



**SUBMIT AN ABSTRACT BY JULY 1**

**FEBRUARY 27-MARCH 3, 2022**  
**ANAHEIM CONVENTION CENTER & ANAHEIM MARRIOTT**  
**ANAHEIM, CALIFORNIA, USA**  
**#TMSAnnualMeeting**

**SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2022 SYMPOSIUM:**

## **ADDITIVE TECHNOLOGIES**

### **Additive Manufacturing: Advanced Characterization with Synchrotron, Neutron, and In Situ Laboratory-scale Techniques II**

Additive manufacturing (AM) is beginning to realize its transformative potential to impact many industrial sectors through performance gains, weight savings, and rapid part customization and delivery. However, more widespread utilization of AM technologies in critical sectors, such as aerospace and defense, is still hindered by the challenges of qualification and certification of AM parts. The main reasons for these challenges are the material and functional complexities arising from the highly heterogeneous microstructure across multiple length scales that are introduced during the nonequilibrium fabrication processes.

To solidify AM's status as a new design paradigm, continuous advancements in process control and process monitoring as well as development and application of advanced characterization methods to measure and quantify the interactions between material and processing parameters to better understand and construct the material-process-structure relationship are required. The purpose of this symposium is to provide a forum to share, spread, and promote exciting ideas and progress of AM materials and process characterization using advanced synchrotron, neutron, and laboratory-scale processing monitoring and control techniques.

It has two main themes. The first theme emphasizes characterization of AM materials using facility-based, state-of-the-art synchrotron and neutron characterization techniques. Abstracts are requested in, but not limited to, the following areas:

- Time-resolved imaging and diffraction of the AM process
- Structure and microstructure evolution during post-build heat treatment
- Residual stress measurements and their model validation
- Spatially resolved measurements at different length scales, including microdiffraction and microtomography
- Mechanical behavior characterization, including deformation, fatigue, and fracture
- Additive manufacturing inspired machine learning methods

The second theme emphasizes in situ characterization and diagnostics using laboratory-scale techniques. Abstracts are requested in, but not limited to, the following areas:

- Advancement of existing and emerging in situ process monitoring and process control techniques to reveal process phenomenon, detect material defects, and control process variation
- Identification and understanding of the formation of inherent defects and process anomalies during fabrication from laboratory-scale research to industrial-scale implementation, including those using machine learning methods

We also welcome abstracts addressing industrial applications and industrial perspective on characterization needs, as well as theoretical modeling and numerical simulations that are validated by synchrotron, neutron, or laboratory-scale in situ measurements.

#### **ORGANIZERS**

**Fan Zhang**, National Institute of Standards and Technology  
**Donald W. Brown**, Los Alamos National Laboratory  
**Chihpin Chihpin Chuang**, Argonne National Laboratory  
**Joy Gockel**, Wright State University  
**Sneha Prabha Narra**, Worcester Polytechnic Institute  
**Tao Sun**, University of Virginia

#### **SYMPOSIUM SPONSORS**

TMS Additive Manufacturing Committee  
TMS Advanced Characterization, Testing, and Simulation Committee

[www.tms.org/TMS2022](http://www.tms.org/TMS2022)

**QUESTIONS?**  
Contact [programming@tms.org](mailto:programming@tms.org)