ADDENDUM

MONDAY AM: PLENARY

New presenter: 8:35 AM: Hans-Joachim Schmid, Direct Manufacturing Research Center (DMRC) of Universität Paderborn

MONDAY PM

Applications 1
Cancellation: 4:30 PM: Presenter Jakob Croghan

Lattices and Cellular 1
Cancellation: 5:00 PM: Presenter: Maggie Yuan

Presentation moved from Wednesday, now 4:40 PM: On the Mechanical Behavior of Additively Manufactured Asymmetric Honeycombs: Lucas Casanova[1]; Vineeth Anitha[1]; Nikhil Kadway[1]; Arpit Gandhi[1]; Thao Le[1]; Christine Lee[1]; Dhruv Bhate[1]; [1]Arizona State University.

Materials: Metals 2 - Stainless Steel 316L
Cancellation: 5:00 PM: Presenter: Meysam Akbari, SMU

Physical Modeling 1 - Thermal Modeling in Powder Beds
New session chair: Amy Peterson, Worcester Polytechnic Institute

New presentation: 4:40 PM: Absorptivity Measurements in Laser Powder-bed Fusion Additive Manufacturing: Laser Parameters and Materials Dependence: Jianchao Ye[1]; Gabe Guss[1]; M. Crumb[1]; Saad Khairallah[1]; John Roehling[1]; A. Rubenchik[1]; Manyalibo Matthews[1]; [1]Lawrence Livermore National Laboratory – *Absorption of laser radiation in Laser Powder Bed Fusion (LPBF) is a complex process involving multiple reflections along an irregulate surface, light interaction with metal vapor and material phase transitions. Experimental measurements are needed to clarify the physics of the process and to validate modeling. We present direct measurements of the absorptivity for different materials (SS316, In625, Ti64) as a function of laser power, scan velocity and beam diameter. We demonstrate that absorptivity, with reasonable accuracy, can be approximated by a universal function of normalized enthalpy which is given by the ratio of the deposited laser energy density to the material melting enthalpy. Model predictions are shown to agree well with the experimental data. The results enable methods to rescale the optimal processing parameters between different materials and machines. Prepared by LLNL under Contract DE-AC52-07NA27344.*

Physical Modeling 2 - Multi- and Micro-scale Modeling
Cancellation: 2:10 PM: Presenter: Xiangyang Dong, Missouri University of Science and Technology

Process Development 1 – Deposition
Presenter change: 1:50 PM: Presenter is now Edward Reutzel

Process Development 2 - Extrusion
Cancellation: 1:50 PM: Presenter: Dennis Scheglov

Special Session: Data Analytics in AM 1 - Quality in Modeling 1
Cancellation: 4:00 PM: Presenter: Alex Renner, Iowa State University

Special Session: Hybrid AM Processes 1 - Hybrid Additive-Subtractive Processes
Cancellation: 1:30 PM: Presenter: Phillip C. Chesser, Oak Ridge National Laboratory

Cancellation: 2:30 PM: Presenter: Eric Weflen, Iowa State University

TUESDAY AM

Applications 2
Cancellations: 9:35 AM and 11:05 AM: Presenter: A. Reik, Technical University of Munich

New presentation: 11:05 AM: Effect of Laser Additive Manufacturing on Microstructure Evolution of Inoculated Zr47.5Cu45.5Al5Co2 Bulk Metallic Glass Matrix Composites: Muhammad Rafique[1]; Dong Qiu[1]; Mark Easton[1]; Milan Brandt[1]; [1]RMIT University – *Bulk metallic glass matrix composites are advocated to be material of future owing to their superior strength, hardness and elastic strain limit. However, they possess poor toughness which makes them unusable in any structural engineering application. Inoculation has been used as effective mean to overcome this problem. Zr47.5Cu45.5Al5Co2 bulk metallic glass matrix composites (BMGMC) inoculated with ZrC have shown considerable refinement in microstructure owing to heterogeneous nucleation. Efforts have also been made to exploit modern laser-based metal additive manufacturing to fabricate BMGMC parts in one step. However, the effect of laser on inoculated material is unknown. In this study, an effort has been made to apply laser based additive manufacturing on untreated and inoculated BMGMC samples. It is observed that laser treatment not only refine the microstructure but result in change of size, morphology and dispersion of CuZr B2 phase in base metal, heat affected zone and fusion zone. This effect is documented with back scatter electron imaging. This provides feedstock for further research to quantify this phenomenon and full scale part development.*

