NASA Research Focus Areas (RFA)

RFA-176 Stereolithographic 3D Printing of Ultraviolet Curable Potting Compounds for Cryogenics

RFA-175 Repair, Manufacturing, And Fabrication (RMAF) Facility for the Common Habitat Architecture

RFA-174 Crew quarters internal architectures compatible with both microgravity and fractional gravity domains

RFA-173 Crew-worn restraints and mobility aids for microgravity spacecraft cabin environments

RFA-172 Ocean biology and biogeochemistry – Work in this focus area focuses on better understanding the ocean's role in the Earth System, and predicting future causes and impacts of change driven by Earth's climate, the environment, and event-scale phenomena on ocean biology, biogeochemistry, and ecology.

RFA-171 Synthesis activities that combine multiple data sets to analyze the vulnerability and resilience of Arctic and boreal ecosystems in the Arctic Boreal Vulnerability Experiment (ABoVE) domain, across North America, and across the circumpolar region.

RFA-170 Research that contributes to furthering our understanding of climate change impacts in high-latitude drainage basins, including coastal zones, and advance humanity's understanding of the potential feedback(s) of naturally- or anthropogenically-driven change in such zones.

RFA-169 Integration of research results and remote sensing data from ABoVE into a coherent modeling framework to diagnose and predict the impacts of environmental change on ecosystem dynamics and the consequent impacts on ecosystem services and society.

RFA-168 Filling critical research gaps in our understanding of how environmental change impacts the dynamics of boreal and Arctic ecosystems within the ABoVE domain.

RFA-167 Gas-Gas Interactions - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-166 Gas-Surface (heterogeneous) Interactions - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-165 Microstructural Analysis - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-164 Experiment deriving the fundamental properties of thermal protection systems - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-163   Re-usable Thermal Protection Systems Performance and Design - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-162   Ablative Thermal Protection Systems Performance and Design - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-161   Thermal Barrier Coatings - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-160   Ultra-High Temperature Ceramics (UHTC's) - physical chemistry of high-temperature materials used in atmospheric entry, low earth orbit (LEO), and interplanetary travel

RFA-159   Diagnostics for Arc Jet Characterization

RFA-158   Oxidation Protection of Porous Carbon Substrates for Ablative Applications

RFA-157   Thermal and Mechanical Property Measurements of Carbon and Organic Fiber Single Filaments and Tows

RFA-156   Lunar and Martian Sustainability of Additively Manufactured Materials

RFA-155   Development and Thermal/Mechanical Properties of Carbon Nanotube-Polymer Composites

RFA-154   Soft matter with specific focus on granular materials, colloidal science, rheology and other non-Newtonian Fluids

RFA-153   Development of an algorithm to invert 3D capacitance data to estimate 3D dielectric profile

RFA-152   Compact, deployable dual polarized low frequency (40-200 MHz) Log Periodic Dipole Array (LPDA) antenna for remote sensing of magnetic field of distribution inside large expulsions of plasma from the Sun's corona.

RFA-151   Photogrammetric methods to measure dynamic motions of structures and validate dynamic models

RFA-150   An autonomous method of structural repair of spacecraft

RFA-149   Self healing metals in space environments

RFA-148   Investigation into technologies that allow for autonomous printing such as in-situ monitoring or self-cleaning technologies.

RFA-147   Investigation of the durability and wear resistance of ceramic parts produced by additive manufacturing.

RFA-146   Optimization of process parameters for ceramic feedstocks used in additive manufacturing in a micro or reduced gravity processing environment.

RFA-144   Investigation of microstructural properties of ceramic parts produced by additive manufacturing compatible with microgravity.

RFA-143   Research into technologies that can print muti-material parts in a singular platform.

RFA-142   Development of methods for in-orbit repair and maintenance of spacecraft using metal additive manufacturing.

RFA-141   Research on ways to improve the quality and consistency of metal AM part produced in microgravity.

RFA-140   Study solidification behavior in simulated microgravity environments.

RFA-139   Study the effect of processing temperatures for bound metal additive manufacturing with an emphasis on how temperature profiles may change in microgravity.

RFA-138   Research into the optimization of process parameters for bound metal deposition additive manufacturing with an emphasis on micro- or reduced gravitational effects.

RFA-137   Investigation of microstructural properties of metal parts produced by bound metal deposition additive manufacturing with an emphasis on micro- or reduced gravitational effects.

RFA-136   Development of new bound metal feedstocks for additive manufacturing using non-solvent based debinding.

