



23 - 26 June, 2025  
Norfolk, VA

# NSMMS

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

# CRASTE

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO  
SPACE TECHNOLOGY EXCHANGE



Abstract Due Date: 7 January 2025

# CALL FOR ABSTRACTS

**NSMMS**

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# JOIN US!

You are invited to participate in the **National Space & Missile Materials Symposium (NSMMS)** and the **Commercial and Government Responsive Access to Space Technology Exchange (CRASTE)** to be held 23 - 26 June 2025. These co-located Symposia continue their outstanding legacy in bringing together technologists, users, and decision makers from across the Nation. Discussions involve key technology issues related to space, missiles, hypersonic systems, and a variety of ground-breaking commercial space topics necessary for our country's defense and research and development pursuits.

**NSMMS** focuses on aerospace industry needs and most recent advances to enable new capabilities for challenges associated with new and future space and missile systems. A special focus is given to advanced materials technology and testing, manufacturing and producibility, structural applications, concepts and prototype system development, and flight test evaluation, which are crucial to improve performance and reliability of both defense and commercial systems.

**CRASTE** brings system integrators and subsystem technology experts together to improve space access, mobility & logistics (SAML) capabilities, lowering cost, and increasing responsiveness. Special focus is given to the integration of emerging technologies, including advanced concepts, with space-access and in-space maneuver architectures to create new markets and improve existing systems for government and commercial users.

The 2025 forum will have a joint senior level Plenary Session, a variety of technical sessions covering ground-breaking research and technology, an exhibit show, a student grant program which promotes college-level participation in science and technology, a small business forum designed to forge connections between primes & SBIR agencies with small businesses, a work-share and job board program to promote workforce development, and multiple networking events.

NSMMS & CRASTE attendees will have access to all the technical sessions at both events. These events share significant support from DoD, DOE, FAA, and NASA with an effort to promote the commercial and government space, missile, and space launch communities. Each year, our industry and academic partners help ensure that we focus on the latest advancements and challenges affecting industry. We invite you to submit an abstract that discusses the leading-edge technology or research your organization is working on, as well as engage your organization through exhibiting, sponsoring, or participating in our outreach programs.

For more information on the event,  
visit: <https://www.usasymposium.com/space/default.php>

## EVENT SECURITY INFORMATION

These Symposia are restricted to U.S. citizens who work for a U.S. company or organization. The events are ITAR Restricted in accordance with DoD Directive 5230.25 under the provisions of the Arms Export Control Act; and contain Military Critical data. This event is not open to the general public. Green Card holders are not permitted to attend; born or naturalized U.S. citizenship is required.

**All non-government attendees must have an active DD 2345 (Military Critical Certification) at the time of the event to attend.** Please make it a priority to check the status of your DD 2345. If you do not have one, you should start the process of obtaining one as soon as possible. If yours is expiring prior to the event, start the renewal process right away. The process to obtain or update one has become increasingly complex and processing time is unpredictable.

For more information about this and other security aspects of the event, please visit our website at [www.usasymposium.com/space/security.php](http://www.usasymposium.com/space/security.php).

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# TOPIC AREAS

## Topic 1 (NSMMS): Advanced Topics in Additive Manufacturing

This topic area focuses on recent developments in additive manufacturing (AM) methods and materials for diverse aerospace applications including structural, thermal management, energy storage, and propulsion components. Some areas of emphasis include:

- » Correlation of processing parameters with materials properties and performance;
- » Integrated computational and materials engineering tools;
- » Refractory metals, super alloys, and fiber reinforced polymer and ceramic composites;
- » Part/process qualification, certification, verification, and validation;
- » Nondestructive inspection and in-situ monitoring with or without machine learning;
- » Case studies in design and development of AM processed components; and
- » In-space manufacturing.

## Topic 2 (NSMMS): Ablators and Mars Sample Return

This topic focuses on the design, development, and testing of ablative thermal protective systems (TPS) and their constituents that have application in space exploration or strategic reentry missions. Areas of interest include novel and synergistic combinations of constituents and enhanced-performance architectures to allow improved thermal protection capabilities. In addition, cost and schedule-efficient advanced manufacturing allowing novel TPS geometries topics are desired. Understanding the charring of compositionally and structurally complex ablator systems, as well as volatile transport and heat-transfer mechanisms in extreme environments and their impact on performance also fall within this topic area.

