

## Call for Papers

The AIAA Structures and Materials Technical Committees are sponsoring a special session on

# Applications of Artificial Intelligence and Machine Learning to Problems in Structures and Materials

## AIAA SciTech 2021

11-15 January 2021

Music City Center

Nashville, TN

The AIAA (American Institute of Aeronautics and Astronautics) Structures and Materials Technical Committees are pleased to announce a call for papers to be presented in special sessions on **Applications of Artificial Intelligence and Machine Learning to Problems in Structures and Materials** within the AIAA SciTech Forum.

Artificial Intelligence and machine learning (deep learning included) technologies offer the potential to revolutionize and streamline current processes to develop and qualify materials as well as improving our design process for aerospace structures. These sessions will examine applications of various artificial intelligence and machine learning technologies to further the development of new material and structural applications, as well as their application to design and qualification/certification. Abstracts are sought covering recent research, technological advancements, and systems level perspectives in the above areas. The committee welcomes submissions from government, industry, academic, and small businesses.

Extended abstracts are due **June 8, 2020**  
Author notification of paper acceptance August 2020  
Final manuscripts are due **December 1, 2020**

Detailed abstract preparation instructions and policies can be found at  
<https://www.aiaa.org/SciTech/presentations-papers/technical-presenter-resources>

**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract so that we can ensure it is included in these sessions. For more information contact one of the following organizers:

**Dr. Wenbin Yu**  
Purdue University  
[wenbinyu@purdue.edu](mailto:wenbinyu@purdue.edu)

**Dr. Steven Wanthal**  
The Boeing Company  
[steven.wanthal@boeing.com](mailto:steven.wanthal@boeing.com)

# Call for Papers

For technical papers and presentations on

## **Materials Development, Design and Certification of Additive Structures**

The AIAA Structures Technical Committee and Materials Technical Committee are sponsoring coordinated special sessions related to advances in materials, design, analysis, manufacturing and certification of additive manufactured structures.

*at*

**AIAA SciTech 2021**  
**January 11-15, 2021**  
**Music City Center**  
**Nashville, TN**

Details of the special sessions are given below. Authors are invited to submit abstracts to whichever session is most relevant to their topic.

## Call for Papers

The AIAA Structures Technical Committee is sponsoring a special session on  
**Design, Analysis, and Certification of Additive Structures**

at

### AIAA SciTech 2021

January 11-15, 2021

Music City Center

Nashville, TN

Additive manufacturing (AM) using 3D printing has the potential to revolutionize design of many types of structural components if the challenge of designing and fabricating components with reliability sufficient for certification can be met. Opportunities to leverage AM processes for structural improvement include low volume production, aging component replacement, piece part reduction and assembly simplification, material savings, multi-functionality, increased complexity, and weight and performance improvement through generative design optimization free from many conventional manufacturing constraints. Despite these opportunities, formidable challenges remain in manufacturing process reliability, design and analysis methodology, printed part inspection, and certification, etc. The AIAA Structures Technical Committee seeks papers of development and application addressing these challenges at the structural or component level.

Potential topics could include the following:

- AM-informed design, analysis, and optimization methods
- Generative design optimization for AM
- Lattice structure design and application
- Process-structure-property-performance relationships, sensitivities, and models
- Predictive design tools
- Multiscale approaches
- Reliability-based approaches
- Qualification/certification approaches
- Traditional building block approach
- Rapid qualification framework
- Inspection methods—in-situ and post-process, destructive and non-destructive
- Build simulation, heat treatment, and correlation

Extended abstracts of no less than 1,000 words are due **June 8, 2020**

Final manuscript due **December 1, 2020**

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<https://www.aiaa.org/SciTech/presentations-papers/technical-presenter-resources>

**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract. For more information contact one of the following organizers:

**Rob Taylor**

University of Texas at Arlington

[taylorrm@uta.edu](mailto:taylorrm@uta.edu)

**Zhenning Hu**

The Boeing Company

[zhenning.hu@boeing.com](mailto:zhenning.hu@boeing.com)

## Call for Papers

The AIAA Materials Technical Committee is sponsoring a special session on  
**Materials and Design for Additive Manufacturing**

