

## Strategic Technology Partnership Initiative GRC High-Priority Technology Areas

### Related to 2019 Accelerated Lunar Exploration in 2024:

#### Relevance Estimates:

Early Return: 2024 Lunar Crew mission

Sustainable: sustained lunar exploration

### Communications technology

Advanced RF (radio frequency) technology (sustainable)

Integrated RF and Optical Communications System (sustainable)

Cognitive Communications (sustainable)

Quantum Communications

Adaptable Communications architectures (early return) (sustainable)

### Power and energy storage:

Deployable solar arrays (early return)

High energy-density batteries (early return)

High power-density solid-oxide fuel cells (sustainable)

Low-temperature PEM fuel cells (sustainable)

Regenerative fuel cells (sustainable)

Autonomous power systems (sustainable)

### Space Propulsion:

High power-density electric propulsion (sustainable)

Two-phase fluid systems for reduced-gravity operations (sustainable)

### Sensors and Electronics for Extreme Environments

Pressure sensors with high temperature capability

Integrated pressure and temperature sensors

Silicon-carbide based electronics and sensors (sustainable)

Miniature chemical sensors in harsh environments (early return)

### Materials and Structures

Aerogels (sustainable)

Shape memory alloys and components (e.g., bearings, tires, actuators) (sustainable)

Ceramic composites (sustainable)

Thermal and environmental barrier coatings (sustainable)

Composite gears (sustainable)

### Space Resource Utilization:

Carbon Dioxide capture and conversion to fuel (sustainable)

Extraction of water from minerals (early return) (sustainable)

Extraction of oxygen from minerals (sustainable)

### CubeSat subsystems (relevant system scale and CubeSat Concept of Operations):

Chemical and electric propulsion

Communications

Remote-sensing instruments

Formation flying technologies

## **Enabling Advanced Aeronautical Science and Technology:**

### **Electrical machines and components for hybrid and all-electric aircraft propulsion**

- High power-density electrical motors
- High power-density power electronics
- High voltage cables
- Magnetic materials

### **Airbreathing propulsion (or gas-turbine engines)**

- Low NO<sub>x</sub> combustion technology
- Low noise technologies
- Cooled components for propulsion system hot section
- Aerodynamically efficient compressors
- Control systems for gas turbine engines