

HENDERSON, NV

24 – 27 JUNE

NSMMMS

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

CRASTE

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

2019

DUE: 7 JAN 2019

Call for Abstracts

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

Join Us

You are invited to participate in both the 2019 National Space & Missile Materials Symposium (NSMMS) and the 2019 Commercial and Government Responsive Access to Space Technology Exchange (CRASTE) from 24 – 27 June, 2019 in Henderson, NV at the Green Valley Ranch. These co-located conferences continue their outstanding legacy in bringing together technologists, users, and decision makers from across the nation. Discussion involves 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 the materials industry's 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 development which is crucial to improve performance and reliability of both defense and commercial systems.

CRASTE focuses on bringing system integrators and subsystem technology experts together to improve space access capabilities and responsiveness. Special focus is given to the integration of emerging technologies with space-access architectures to create new markets and improve existing systems for government and commercial users.

The 2019 forum will have a joint senior level Plenary Session, a variety of technical sessions covering groundbreaking research and technology, tutorials and workshops, a poster session, an exhibit show, a small business forum, a student grant program, and multiple networking events.

NSMMS & CRASTE attendees will have unlimited 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 academia partners help ensure that we focus on the latest advancements and challenges affecting the 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.**

Thank You to Our NSMMS & CRASTE Supporters!

- Aerojet Rocketdyne
- The Aerospace Corporation
- Air Force Research Laboratory
- Altair Aerospace
- Army Aviation & Missile Research Development & Engineering Center
- Army Space & Missile Defense Command
- Ball Aerospace
- The Boeing Company
- Centrus Energy Group
- Dynetics, Inc.
- Federal Aviation Administration
- Integration Innovation, Inc.
- Koenig Consulting
- Lockheed Martin Corporation
- Materials Research & Design, Inc.
- Missile Defense Agency
- Missouri University of Science & Technology
- NASA Glenn Research Center
- NASA Langley Research Center
- NASA Marshall Space Flight Center
- Naval Research Laboratory
- Naval Surface Warfare Center Carderock Division
- New Mexico Institute of Mining and Technology
- Northrop Grumman Corporation
- Plasma Processes, LLC
- Quantitech, Inc.
- Raytheon Missile Systems
- Southern Research
- Ultramet
- The University of Texas at Austin

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

NSMMS TOPICS

Topic 1 (NSMMS): Additive Manufacturing for Space and Missile Materials

This topic area focuses on recent developments in additive manufacturing (AM) methods and production of materials for diverse aerospace applications including structural, thermal management, and propulsion components. Development of new AM materials (monolithic, graded, composites, or coatings) and methodology for space and missile applications and materials development methodology will also be addressed. Additional areas of interest under this topic include the results of design and development of AM processed components, post processing heat treatments, residual stresses, in-situ monitoring, integrated computational and materials engineering tools, and database development and processes for assessment. This topic area also includes the non-destructive inspection, and the status of verification/certification, man-rated and spacecraft validation, and part/process qualification.

Also of interest is the In Space Manufacturing (ISM) initiative where specific topics would include an overview of ISM, 3D Plastics Printer results, Additive Manufacturing Facility (AMF) characterization data, refabricator status, printed electronics, ISM metals updates, FabLab Phase A overview, and any of the common use materials. Also of interest is AM of primary structure made in space.

Topic 2 (NSMMS): Ground Test & Evaluation

This topic area focuses on the development & utilization of ground test facilities to support material technology development. Significant investment is currently being applied to the revitalization of the national test infrastructure. The renewed interest in hypersonics, as well as space access has resulted in the identification of gaps in the available test infrastructure. The Aerospace Community has recognized these gaps and has invested funding to improve the test capability supporting flight and space system material development. These investments are focused on risk reduction to ensure technology maturation is adequately accomplished prior to flight demonstrations and fielding. Topic areas include testing with respect to: hypersonics, aerothermal, airbreathing engines, combined thermostructural effects, electromagnetic & radiation effects, optical, adverse environments, weather encounter, boundary layer transition, and performance in space environments.

Topic 3 (NSMMS): Emerging Materials & Novel Processing Technologies

This topic area addresses emerging materials innovations at lower TRL level (1-3), encompassing both materials science and process development. Topic areas include next generation materials with improved properties, novel materials processing, manufacturing techniques, and integrated computational materials science.