RFA-135   Development of lunar, ISRU-based, "waterless" cementitious materials for construction

RFA-134   Lunar regolith simulants

RFA-133   Synthetic biology applications to construction of infrastructure elements

RFA-132   Creating instrumentation to verify structural properties/integrity in space

RFA-131   Reducing water content in concrete

RFA-130   Logistics studies for outfitting

RFA-129   Landing pad design

RFA-128   Outfitting

RFA-127   Concrete chemistry that will lend itself to applications on Earth, as well as space.

RFA-126   *Lunar surface navigation using AI-assisted feature identification*

RFA-125   Artificial Intelligence and Machine Learning Methods for Distributed Planning, Scheduling, and Execution Robust to Communication Delays

RFA-124   Quantum Characterizations of classical optical communications links

RFA-123   Fundamental physics requiring quantum sensing in space. Astrophysical, cosmological or fundamental physics concepts requiring quantum systems and sensors in space. Examples include gravitational wave observation, dark matter or dark energy searches, quantum foundations

RFA-122   Optical lattice clocks for space applications. Ultra-precise time keeping with low size, weight and power for deep space position, navigation and timing. Optical time transfer methods for dissemination of ultra precise clocks.

RFA-121   Quantum magnetometry for space systems: Spin- or defect-based magnetometers with wide bandgap semiconductors or laser cooled atom systems. Capabilities for low size, weight and power, radiation hardening and operation in extreme environments

RFA-120   Laser optical systems for cold atom sensors: Development of high power (>1 W), ultra narrow linewidth (<1 kHz) modular laser systems at 780nm or 852nm for integration with cold atom interferometers, cold atom inertial sensors and optical lattice clocks.

RFA-119   Quantum gravitational sensors: Robust cold atom sensors for space-based gravity gradiometry and gravimetry. Development of low size, weight and power systems utilizing high flux cold or ultra cold atom interferometers based on Rb, Cs or other alkali species for gravity or inertial sensing.

RFA-118   Develop autonomous systems for weld and Additive Manufacturing microscopy (e.g. polishing, etching, imaging)

RFA-117   In-space joining: enabling technology for the space economy

RFA-116   Integrated Computational Materials Engineering (ICME) & Multi-Physics Modeling Work-Flows for Optimization of and Detailed Computational Characterization of Existing Materials and for Novel Materials Discovery.

RFA-115   Technologies for autonomous collaborative planetary multi-robot systems

RFA-114   Quantum Computing as a Service

RFA-113   Novel QKD+Chaotic Communications

RFA-112   Quantum Characterizations of classical optical communications links

RFA-111   Low Cost Space Optical Communications

RFA-110   Orbital Angular Momentum for Space Communications

RFA-109   Deep Learning and Neural Networks for Optical Communications

RFA-108   Quantum Clock Synchronization

RFA-107   Quantum Optics

RFA-106   Trash Processing – Recycling and Resources Extraction from Space Logistical Waste

RFA-105   Development of reduced-volume acoustic liner concepts for subsonic aircraft and/or urban air mobility (UAM) applications

RFA-104   Phytoplankton Biodiversity of Inland Waters (South Africa – NASA BioSCape Project)

RFA-103   Low Earth Orbit Downmass Concepts: Development of small, unmanned re-entry vehicle concepts that provide small volume and downmass capabilities designed to deliver products created on the International Space Station to the Earth.

RFA-102   Building Bridges in Biosciences: Creating novel teams of researchers and technologists that collaborate to advance one or more of the following space life sciences topical areas: instrumentation, facilities, databases, artificial intelligences/machine learning, and mission concepts. Proposals must demonstrate benefit to both the astrobiology and space biology communities.

RFA-101   Inorganic Solid-electrolytes Processing and Scale-Up

RFA-100   Multifunctional Structural Materials for Extreme Space Environments

RFA-099   Improvements for Entry, Descent and Landing

RFA-098   Wireless Communication for Avionics and Sensors for Small Spacecraft Space Applications

RFA-097   Water Electrolysis: Includes proton exchange membrane and alkaline electrolyzers.

RFA-096   Utilization of Machine Learning Approaches for Efficient Estimation of Vector Magnetic Fields from SDO/HMI and SoHO/MDI

RFA-095   Transfer Function of Nondestructive Evaluation Response of Cracks and Notches

RFA-094   Tissue and Data sharing for space radiation risk and mitigation strategies

RFA-093   THz limb sounding of the thermosphere

RFA-092   Thermal Batteries: Includes new cell chemistries and spacecraft applications.