## Topic 3 (NSMMS): Development, Processing & Testing of Novel Materials

This topic addresses emerging material innovations at lower TRL levels (1-3), encompassing both materials science and process development. Topic areas include novel and next-generation materials with improved properties, improved property retention in extreme environments, or novel materials processing. This may include microstructure, properties and/or processing of multifunctional materials, ceramics, metal alloys, shape memory alloys, composites, high temperature fiber development, thermoelectrics, sensors, and more.

## Topic 4 (CRASTE): Down Mass Re-Entry Capabilities

This topic includes existing and emerging platforms for sounding rockets, LEO, MEO, GEO, and reentry/ascent to deliver or land payloads and experiments into their desired location. Abstracts are encouraged, but not limited to the following:

- » Near term capabilities in development for delivering payloads into the desired environment;
- » Pico/nano re-entry systems;
- » Reusable upper stages;
- » Hot structures for entry;
- » Fairing recovery;
- » Lunar, planetary, comet, asteroid (sample return);
- » Decelerators;
- » Unique CONOPS approaches;
- » Emerging methods for disposal of on-orbit assets;
- » Recent or near-term flight test activities;
- » Requirements and understanding of projected payloads, orbits, and capabilities of emerging systems including associated technical challenges and timelines; and
- » Government practices, programs, and technologies which potentially benefit the emerging suborbital and small launch industry.

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## Topic 5 (NSMMS): Ground & Flight Test Methodologies

This topic area focuses on the development and utilization of ground and flight test capabilities to support material, component, and system development. The renewed interest in hypersonics, as well as space access has resulted in the identification of gaps in the available test and evaluation infrastructure, as well as work force attrition. The aerospace community has recognized these gaps and has invested funding to improve the test capability and capacity supporting flight and space system development. These investments are focused on risk reduction to ensure that technology maturation can be adequately accomplished prior to operational fielding. System component T&E capabilities of interest include seekers, nose tips, leading edges, thermal protection systems, control surfaces, and propulsion systems. Topics covered in this session include test and evaluation capability with respect to:

- » Test and evaluation infrastructure modernization and work force development within DoD, industry, and academia;
- » Simulation of environments to address aerodynamics, aerothermodynamics, combined thermostructural, electromagnetic and radiation effects, boundary layer transition, space environments, environmental extremes, and weather encounter;
- » Details on recent ground and flight test results and campaigns; and
- » Ground and flight test and evaluation methodologies including digital engineering, modeling and simulation, test plan development, test fixture design, instrumentation, test diagnostics, and modeling and simulation validation.

## Topic 6 (NSMMS): Hypersonics

This topic area addresses expendable strike and reusable hypersonic systems and requirements, materials & process development, and component/concept testing. Airframe topics include leading edges and nose tips, acreage TPS and hot structures, and control surfaces and windows/apertures. Propulsion topics include inlets, throat, injectors, and nozzle for airbreathing systems. Abstracts may cover materials, processing, manufacturing & (re)producibility, non-destructive investigation & quality, aerothermal structural concepts, and design, analysis & testing. Submitted abstracts should fall in one of the following:

- » Requirements and modeling;
- » Platform build or flight test;
- » Aeroshell and acreage TPS;
- » Leading edges and control surfaces;
- » Apertures; and
- » Propulsion.

## Showcase Your Company in the Exhibit Hall!

Details about the exhibit hall will be available at <https://www.usasymposium.com/space/exhibitor.php>, once published. We anticipate the exhibit hall to sell out early. To secure your spot today, please visit: <https://www.usasymposium.com/space/registration.php>

If you have any questions, please contact the NSMMS & CRASTE Exhibit Show Coordinator, Chelsea Kubal at [ckubal@blue52productions.com](mailto:ckubal@blue52productions.com).