### AIAA SciTech 2021

11-15 January 2021

Music City Center

Nashville, TN

The AIAA (American Institute of Aeronautics and Astronautics) Materials Technical Committee is very pleased to announce a call for papers to be presented in special sessions on **Materials and Design for Additive Manufacturing** within the AIAA SciTech Forum. These sessions will examine advances in Additive Manufacturing, also sometimes known as 3D Printing. Any materials-related aspect of additive manufacturing that is relevant to aerospace is acceptable for papers, including:

- Materials and material property development (polymers, metals, ceramics, fibers)
- Modeling and experimentation of predictive relationships between the processing parameters, material composition, and resulting microstructure
- Design and innovative applications
- Machines and processing
- Process monitoring and control methods
- In-space additive manufacturing
- Testing and Inspection
- Materials discipline capabilities for certification

To this end, the Materials Technical Committee is soliciting papers with recent research, technological advancements, and systems level perspectives in the above areas. The committee welcomes submissions from government, industry, academic, and small businesses.

Extended abstracts are due **June 8, 2020**

Author notification of paper acceptance August 2020

Final manuscripts are due **December 1, 2020**

Detailed abstract preparation instructions and policies can be found at  
<https://www.aiaa.org/SciTech/presentations-papers/technical-presenter-resources>

**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract, so that we can ensure that it is included in these sessions. For more information contact one of the following organizers:

**Dr. Joseph H. Koo**

The University of Texas at Austin

[jkoo@austin.utexas.edu](mailto:jkoo@austin.utexas.edu)

**Dr. Steven Wanthal**

The Boeing Company

[steven.wanthal@boeing.com](mailto:steven.wanthal@boeing.com)

# ICME for Aerospace Applications

January 11-15, 2021

Music City Center, Nashville, Tennessee

The AIAA (American Institute of Aeronautics and Astronautics) Materials (MAT), Structures (STR), Multidisciplinary Design Optimization (MDO), and NonDeterministic Approaches (NDA) Technical Committees are very pleased to announce a call for papers to be presented in a series of special sessions on **Integrated Computational Materials Engineering (ICME)** within the AIAA SciTech 2021 Forum. ICME initiatives focus on the **integration** of materials information (captured in models and computational tools at various length and time scales), with engineering product performance analysis/design and manufacturing process simulation (references: [NAP 2008](#), [NSTC 2011](#)). The coordinated efforts of ICME, the Materials Genome Initiative (MGI), United States Government “Digital Engineering” and [Manufacturing USA](#) initiatives and most recently the [2040 Vision roadmap](#), aim to deliver the required cyber-physical-social ecosystem that impacts the entire supply chain to **accelerate** model-based concurrent design, development, and deployment of materials and systems throughout the product lifecycle for **affordable, producible** aerospace applications. The presentations addressed will be affiliated with and compliment the efforts of ASM International ([AeroMat & Computational Materials Data Network](#)), TMS (e.g. [ICME World Congress](#)), ASME ([Verification & Validation Sub-Committee efforts](#)) and SciTech short courses for ICME.

To this end, the MAT, STR, MDO, and NDA Technical Committees are soliciting papers with recent research, technological advancements, and systems level perspectives that address issues/challenges involved in the **integration** of computational materials models and design/structures/optimization over multiple length scales from “processing” to “performance”, with emphasis on structural performance. The end goal of these sessions is to catalog challenges and solutions which will facilitate successful implementation of ICME concepts in industry and research labs.

The session organizers welcome submissions & participation from government, industry, academia, and small businesses in the following ICME integration events for AIAA SciTech 2021:

- Cross-TC Coordinated Technical Sessions
  - “Elements of ICME for Materials & Structures - STR (Waas and Bednarczyk) and MAT (Arnold and Pineda)”
  - “Realizing ICME, Including UQ and Experimental Validation– NDA (Bichon and Acar) and MAT (Sangid and Acar)
  - Materials and Structures Solutions for Low-Cost High-Rate Production – MAT (Dustin and Maiaru)

**Dr. John F. Matlik (Materials TC)**  
Rolls-Royce Corporation (Indianapolis)  
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**Dr. Barron J. Bichon (NDA TC)**  
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**Dr. H. Alicia Kim (MDO TC)**  
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**Dr. Stephanie TerMaath (Structures TC)**  
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**Dr. Joshua S. Dustin (Materials TC)**  
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**Dr. Steven M. Arnold (Materials TC)**  
NASA Glenn Research Center  
[Steven.M.Arnold@nasa.gov](mailto:Steven.M.Arnold@nasa.gov)