RFA-091   The dense, warm interstellar medium

RFA-090   Testing: Ground testing capabilities for small satellites in a realistic environment to perform; Small Satellite inspection flight hardware qualification testing; Small Satellite docking demonstration in a realistic environment

RFA-089   Technologies That Enable Large Swarms of Small Spacecraft

RFA-088   Submm-wave and IR polarimetry for cloud remote sensing

RFA-087   Studying phytoplankton ecology and community composition, both in situ and derived from ocean color remote sensing.

RFA-086   Stereo imaging from space

RFA-085   Spearheading big data analysis using satellite ocean color remote sensing products and field measurements, and create and validate bio-optical algorithms.

RFA-084   Spacecraft Battery Design, Test and Operation.

RFA-083   Space radiation sex-differences

RFA-082   Solid-state electrolytes including polymer/composite polymer electrolyte

RFA-081   Solar power from the cell to the array level, ground and in-space testing of photovoltaic systems, mission support of solar powered spacecraft

RFA-080   Societal ramifications of ethical decision making

RFA-079   Small Spacecraft Lunar Communications and Navigation Networks

RFA-078   Small Spacecraft High-Bandwidth Interoperable Space Layer and Networking for Cislunar and Deep Space

RFA-077   Seismometry to meteorology and other science measurement preparation

RFA-076   Satellite and Ground Communication systems

RFA-075 Safety of Electro-mechanical Powertrains for Electrified Vertical Takeoff and Landing (eVTOL) Vehicles

RFA-074 Research Fellow for Advanced Manufacturing of Sensors and Electronics

RFA-073 Remote Sensing of Land Use/Cover Changes, Vegetation (forestry, agriculture), Fires

RFA-072 Propulsion : Develop propulsion technology for small satellite proximity operations maneuvers; Provide propulsion performance to meet inspection time and coverage requirements; Ensure propulsion fault tolerance for reliability

RFA-071 Printed sensors (environmental, biosensors, structural health monitoring)

RFA-070 Portable, non-ionizing radiation based, high resolution disease detection imaging

RFA-069 Policy/Standards/Law Making Assessment

RFA-068 Pilot studies to demonstrate the utilization of full systems biology approaches in addressing human spaceflight risks

RFA-067 Pilot studies to adopt terrestrial precision health solutions for astronauts

RFA-066 Phytoplankton pigments and derivation of phytoplankton composition

RFA-065 Orchestrating multiple community driven efforts to standardize data collection, analysis, and management approaches; an example technical manual can be found here: https://repository.oceanbestpractices.org/handle/11329/1705

RFA-064 Novel thermal management of the propulsion components and/or of the propulsion system.

RFA-063 Nondestructive Evaluation of Additive Manufacturing

RFA-062 Multi-Physics Modeling: Thermal, fluid dynamics, electrochemical modeling for a wide range of reactor and device applications.

RFA-061 Molten Regolith Electrolysis: High temperature electrolysis of lunar and Martian soils to generate oxygen gas and metals.

RFA-060 Molecular clouds and star formation

RFA-059 Modeling, analysis, and support from field data for Venus related seismometer

RFA-058 Model Zoo" of pretrained biological models for transfer learning on space biology datasets

RFA-057   Mineralogy, geochemistry, and water-rock interactions

RFA-056   Materials development for additive manufacturing

RFA-055   Manufacturing and integration of low-cost, robust, reusable thermal protection systems with high temperature capability

RFA-054   Machine Learning-Based Detection of Flood Extent and Impacts

RFA-053   Lunar manufacturing of solar cells and sensors

RFA-052   Low temperature performance and thermal management

RFA-051   Li-ion and beyond Li-ion battery technologies such as metal-air

RFA-050   LEO manufacturing support (additive, advanced materials, thin layer processing)

RFA-049   Laser Communication

RFA-048   Inflammasome role in radiation-associated health impacts

RFA-047   In Situ Monitoring of Additive Manufacturing

RFA-046   Improved Understanding of Solar Microflares using Data Science

RFA-045   High Temperature Batteries: Includes primary and secondary cells up to 460oC.

RFA-044   High reliability and robustness for safety-critical propulsion systems including but not limited to a) arc fault protection; b) EMI/filtering; c) fault tolerant architectures; d) power management.

RFA-043   High power density power grids, power electronics, motors, and electromechanical powertrains

RFA-042   High capacity anode and high capacity/high voltage cathode

RFA-041   GNSS radio occultation (RO) for PBL

RFA-040   GNC: Mature guidance, navigation, and controls algorithms and hardware applied to small satellites performing inspection and rendezvous maneuvers; perform statistical studies and simulations to formulate damage probability metrics in support of a damage aware control system
- Mature Verification &Validation of GNC algorithms for RPOC capabilities
- Innovative reliable flight-ready low-cost sensors to enable rendezvous and proximity operations

RFA-039   Fuel Cells POC: Includes proton exchange membrane and alkaline fuel cells.

