONOPROPELLANT

### SATELLITE MISSION BENEFITS

#### Increased Performance

- 10% higher specific impulse and 50% higher density impulse than Hydrazine
- Can fully reconstitute upon reheat

#### Fewer Co-Manifest Challenges

- Reduced physical risk to other satellites
- Reduced launch schedule risk
- Compatible with COTS storage materials

#### Reduced Mission Costs

Significant life cycle cost reductions:

- No SCAPE suit, equipment, inspections required
- Less labor and training

#### Simplified Handling and Transportation

Low toxicity propellant

- Simplified spill procedures
- Reduced shipping and disposal costs

### DEMONSTRATED ON ORBIT – GREEN PROPELLANT INFUSION MISSION

- NASA, Ball Aerospace, Aerojet Rocketdyne, AFRL
- Launched June 2019, Successful completion Oct 2020
- Demonstrated: ASCENT on orbit, ASCENT ACS, ASCENT GNC
- ESPA-class, five 1N thrusters
- AFRL loaded 14kg of ASCENT successfully



### ASCENT TECHNOLOGY PROGRAMS

#### ASCENT 1N THRUSTERS

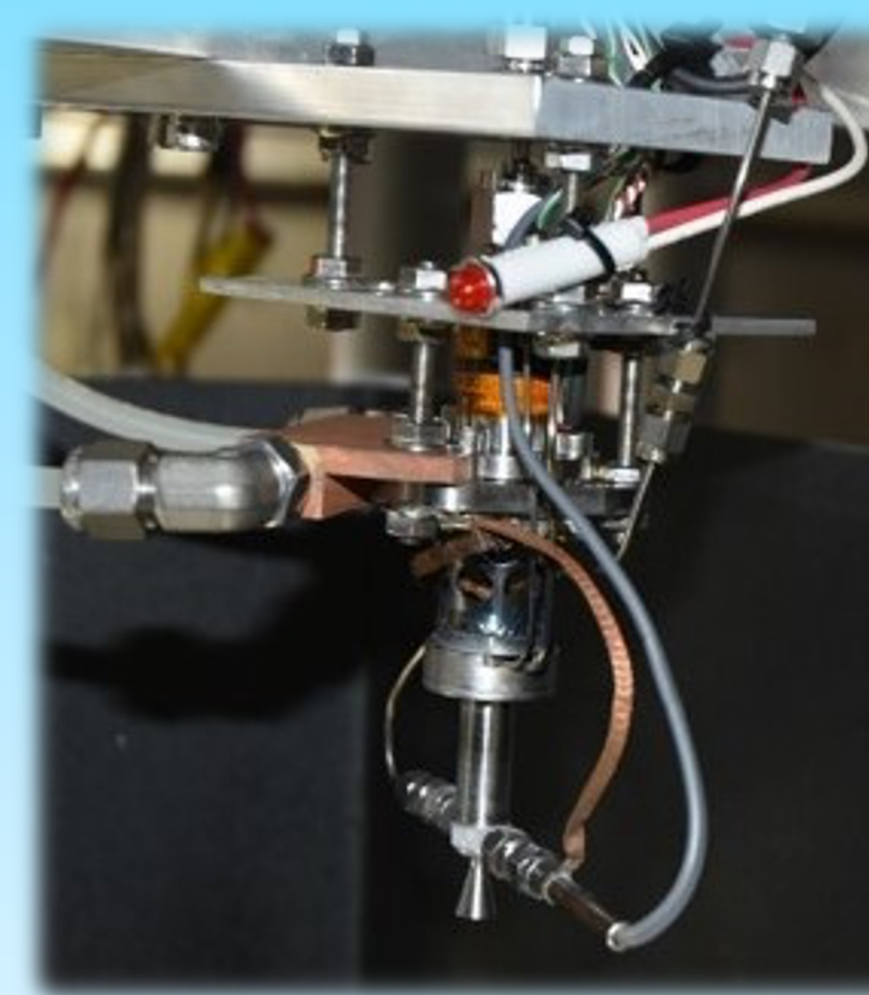
- Development thrusters successfully hot fire tested at AFRL Edwards, ECELL facility
- Flight weight thrusters on contract, expected completion FY25