Next Generation Materials - This area focuses on the development of new materials that provide unique combinations of properties and/or demonstrate property retention in extreme environments. This includes multifunctional materials, ceramics, UHTCs, metal alloys, shape memory alloys, composites, high temperature fiber development, innovative thermal protection materials (ablative and non-ablative), sensor & nanomaterials.

Novel Materials Processing - This area focuses on novel materials processing methods to improve material properties. Special focus areas include electronic, optical, and structural metamaterials, flash sintering and spark plasma sintering (SPS).

Integrated Computational Materials Science - This area focuses on novel approaches to computationally driven materials design, verification of predicted structure/property relationships models to accelerate materials development, and lower materials development costs.

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

NSMMS TOPICS

Topic 4 (NSMMS): Hypersonics

The topic area addresses the use, testing, analysis, and fabrication of materials and structural concepts for single use and reusable hypersonic systems.

Topics include, but are not limited to: manufacturability (quality, rate, size) of refractory composites, affordable / high performance aero-structures, propulsion, tanks, durable and rapid turnaround thermal protection systems, integrated thermal management, hot structures, leading edges, apertures, seals, Integrated System Health Monitoring (ISHM), the use of Integrated Computational Materials Engineering (ICME), and applied ground test methods / operations / test facilities. Abstracts on materials and structures are sought that are TRL 4 and above, are planned for flight, have recently flown, or are in trade studies that are enabling affordable hypersonic flight.

Topic 5 (NSMMS): Missiles & Missile Defense

The topic area addresses the use, testing, analysis, and fabrication of materials and structural concepts for missiles and missile defense.

This topic area includes materials and material processes that support missile defense, strategic systems, tactical missiles, high energy kinetic projectiles, and re-entry systems for military applications. Abstract topics may include missile material/component performance, properties, analysis, material producibility, affordability, corrosion prevention, and sustainability; ground- and flight-test materials evaluations; weather encounter; and material manufacturing advancements and innovative techniques. Program and system overviews with pertinent materials issues and updates related to current missile programs are also of interest. Focus areas include development and ground/flight testing of missile thermal protection systems, radomes, infrared windows and domes, structural insulators, axial rocket motors and propulsion control system materials, material technologies for novel propulsion systems (excluding propellants), integrated health monitoring, aging and surveillance, and technologies for insensitive munitions.

Topic 6 (NSMMS): Mission Operations & Experiments in Space

This topic area addresses key materials technologies, requirements, novel designs, or materials innovations for current and future space missions/operations and planetary exploration for commercial or government customers focusing on materials and environmental effects in space or simulation on the ground. Space operation technology interests include rad hard electronics, advanced processors, next generation storage solutions, communications, optics, optical communication, optical benches, windows, solar arrays, sensors and integrated vehicle health monitoring, and other payload materials. Space exploration technologies for atmospheric entry to landing and surface operation including ablative thermal protection materials will also be addressed. Additional areas of interest include the tools and processes for assessment including computational modeling, ground testing, and actual space environment experimentation (including results from Materials on International Space Station Experiments (MISSE)) and orbital debris. This topic area also includes environmental simulation chambers, radiation effects, and atomic oxygen effects.

Topic 7 (NSMMS): Space Access & Propulsion

This topic area addresses space propulsion critical materials and processing technologies enabling access to space, including single use or reusable crewed and robotic launch and orbital boost systems. Topics of interest include innovative structures and designs, materials and processes, and manufacturing fabrication concepts for launch vehicle and in-space propulsion system structures, propellant tanks, engine systems, solid and liquid rocket boosters, and thermal management/protection systems. Of particular interest this year is commercial space development efforts applied to government requirements and needs with a focus on modularity and agility.

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

CRASTE TOPICS

Topic 8 (CRASTE): Innovative Test Methodologies and Platforms

This topic covers innovative test methodologies and platforms such as cube-sat and small-sat testbeds and sub-systems. 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. We encourage abstracts that look at progress in using this method of test and demonstration to reduce risk and cost for existing small, medium, and heavy lift systems and next generation responsive access to space and sub-orbital systems.