## Call for Papers

The AIAA Structures and Materials Technical Committees are sponsoring a special session on

# Elements of ICME for Advanced Materials and Structures

## AIAA SciTech 2021

11-15 January 2021

Music City Center

Nashville, TN

The purpose of these sessions is to advance ICME as applied to Materials and Structures. ICME initiatives focus on the **integration** of materials information (captured in models and computational tools at various length and time scales), with engineering product performance analysis/design and manufacturing process simulation. To this end, we invite papers addressing all aspects of ICME (processing and material modeling, microstructure, optimization, uncertainty quantification, structural response, etc.) as related to the analysis and experimental validation of studies that provide insight in advancing this topic. Specifically, we would like to see papers addressing issues/challenges involved in the **integration** of computational materials models and design/structures/optimization over at least two length scales from “processing” to “performance”, with emphasis on structural performance.

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**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract, so that we can ensure that it is included in these sessions. For more information contact one of the following organizers:

**Anthony Waas**

University of Michigan

awaas@umich.edu

**Steve Arnold**

NASA Glenn

steven.m.arnold@nasa.gov

**Brett Bednarczyk**

NASA Glenn

brett.a.bednarczyk@nasa.gov

**Evan Pineda**

NASA Glenn

evan.j.pineda@nasa.gov

## Call for Papers

# The AIAA Materials Technical Committee is sponsoring a special session on **Materials for Hypersonic Applications and Extreme Environments**

### AIAA SciTech 2021

11-15 January 2021

Music City Center

Nashville, TN

The AIAA (American Institute of Aeronautics and Astronautics) Materials Technical Committee is very pleased to announce a call for papers to be presented in special sessions on **Materials for Hypersonic Applications and Extreme Environments** within the AIAA SciTech Forum.

Focus areas include but are not limited to:

- Materials for hypersonic applications
- Degradation of materials in low Earth orbit due to atomic oxygen, micrometeoroids, UV radiation, and other hazards
- Effects of ionizing radiation on materials
- Cryogenic and high temperature materials

To this end, the Materials Technical Committee is soliciting papers with recent research, technological advancements, and systems level perspectives in the above areas. The committee welcomes submissions from government, industry, academic, and small businesses.

Extended abstracts are due **June 8, 2020**

Author notification of paper acceptance August 2020

Final manuscripts are due **December 1, 2020**

Detailed abstract preparation instructions and policies can be found at

<https://www.aiaa.org/SciTech/presentations-papers/technical-presenter-resources>

**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract, so that we can ensure that it is reviewed for inclusion in this session. This session is not an appropriate forum for ITAR restricted or classified material. For more information contact one of the following organizers:

**Terrisa Duenas**

NanoArmor

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**Jessica Piness**

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[Bilim.atli@tno.nl](mailto:Bilim.atli@tno.nl)

## Call for Papers

The AIAA Materials Technical Committee is sponsoring a special session on  
**Testing and Characterization of Materials**

### AIAA SciTech 2021

11-15 January 2021

Music City Center

Nashville, TN

The AIAA (American Institute of Aeronautics and Astronautics) Materials Technical Committee is very pleased to announce a call for papers to be presented in special sessions on **Testing and Characterization of Materials** within the AIAA SciTech Forum. These sessions will examine advances in testing and characterization of materials to be utilized in any aircraft, aerospace, spacecraft, hypersonic, or other vehicle or structure. Any aspect of this broad area relevant to aerospace is acceptable for papers, including:

- Testing and characterization programs, results, or material selection efforts
- Unique challenges in testing and characterization
- New or novel materials testing techniques
- Overview or survey papers addressing available databases or consortiums
- New or novel instrumentation methods or instrumentation applications for new material types
- Extreme environment materials testing or characterization
- Analog or performance testing of materials, even in structural configurations

To this end, the Materials Technical Committee is soliciting papers with recent research, technological advancements, and systems level perspectives in the above areas. The committee welcomes submissions from government, industry, academic, and small businesses.

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**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract, so that we can ensure that it is included in these sessions. For more information contact one of the following organizers:

**Dr. Rajiv A. Naik**

Pratt & Whitney

[rajiv.naik@pw.utc.com](mailto:rajiv.naik@pw.utc.com)

**Dr. Jonathan B. Ransom**

NASA Langley Research Center

[jonathan.b.ransom@nasa.gov](mailto:jonathan.b.ransom@nasa.gov)

# Call for Papers

## Enabling Next-Generation Materials

### AIAA SciTech 2021

The AIAA (American Institute of Aeronautics and Astronautics) Materials Technical Committee (MTC) is pleased to announce the first call for papers for its new special session(s) on innovative approaches in materials.