Busek 1N



Plasma Processes 1N



Moog 1N

#### ASCENT Technology Programs

- 100mN to launch on Lunar Flashlight Propulsion System Spring 2022 – Plasma Processes
- 5N NASA SBIR – Plasma Processes
- 22N thruster Summer 2026 – Benchmark



ECELL at AFRL Edwards



Inside ECELL test chamber

### COMPATIBLE WITH COTS MATERIALS

#### METALS

**Long Term:** Gold, Pt/Rh 90/10, Ti, 3Al-2.5V, 6 Al-4V, CpTi

**Short Term:** Ti grade 19, CRES: 13-8PH, 15-5PH, 17-7PH, 17-4PH, 301, 302, 304, 316L, 321, Inconel 718

#### NON-METALS

**Long Term:** PEEK, PTFE, PFA, AF-E-332, SIFA, HDPE, Kalrez: 4079, 6375, 6380, 9100, Kynar, Masterflex, Polypropylene, Viton

**Short Term:** Hydrazine, EPDM, AF-E-411



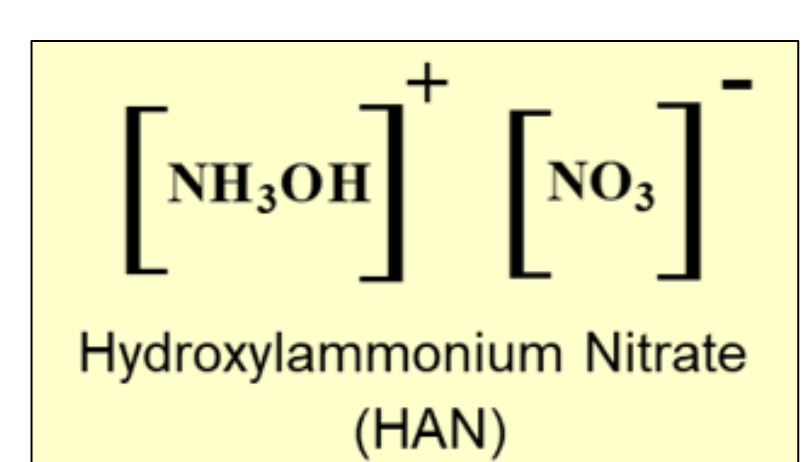
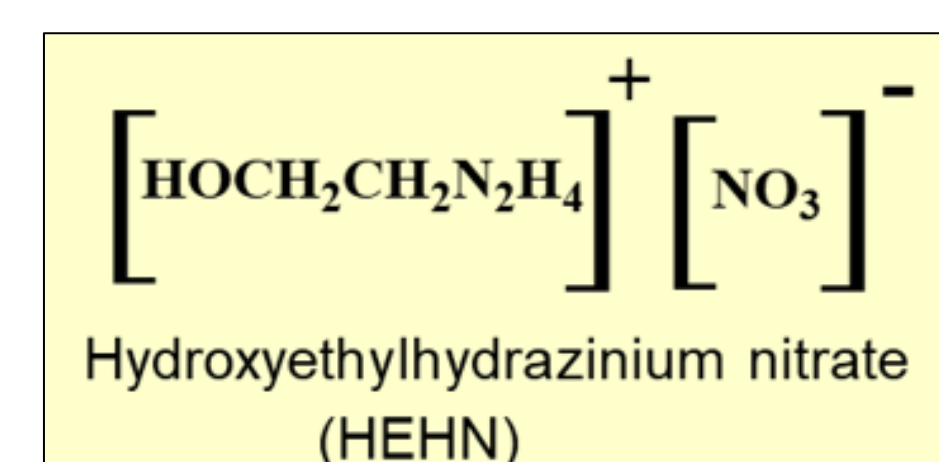
### LOW TOXICITY STORABLE GREEN PROPELLANT

- Formerly named AF-M315E
- Commercially available through Digital Solid State Propulsion

**Hazard Class:** 1.3C explosive  
**Density:** 1.46 g/cm<sup>3</sup>  
**Theoretical Isp at 300psi:** 266s  
**Vapor Pressure:** 1.4 kPa  
**Freezing Point:** -80C



Primary Constituents: HEHN, HAN, H<sub>2</sub>O



Products: H<sub>2</sub>O, N<sub>2</sub>, CO<sub>2</sub>, CO, H<sub>2</sub>