Topic 9 (CRASTE): Responsive Access for Pico/Nano/Small Payloads

This topic includes existing and emerging platforms for delivering small payloads and experiments into their desired location (high altitude, sub-orbital or orbital environments). This would include concepts for novel use of vehicles such as a flying testbed. We are seeking abstracts with a focus on near term capabilities in development for delivering payloads up to 1000 lbs into the desired environment for less than \$5M per launch. This topic area includes requirements and understanding of projected payloads, orbits, and capabilities of emerging systems. Technical challenges and time lines should be addressed where practical. This topic area also includes government practices, programs, and technologies which potentially benefit the emerging sub-orbital and small launch industry.

Topic 10 (CRASTE): Advances in Ground System and Range Operations

This topic area focuses on the ground segment and how to reduce costs while improving operability. We encourage abstracts that discuss advanced and/or low-cost range concepts; data collection technologies; air & launch traffic control; clean pad concepts; vertical versus horizontal integration; innovative ground test methods; and other technologies that will reduce cost per launch (or re-entry), turn-around time, and overall life cycle costs. This topic includes FAA commercial launch license and (experimental) permit process issues. Abstracts on range utilization of autonomy/automation and/or artificial intelligence to streamline and reduce ground operation costs or timelines are desired, including space object tracking. Finally, we are seeking abstracts that discuss the developments/initiatives to minimize impact of launch (orbital and sub-orbital) and re-entry on other National Airspace (NAS) users.

Topic 11 (CRASTE): Reducing Cost, Increasing Safety, and Improving Reliability

This topic area will cover concepts and/or progress in developing low cost (or lower cost) subsystems, systems or architectures that will help increase safety and/or flight rate of launch (orbital and sub-orbital), and future "commercial aircraft like" re-entry. Topics include, but are not limited to, non-toxic propellants/monopropellants, minimization of launch and re-entry noise, improved noise modeling of launch and re-entry operations, subsystem and vehicle integrated health management systems, and associated sensors for severe environments. This topic includes increased reliability and public safety, as well as safety of crew and other occupants for manned vehicles.

Topic 12 (CRASTE): High Altitude/Sub-Orbital Experiments and Capabilities

This topic seeks abstracts on lessons learned and information gathered from recent flight test experiments on high-altitude balloons and sub-orbital rockets. This includes both commercial and government platforms. Lessons learned may include test conduct, safety, and mission performance. Capabilities for future test and upgrades are also welcome.

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

CRASTE TOPICS

Topic 13 (CRASTE): Emerging Propulsion Systems

This topic area addresses industry and government propulsion development programs that can support future responsive space access needs. The topic includes traditional rocket engines and emerging technologies to develop lower cost propulsion solutions for small (<1k lb), medium (1k - 10k lb), and large (10k+ lb) orbital payloads. Of interest are rocket engines and propulsion technologies that can be used in support of next generation Evolved Expendable Launch Vehicles (EELV), reusable boost system architectures, low-cost expendable engines (experimental demonstrators and emerging operational systems), inter-planetary propulsion, emerging nuclear technologies, and propellant development. Recommended technology roadmaps and demonstrations are also encouraged.

Topic 14 (CRASTE): Emerging Entry, Descent, and Recovery Systems and Technologies

This topic covers emerging concepts to permit safe, low cost, efficient recovery of on-orbit payloads. Included are reusable upper stages, fairing recovery, and unique CONOPS approaches. Abstracts should discuss mission needs, system description, uniqueness, and roadmap towards developing the capability. Emerging methods for disposal of on-orbit assets are also encouraged. Recent or near-term flight test activities may also be covered in this topic.

Topic 15 (NSMMS & CRASTE): Integrated Vehicle Health Management (IVHM) & Integrated Systems Health Monitoring (ISHM)

Integrated Vehicle Health Management (IVHM) / Integrated System Health Monitoring (ISHM) abstracts are being sought for the 2019 NSMMS and CRASTE. This topic area will address current use and perspectives of IVHM/ISHM as an integral part of space systems. Applications will include, but are not limited to, solid motor, liquid rocket, hypersonic, and electric propulsion.

Please consider proposing an abstract which addresses one of the following IVHM/ISHM topics:

- How IVHM/ISHM was used to improve safety, reliability, performance, affordability, and reusability;
- Challenges during the IVHM/ISHM process, including requirements definition, design, integration, and test activities;
- Lessons learned from achieving IVHM/ISHM optimization; and
- Technology advancement needs to enable future IVHM/ISHM capabilities.