## Join the Sponsorship Team!

Sponsorship packages are now available for the 2025 NSMMS & CRASTE! Gain brand visibility and make the most of your access to this very specialized target market of technical experts. Visit <https://www.usasymposium.com/space/sponsorship.php> to see our wide range of packages. Sign up early to take full advantage of all the marketing opportunities.

To join the sponsorship team, contact Kelli Jameson at [kjameson@blue52productions.com](mailto:kjameson@blue52productions.com).

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## Topic 7 (CRASTE): Innovative Test Methodologies & Platforms

This topic covers innovative test methodologies and platforms to mature small-sat and vehicle technologies in flight. Emphasis will be on the test and demonstration capabilities of test platforms to improve technology readiness levels (TRLs) of systems and components that may be useful to future satellites, launch vehicles, and upper stages such as guidance, communication, and propulsion in relevant environments. This can include on-orbit and/or re-entry testing. Abstracts are encouraged, but not limited to include:

- » Test platform descriptions;
- » Hypersonic testing techniques;
- » Payloads preparation and integration methods;
- » Results from previous flight tests;
- » Payload recovery methods; and
- » Approaches to increase flight cadence.

## Topic 8 (CRASTE): Innovative/Disruptive Technologies

This topic covers novel technologies (or new applications of technologies not traditionally used in aerospace) that facilitates new capabilities or very significant improvements to existing launch vehicles, missiles, small satellites, re-entry systems and related platforms and architectures. (Papers may be submitted on Low TRL (1-3), or Medium TRL (4-6), or High TRL (7-9). Topics should be relevant to “to space”, “in space” and, “from space.”

## Topic 9 (CRASTE): In-Space Mobility

This topic area addresses orbital maneuvering systems, with their propulsion systems that improve space mobility for the enterprise. Areas that emphasize system level advancement, critical materials, and processing technologies are desired. Of particular interest are commercial space development efforts applied to government requirements with a focus on modularity and agility. Additional topics of interest include innovative vehicle concepts and designs, structures and designs, materials and processes, and manufacturing fabrication concepts for:

- » Spacecraft coatings (thermal, ESD control);
- » Lightweight space structures and assembly;
- » Existing and novel in-space propulsion technologies (chemical/electrical/nuclear electric/nuclear thermal propulsion);
- » On-orbit fluids management and transfer (tanks/valves/PMD/etc);
- » Materials compatibility with emerging propellants;
- » Oxygen-compatible cathodes for electric propulsion;
- » Additive manufacturing and digital engineering;
- » High-temperature, oxidation-resistant catalysts, coatings and materials;
- » Rendezvous, proximity operations, and docking systems;
- » High Delta-V orbital transfer vehicles/orbital platforms;
- » Automated spacecraft operations; and
- » Novel system ConOps enabling rapid missions.

**Reminder: Submitting an abstract does not automatically register you for the event. For more information on registering, visit: <https://www.usasymposium.com/space/registration.php>**

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## **Topic 10 (NSMMS & CRASTE): Integrated Vehicle Health Management (IVHM) & Integrated System Health Monitoring (ISHM)**

This topic area addresses current use and perspectives of IVHM/ISHM as an integral part of space systems. Applications will include, but are not limited to electric, hypersonic, liquid rocket, nuclear, and solid motor propulsion. Abstracts are encouraged, but not limited to include:

- » Additive manufacturing technologies for enabling IVHM/ISHM;
- » Business cases for IVHM/ISHM;
- » Challenges during the IVHM/ISHM process, including requirements definition, design, integration, and test activities;
- » Digital twin;
- » Flight data collection and retrieval methods;
- » Recent IVHM/ISHM application success stories;
- » Sensor suite optimization for enabling IVHM/ISHM including fiber optic and wireless options;
- » Solutions for closing IVHM/ISHM requirement gaps in affordability, performance, reliability, reusability, and safety; and
- » Technology advancement needs to enable future IVHM/ISHM capabilities.