Materials: Ceramics
New presenter: 11:45 AM: Enhanced Properties of Mullite Ceramic Foams Prepared by Selective Laser Sintering using Fly Ash Hollow Spheres as Raw Materials, An-Nan Chen, presenter

ADDENDUM

Materials: Metals 3 - Nickel-based Alloys
New presenter: 11:05 AM: Presenter: Oscar Sanchez Mata, McGill University

Cancellation: 11:25 AM: Presenter: Haiyang Fan, KU Leuven

Materials: Metals 4 - Stainless Steels 17-4PH and 304
Cancellation: 11:45 AM: Presenter: Jingjing Yang

Physical Modeling 3 - Advanced Thermal Modeling Techniques
Cancellation: 10:45 AM: Presenter: Yuze Huang, University of Waterloo

Physical Modeling 4 - Modeling Part Performance
New presenter: 8:35 AM: **Numerical Prediction of Fracture in FDM Printed Parts:** Presenter is now Robert Taylor, University of Texas at Arlington

Cancellation: 11:25 AM: Presenter: Yuanqiang Tan, Huaqiao University

Process Development 4 - Metal Powder Bed Fusion 2
Cancellation: 10:25 AM: Process Development 4 - Metal Powder Bed Fusion 2, Presenter: MD AHASAN Habib, North Dakota State University

Process Development 5 – Imaging
New presenter: 11:45 AM: Presenter is now Nick Calta

Special Session: Binder Jet AM 1
New presentation: 11:45 AM: Optimizing Process Parameters to Binder Jet Oxide Ceramics: Edgar Mendoza[1]; Daming Ding[1]; Baby Reeja Jayan[1]; Jack Beuth[1]; [1]Carnegie Mellon University – *Current additive manufacturing (AM) processes cannot feasibly produce fully dense, crack-free ceramic parts. Accordingly, the engineering challenges in ceramic processing must be explored in order to create a ceramic AM process with control over porosity, microstructure, and mechanical properties. In this work, feasibility of binder jetting ceramics is increased by addressing build parameters, powder preparation, and post processing. Process parameters for ceramics were modified from standard metal parameters to compensate for lower flowability and successfully print aluminum oxide parts. Modifying powder size distributions during powder preparation and alternative sintering approaches in post processing are being explored to increase density and decrease thermally-induced cracks, respectively. Such "3D printed" geometrically complex ceramics have potential applications in energy, aerospace, automobiles, military, and healthcare.*

Topology Optimization 1
Cancellation: 8:15 AM: Presenter: Miguel Aguilo, Sandia National Laboratories

TUESDAY PM

Materials: Composites 1
New presenter: 2:40 PM: Presenter is now Rajkumar Velu, Singapore University of Technology and Design

Applications 3
Presenter change: 2:40 PM: Presenter is now Kamran Kardel, Georgia Southern University

Special Session: Data Analytics in AM 3 - Process Monitoring and Defect Mitigation
New presenter: 2:20 PM: Presenter is now Prahalada Rao