For this session, the MTC is soliciting papers with novel results and recent research advances in the areas of realization, design, manufacturing, characterization, modeling, and certification of innovative, potentially high-risk, materials.

Topics of special interests are multi-scale/hierarchical structuring, nano-crystalline or amorphous materials, polymer engineering, materials consisting of high-contrast phase/elements and their manufacturing, interface/interphase engineering, renewable/recyclable materials, low-cost and low-energy manufacturing, scalable manufacturing (other than additive manufacturing; for additive manufacturing please see calls for “Materials and Design for Additive Manufacturing” and “Additive Manufacturing Modeling”), high-performance materials (radiation shielding, thermal interphase, dynamic impact resistance), meta-materials, and accelerated certification of novel materials. Material forms include but are not limited to polymers, ceramics, metals, and their composites. Papers that contain innovative ideas regarding physics-based atomistic simulations and nonlocal modeling of hierarchical materials are strongly encouraged.

The committee welcomes submissions from government, industry, academia, and small businesses.

For more information, contact one of the following organizers:

Prof. Brian L. Wardle, MIT, [wardle@mit.edu](mailto:wardle@mit.edu)

Prof. Namiko Yamamoto, Penn State University, [yamamoto@enr.psu.edu](mailto:yamamoto@enr.psu.edu)

## Call for Papers

The AIAA Materials Technical Committee is sponsoring a special session on

## Nanostructured Materials

**AIAA SciTech 2021**

11-15 January 2021

Music City Center

Nashville, TN

The AIAA (American Institute of Aeronautics and Astronautics) Materials Technical Committee is very pleased to announce a call for papers to be presented in special sessions on **Nanostructured Materials** within the AIAA SciTech Forum.

DESCRIPTION: The focus of this topic is on the fabrication, testing, simulation, and application of multifunctional nanostructured and hierarchical composite materials for the enhancement of mechanical, thermal, electrical and optical properties of a composite material using nanotechnology. In these sessions, we invite talks in all areas of multifunctional nanocomposites research and development. Topics include but are not limited to the design, processing, characterization, and modeling of structure-property relationships of nanocomposites. Novel concepts, experimental and modeling approaches to investigate and/or improve the performance of nanocomposites for multifunctional applications such as structural, electrical, thermal, photonics are welcome. Additive manufacturing and related topics pertaining to nanocomposites are also welcome.

- Hierarchical Materials
- Multifunctional Nanostructured Materials
- Modeling and Testing of Structure-property Relationships of Nanocomposites

To this end, the Materials Technical Committee is soliciting papers with recent research, technological advancements, and systems level perspectives in the above areas. The committee welcomes submissions from government, industry, academic, and small businesses.

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**Make sure to select the “Special Sessions” option during submission.**

Please notify us if you are planning to submit an abstract, so that we can ensure that it is included in these sessions. For more information contact one of the following organizers:

**Samit Roy**  
University of Alabama  
sroy@eng.ua.edu

**Brian Wardle**  
Massachusetts Institute of Technology  
Wardle@mit.edu

# Call for Papers

## Materials for Survivability

### **Joint Session, Sponsored by the Survivability and Materials Technical Committees: Materials for Survivability**

Survivability improvements for air and space systems increasingly rely on the development of new materials and composites, which must be lightweight but also satisfy a demanding set of mechanical, thermal, electromagnetic, or other requirements. Examples include: (1) high toughness composite materials for aircraft, (2) impact resistant thermal protection materials for spacecraft, (3) low observability coatings which reduce optical or radar signatures, (4) smart materials which support structural health monitoring or self-healing, and (5) additively manufactured materials with properties optimized for specific applications. Abstracts describing analytical, computational, experimental, or design research which address any aspect of the 'materials for survivability' theme are encouraged.

Interested authors may contact Eric Fahrenthold ([epfahren@mail.utexas.edu](mailto:epfahren@mail.utexas.edu)) or Joe Koo ([jkoo@mail.utexas.edu](mailto:jkoo@mail.utexas.edu)).