## **Topic 11 (NSMMS & CRASTE): Missiles & Missile Defense**

This topic area is focused on addressing material technology development and transition for tactical, strategic, missile and missile defense applications (to address both ballistic and hypersonic threats). Example topics of interest include:

- » Program and system overviews describing dependence on material technologies;
- » Ground and flight test material evaluations;
- » Innovative manufacturing and producibility advancements;
- » Modeling and simulation validation;
- » Material technologies:
  - » Seeker windows (IR/RF);
  - » Thermal protection systems;
  - » Lightning protection and weather effects; and
  - » Propulsion device technology.

## **Topic 12 (NSMMS): Novel Material Testing and Computational Analysis**

This topic area focuses on novel test methods, modeling, and Integrated Computational Materials Engineering (ICME). This includes test methods to verify base material attributes of next generation or heritage materials to provide a better understanding of basic material properties and reduce testing costs. Computationally-driven materials design, verification of microstructures, and predicted structure/property relationship models to accelerate materials development and lower materials development costs are within topic. Tools that support digital engineering and digital twin sustainment concepts are also encouraged.

## **Abstract Template Available!**

We recommend using our abstract template for the most accurate submission. Visit <https://www.usasymposium.com/space/cfa.php> for a downloadable copy of our abstract template form.

## Topic 13 (NSMMS): Novel Spaceflight Payloads, Instruments, & Mission Operations

This topic area addresses key materials technologies, requirements, novel designs, testing or materials development, and innovations for current and future space payloads, instruments, and mission operations including:

- » Development of structural and thermal applications, contamination and radiation effects, material degradation in the space environment;
- » Flight material applications and testing including nanomaterials, additively manufactured hardware, and satellite structures;
- » Lunar and martian mission development (commercial payload services, human landing systems); technology developments in robotics missions, landing and redeployment; space suits; in-situ resource development; and environmental qualification;
- » Development of novel SmallSat and CubeSat material applications, instruments, upcoming and completed MISSE-FF payloads and payloads for cost-efficient commercial missions;
- » In-space assembly and servicing of telescopes, satellites, and mission extension;
- » Laser applications, LIDAR, and associated materials testing; and
- » Non-destructive testing techniques.

## Topic 14 (NSMMS): Refractory Composites for Extreme Aerothermal Environments

This topic focuses on the design, development, demonstration, and testing of non-ablative and minimally ablative (i.e. geometrically-stable) refractory composites and environmental barrier coatings for sustained hypersonic flight or reentry. Carbon, silicon carbide, refractory oxides, and ultra high temperature ceramics (UHTCs) are some examples of constituent chemistries relevant to this topic. Areas of interest include novel and synergistic combinations of constituents, architectures to allow improved thermo-structural capabilities, extended survivability in high heat-flux, oxidative, shear and shock environments, while also targeting cost-efficient and high-quality and throughput manufacturing. Understanding the failure mechanisms of compositionally and structurally complex composite systems, including heat transfer and oxidative phenomena, as well as their impact on performance are also within topic scope. In addition, advanced manufacturing methodologies allowing accelerated fabrication and novel structure geometries are of interest. Composite constituent development is also within scope, as long as it is clearly associated with the mission space of interest.

## Topic 15 (NSMMS & CRASTE): Space Access (Including Launch) & Propulsion

This topic area addresses launch vehicles and their propulsion systems that improve space access. Areas that emphasize system level advancement, critical materials, and processing technologies are desired. Of particular interest are commercial space development efforts applied to government requirements with a focus on modularity and agility. Additional topics of interest include innovative vehicle concepts and designs, structures and designs, materials and processes, and manufacturing fabrication concepts for:

- » Existing and novel launch vehicles and propulsion technologies (liquids/solids/hybrids/other);
- » Turbopumps/cryogenic/fluid management/propellant tanks;
- » Thermal management/protection systems;
- » Nuclear propulsion and related component technology;
- » LOX/methane assessments;
- » Rotating detonating engines (RDEs);
- » High-temperature, oxidation-resistant coatings and materials;
- » Long-lifetime, cost-effective, high heat flux materials;
- » Case/binder/insulation concepts; and
- » Reusability and modular design.