Important Notices

Travel Restrictions & Approval

For those working for government agencies, you are encouraged to submit your travel requests now. Though travel restrictions for many government agencies are loosening, some still require many months advance notice for conference travel. Because of this, we encourage you to get your paperwork submitted ASAP and contact us if you need any additional information or justification.

Event Information Security

This Symposium is restricted to U.S. CITIZENS only; is ITAR Restricted in accordance with DoD Directive 5230.25 under the provisions of the Arms Export Control Act; and contains Military Critical data. This Symposium is not open to the general public. Green Card holders are not permitted to attend; born or naturalized United States' citizenship is required.

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

Other Ways to Engage

Join Our Team of Sponsors

These events are largely made possible by industry sponsorships. Why sponsor?prominent organizational recognition...position yourself for the future....involve your organization in influencing the direction of the industry, and many other valuable return on investment reasons. A variety of sponsorship packages are available for all budgets. For more information, contact Erin Foster, efoster@blue52productions.com or visit our website at <https://www.usasymposium.com/space/2019/sponsorship.php>. **Thank you to these industry leaders who have already joined the NSMMS & CRASTE sponsorship team for 2019!**



Solving the world's hardest problems.



Exhibit

We expect a sold out show. Sign up now to reserve your space for this great networking and marketing opportunity. To register for an exhibit, visit <https://usasymposium.com/space/2019/exhibitor.php>.

Small Business Forum Participation

One of the many noteworthy elements of NSMMS & CRASTE is the Small Business Forum and its numerous opportunities to network. We invite you to engage and maximize your opportunities to team with other companies and engage with the government. The goal of this forum is to facilitate the interaction of small businesses and universities with larger "prime" contractors and government SBIR agencies based on similar interests that relate to specific materials/performance metrics relevant to NASA and the Department of Defense. We will provide you with connections and resources with primes and government SBIR agencies to start your interaction (or assist you along the path of meaningful interactions) with them. We are confident you will broaden your contacts with regard to technology needs and transfer in order to foster future communication, innovation, and partnerships. The participating primes and SBIR agencies will be announced on the website in the coming months. Small businesses and universities may sign up for one-on-one appointments starting in early February. For more information, please visit <https://www.usasymposium.com/space/2019/sbf.php>.

HENDERSON, NV

24 – 27 JUNE 2019

NSMMS CRASTE

NATIONAL SPACE & MISSILE MATERIALS SYMPOSIUM

COMMERCIAL AND GOVERNMENT RESPONSIVE ACCESS TO SPACE TECHNOLOGY EXCHANGE

Abstract Submission Process

We look forward to receiving your abstract(s) for the 2019 NSMMS & CRASTE events via online submission at <https://www.usasymposium.com/space/2019/cfa.php>. Abstracts must be unclassified and may include ITAR or Military Critical information, if they are PASSWORD PROTECTED. Acceptable distribution levels for abstracts include A or C ONLY. Though abstract submission is done online, passwords for the password protected documents should be emailed to Sherry Johnson at sjohnson@blue52productions.com. For information on how to password protect your abstract, visit <https://www.usasymposium.com/space/2019/cfa.php>. Non-restricted (Distribution A) documents do not need to be password protected. For questions concerning submission of your abstract, please contact Sherry Johnson at sjohnson@blue52productions.com, 937-554-4671. Be sure to include the title of your abstract in the body of the submission (the title does not count against the 300 word count.) All abstracts should fall into one or more of the described topics on the previous pages.

In early February 2019, 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).

PLEASE DO NOT WAIT FOR NOTIFICATION ACCEPTANCE TO SUBMIT A TRAVEL APPROVAL REQUEST WITHIN YOUR ORGANIZATION. START THAT PROCESS NOW.

Final presentations will be due 31 May 2019 . Final 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). Please note, presentation of an abstract does not waive any applicable registration fees.

Abstract Due Date: 7 January 2019

Poster Session Participation

Consider submitting multiple abstracts for the poster session in order to better take advantage of your time at the event. Even if you give an oral presentation, you can increase your exposure by presenting a poster as well. The poster session is an important and alternative way to present the results of your research and technology, and in some cases, is a more effective way to present your material. Poster presentations will be available to attendees Monday evening through Wednesday evening in the joint NSMMS & CRASTE exhibit hall. Extra emphasis will be placed on posters during the two receptions on Monday and Wednesday when the authors are required to be present.