TUESDAY PM POSTER SESSION

Cancellation: Poster by Darshan Ravoori, UTA

New poster: How Does Additive Manufacturing Help Senior Capstone Projects? Presenter: Behnoush Rezaeianjouybari[1], [1]University of Missouri-Columbia – *Additive Manufacturing (AM) is a convenient tool to build prototypes for senior Capstone projects. Fused Deposition Modelling (FDM) is a cost effective and safe process for students to build the parts. Some case studies based on FDM on Capstone projects were summarized to indicate how AM technology could accelerate engineering design and testing processes. The research was conducted on FDM to create a comprehensive design guide to identify the characteristics that play the largest roles in the final quality of a 3D printed product. The design guide obtained from the research was applied to three case studies to show the effects of certain design parameters on printed parts through FDM machines. The first case study, a housing for printed circuit board (PCB), required a redesign to effectively and efficiently combine multiple components of the fixture together to allow for easier assembly and disassembly. The second case study, a helical wind turbine, was redesigned to reduce the printing cost and increase the efficiency. Considering the build envelop constrains, the wind turbine blade was redesigned into 3 pieces connecting through a dovetail structure with epoxy adhesive applied at the dovetails to maximize the bonding strength. The third case study, a plastic mechanical watch with tourbillon, required optimizing the performance and accuracy by design of experiments with different materials and various printing settings for time-keeping components. Dynamic analysis of the model in ADAMS verifies design modification results and indicates optimization goal realization while satisfying static and dynamic loads. Design of some critical parts, e. g. mainspring and balance wheel, has support structure and part orientation considerations to reduce distortion, and to increase parts strength.*

ADDENDUM

WEDNESDAY AM

Applications: Biomedical 2
Cancellation: 8:40 AM: Presenter: Ryan Meza

Materials: Polymers 2 - Extrusion-based Polymers
Cancellation: 9:00 AM: Presenter: Louisa Orton, Brigham Young University

Materials: Composites 2 - Extrusion-based Processes,
Cancellation: 9:20 AM: Presenter: Christine Ajinjeru, University of Tennessee Knoxville

Process Development 6 - Novel Methods 1
Cancellation: 8:00 AM: Presenter: Chao Sui, University of Arkansas

Additional co-author: 8:40 AM: Molly Gundermann, ARL Penn State

Special Session: Data Analytics in AM 4 - Quality and Modeling 3
Cancellation: 9:20 AM: Presenter: Ross Salary

Special Session: Hybrid AM Processes 4 - Direct/Indirect Build Strategies,
Cancellation: 10:10 AM: Presenter: Mohamed Eldakroury, Iowa State University

Additional author, 9:20 AM: A Novel Study on EDM Processing of Support Structures in Metal AM: Gregory Bicknell[1]; Xi Gong[1]; Guha Manogharan[1]; [1]Pennsylvania State University

WEDNESDAY PM

Lattices and Cellular 3
New session chair: Carolyn Seepersad from the University of Texas at Austin

This presentation was moved from Wednesday at 1:50 PM; now Monday at 4:40 PM: On the Mechanical Behavior of Additively Manufactured Asymmetric Honeycombs (See listing on Monday for author names.)

Cancellation: 4:00 PM: Presenter: Rahul Rai, University at Buffalo-SUNY.

Materials: Metals 7
Additional author: 4:40 PM: Bey Vrancken[1]; Rishi Ganeriwala[1]; Aiden Martin[1]; Brian Giera[1]; Wayne King[1]; Manyalibo Matthews[1]; [1]Lawrence Livermore National Laboratory

Physical Modeling 5 - AM Modeling Innovations
Cancellation: 1:30 PM: Presenter: Wentao Yan, Northwestern University

Corrected affiliation: 1:10 PM: **Where Next for AM Simulation?**: Brent Stucker[1]; Chong Teng[1]; [1]ANSYS

Physical Modeling 6 - Improvements in AM Modeling
Presenter change: 2:10 PM: Now David Rosen, Singapore University of Technology and Design

Presenter change: 4:00 PM: Now Behrokh Khoshnevis, University of Southern California

Process Development 8 - Novel Methods 2
Cancellation: 2:10 PM: Presenter: Qing Dong, Advanced Technology and Innovation Institute

Process Development 9 - Powder Bed Fusion 2
Cancellation: 3:40 PM: Presenter: Samantha Taylor, University of Texas at Austin

Process Development 10 - Spinning, Pinning, and Stereo-lithography
Cancellation: 2:10 PM: Presenter: Jordan Failla, Manufacturing Demonstration Facility

New title: 4:40 PM: Investigation of Acoustic Field for Localized Particle Manipulation in Projection Photopolymerization: Presenter: Lu Lu, University of Illinois at Chicago.