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## Topic 16 (CRASTE): Spacecraft Buses and Instrumentation

This topic area addresses key technologies involved in the creation of spacecraft buses and enabling instrumentation. This includes novel components and subsystems, including:

- » Power systems including solar arrays, batteries, and alternative energy generation (fuel cell and nuclear);
- » Thermal systems including novel coatings & other technologies;
- » Novel GNC sensors enabling automated control of multi-ball space vehicles & constellations;
- » Deployable structures enabling dynamic space operations;
- » Novel propulsion subsystems including pumps, tank designs, and valves;
- » Intrasatellite link technologies enabling local communication; and
- » Other novel components.

## Topic 17 (CRASTE): Spaceports/Launch Sites & Range and Ground System Operations

This topic area focuses on the ground segment and how to reduce costs while improving operability. This includes advanced and/or low-cost range concepts. Abstracts are encouraged, but not limited to include:

- » Capabilities of new/emerging non-federal spaceports/launch sites;
- » Data collection technologies;
- » Air & launch traffic control;
- » Sensors for vehicle tracking and characterization;
- » Clean pad concepts;
- » Vertical versus horizontal integration;
- » Innovative ground test methods;
- » Technologies that will reduce cost per launch (or re-entry), turn-around time, and overall life cycle cost;
- » FAA commercial launch license and (experimental) permit process issues;
- » Range utilization of autonomy/automation and/or artificial intelligence to streamline and reduce ground operation costs or timelines; and
- » Developments/initiatives to minimize impact of launch (orbital and sub-orbital) and re-entry on other National Airspace (NAS) users.

## Topic 18 (CRASTE): System Architecture Studies

This topic area encompasses industry and government concepts for future space architectures and systems. A major focus of this area is on the opportunities and challenges to multi-vehicle aggregation to achieve both commercial and DoD missions. Regimes of interest include suborbital and orbital access (land/sea/air launch), in-space (VLEO/LEO/MEO/GEO/XGEO), or any combination. Abstracts are encouraged, but not limited to include:

- » Modularity and interoperability;
- » Potential on-orbit servicing constructs (hub-spoke, distributed);
- » Responsive and scheduled launch enhancements;
- » Economics of space logistics (tech upgrade/repair, on-orbit refueling);
- » The role of emerging technologies on space architectures operations;
- » High Delta-V missions of interest;
- » Value proposition for suborbital demonstration; and
- » Government regulations, practices, and technologies to accelerate adoption of promising space architectures.



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# Abstract Submission Process

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When you upload your abstract, please **do not** password protect your file. The submission site is cleared for CUI and has end to end encryption and all files go through a security scan upon upload. **If you submit a file password protected it will not upload and your form will not submit.** Be sure to include the title of your abstract and the distribution level in the body of the submission (this does not count against the 300 word count). All abstracts should fall into one or more of the described topics on the previous pages. For questions concerning submission of your abstract, please contact Sherry Johnson at [sjohnson@blue52productions.com](mailto:sjohnson@blue52productions.com), 937-554-4671.

## Notification & Presentation Information

In early February 2025, you will be contacted regarding the status of your acceptance. Please note that selected abstract titles will be included on the website and in the program, which is freely distributed. Therefore, abstract titles must be cleared for public release (Distribution A).

Abstracts will be selected for oral presentation, alternate oral presentation, or poster presentation. An alternate oral presentation is a presentation in stand-by mode until an oral presentation slot becomes available, and alternates should also plan to present their material as a poster presentation. Poster presentations are an important facet of the NSMMS & CRASTE and provide dedicated one-on-one exchanges between the presenter and the attendees. Oral presentation slots are limited to 25 minutes which includes time for questions and transition to the next speaker. **Please note that selection and presentation of an abstract, whether oral or poster, does not waive any applicable registration fees.**

**Final presentations will be due 28 May 2025.** Presentations and papers cannot contain proprietary information and may not be more restrictive than Distribution C (Distribution authorized to U.S. Government Agencies and their contractors). Distribution F presentations may be accepted with special permission. Controlled Unclassified Information (CUI) markings must be adhered to as appropriate.

## Submission Site:

<https://www.usasymposium.com/space/cfaForm.php>

## Abstract Due Date: 7 January 2025