RFA-038   Formation of molecular clouds

RFA-037   Explore and document the parameters in play in the transition of ethical decision making from humans to autonomous systems

RFA-036   Evaluation space capsule and spacesuit activity in stable and fit lower or upper extremity amputees and compare their responses to non-amputee fit individuals

RFA-035   Electrochemical Sensors: Includes electrochemical impedance spectroscopy, dielectric spectroscopy.

RFA-034   Earth Science Remote Sensing

RFA-033   Document the Current State-of-the-Art/Practice of Ethical Decision Making by Humans in Operational Systems

RFA-032   Document legal ecosphere of ethical decision making in off-nominal scenarios

RFA-031   Development of Uranium based Fuels for Nuclear Thermal Rocket Propulsion

RFA-030   Development of materials for extreme environments

RFA-029   Development of high-temperature refractory alloys and coatings

RFA-028   Development of Coating Materials for Nuclear Thermal Rocket Applications

RFA-027   Development of Characterization Techniques to Determine Rate and Temperature Dependent Composite Material Properties for the LS-DYNA MAT213 Model

RFA-026   Development of advanced soft magnetic materials for high-power electronic systems

RFA-025   Development and elaboration of Functional aids and testing paradigms to measure activity for use by parastronauts during spaceflight

RFA-024   Design, Development, & Implementation of Highly Automated / Autonomous Systems to abide by ethical decision making policy, standards, guidelines, and laws

RFA-023   Current & projected autonomous performance capabilities and limitations

RFA-022   Compound screening techniques to assess efficacy in modulating responses to radiation exposure

RFA-021   CO2 Reduction: Electrochemical conversion of CO_2 to various products including carbon monoxide and ethylene.

RFA-020   Chemical Heat Sources: High specific enthalpy systems including lithium-sulfur hexafluoride reactors for long-lived heat for planetary and lunar missions

RFA-019   Charting a successful course for field campaigns on behalf of NASA missions, including coordinating and supporting laboratory analysis of field samples (particle absorption, carbon) and data processing and collection and analysis of plankton images using in-flow imaging cytometry.

RFA-018   Beyond Lithium-Ion Cell Chemistries: Includes fluoride-ion, magnesium-ion, calcium-ion cell chemistries.

RFA-017   Balloon-based remote sensing of geophysical activity on Venus using infrasound

RFA-016   Bacteria, Archaea, and Fungi are capable of altering terrestrial materials as a way to acquire organic carbon and or trace nutrients.

RFA-015   Autonomy and GNC for multi-agent systems including formation flying, and spacecraft swarms

RFA-014   Autonomous System-Level Fault Diagnosis and Mitigation

RFA-013   Astrophysics Research and Analysis, and Technology Development

RFA-012   Artificial Intelligence (AI)/Machine Learning (ML) for Small Spacecraft Swarm Trajectory Control

RFA-011   Arctic phytoplankton ecology, ocean color remote sensing and optical properties, particularly the Chukchi Sea.

RFA-010   Application of Machine Learning to LNOx Estimation from Satellite Lightning Mappers

RFA-009   Application of advanced materials and manufacturing to achieve above.

RFA-008   Analytical and methodological pipelines that investigate the stoichiometry, elemental abundances, fluid chemistry and size distribution patterns of entrained particles in order to determine the probability for biological origin.

RFA-007   Analytical and methodological pipelines that investigate organic molecular patterns to identify the source and physicochemical history of naturally occurring suites of compounds and developing metrics that can differentiate between biological and abiotic reaction products.

RFA-006   Alternative materials for magnetized liner z-pinch implosions

RFA-005   Algorithm development for, and applications of, optical/thermal imagery for studying freshwater and coastal regions

RFA-004   Self-Healing/Resilient Multi-Agent Systems

RFA-003   Advanced Primary Battery Cells: Includes Lithium carbon monofluoride, lithium thionyl chloride, lithium sulfur dioxide, lithium iron sulfide, high temperature cells, ultra-low temperature cells.

RFA-002   Advanced Lithium-Ion Battery Cells: Wide operating temperature, low temperature, high temperature, high specific energy/high energy density cells, specialized electrolytes

RFA-001   Additive manufacturing and additive manufacturing of electronics