

Annual 2018 Technical Program

Monday, June 4

Dynamic Behavior of Materials

001. Synchrotron Applications/Advanced Dynamic Imaging

Organizer(s) C. Meredith, Army Research Lab; J. Jordan, Los Alamos National Laboratory

Chair Person C. Meredith, Army Research Lab

- 10:30 A **#184 Keynote: Examining Material Response using X-ray Phase Contrast Imaging (40-min)**
B Jensen, Los Alamos National Laboratory; B. Branch, Los Alamos National Laboratory; F. Cherne, Los Alamos National Laboratory; A. Mandal, Los Alamos National Laboratory; D. Montgomery, Los Alamos National Laboratory; A. Iverson, National Security Technologies; C. Carlson, National Security Technologies
- 11:10 A **#504 Jetting Transition Behavior in Additively Manufactured Lattice Structures**
J Lind, Lawrence Livermore National Laboratory; A. Robinson, Lawrence Livermore National Laboratory; B. Jensen, Los Alamos National Laboratory; M. Kumar, Lawrence Livermore National Laboratory
- 11:30 A **#556 Shock Compaction of Al Powder Examined by X-Ray Phase Contrast Imaging**
A Mandal, Los Alamos National Laboratory; M. Hudspeth, Sandia National Laboratories; B. Jensen, Los Alamos National Laboratory; S. Root, Sandia National Laboratories
- 11:50 A **#612 Mechanical Behavior and Deformation Mechanisms of Mg in Shear Using In-Situ Synchrotron Radiation X-Ray Diffraction**
C Meredith, U.S. Army Research Laboratory; Z. Herl, University of North Texas; M. Young, University of North Texas
- 12:10 P **#472 Microstructural Evaluation of Strain Localization on Deformed 5083-H131 Aluminum**
C Williams, U.S. Army Research Laboratory; K. Dannemann, Rensselaer Polytechnic Institute; J. Spencer, Southwest Research Institute; R. Bigger, Southwest Research Institute; A. Carpenter, Southwest Research Institute; N. Scott, Southwest Research Institute; S. Chocron, Southwest Research Institute
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International Student Paper Competition

002. Int'l Student Paper Competition I

Organizer(s)

Chair Person J.D. Rogers, Sandia National Laboratories

- 10:30 A **#768 Ultrasonic Imaging of Structural Damages using Acoustic Sensitivity Kernels**
S Sternini, University of California, San Diego
- 10:50 A **#239 Quantifying Plastic Flow in Small-scale Indentation by Digital Image Correlation**
M Liu, Texas A&M University
- 11:10 A **#372 Electro-mechanical Studies of Multi-functional Glass Fiber Reinforced Composites**
J O'Donnell, University of Massachusetts Dartmouth
- 11:30 A **#602 Image-Based Inertial Impact Tests for Composite Interlaminar Tensile Properties**
J Van Blitterswyk, University of Southampton
- 11:50 A **#73 Multiscale Experimental Investigation of Shape Memory Alloy Fatigue**
W LePage, University of Michigan

- 12:10 P **#547 Correlation Quality Factors Improve Motion Reconstruction in Digital Image and Volume Correlation Measurements**
A Landauer, Brown University

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

003. Recycled Constituent Composites I

- Organizer(s)** I. Miskoiglu, Michigan technological University; E. Bayraktar, SUPMECA-Paris
Chair Person I. Miskoiglu, Michigan technological University; E. Bayraktar, SUPMECA-Paris

- 10:30 A **#112 Devulcanized Recycled Rubber-Graphene-Epoxy Composite Design for "Aircraft Wing Spar" to Withstand Bending Moment**
A Irez, University Paris - Saclay; E. Bayraktar, SUPMECA-Paris; I. Miskoiglu, Michigan Technological University
- 10:50 A **#171 Design of Recycled Rubber Modified Epoxy Composites Reinforced with Titanium Dioxide (TiO₂) for Tribological Applications**
A Irez, University Paris - Saclay; E. Bayraktar, Supmecca-Paris; I. Miskoiglu, Michigan Technological University
- 11:10 A **#549 The Influence of Crumb Rubber Reinforcement on the Mechanical Properties of Medium Density Fiber-board**
L K. Babu, Oklahoma State University; K. Mishra, Oklahoma State University; R. Singh, Oklahoma State University
- 11:30 A **#333 Damping and Toughening Effect of the Reinforcements on the Epoxy Modified Recycled + Devulcanized Rubber Based Composites**
A Irez, University Paris-Saclay; E. Bayraktar, SUPMECA-Paris; I. Miskoiglu, Michigan Technological University
- 11:50 A **#587 Toughening Mechanisms on Recycled Rubber Modified Epoxy based Composites reinforced with Alumina Fibers**
A Irez, University Paris - Saclay; I. Miskoiglu, Michigan Technological University; E. Bayraktar, SUPMECA-Paris
- 12:10 P **#529 Iron Contents on Recycle Aluminum and Influence on Mechanical Properties**
C Alves, University of Campinas; B. Vilas Boas, University of Campinas; F. Gatamorta, University of Campinas

Mechanics of Additive and Advanced Manufacturing

004. Fatigue & Fracture in AM Materials

- Organizer(s)**
Chair Person J. Jordan, Los Alamos National Laboratory; O. Scott-Emuakpor, Air Force Research Laboratory

- 10:30 A **#440 Quantitative Relationship between Anisotropic Fracture in Additively Manufactured Ti-6Al-4V and Grain Morphology**
A Beese, Pennsylvania State University
- 10:50 A **#667 Fatigue of Solid State Additive Inconel 625**
D Avery, University of Alabama; O. Rivera, University of Alabama; C. Mason, University of Alabama; J. Jordon, University of Alabama; P. Allison, University of Alabama; N. Hardwick, Aeroprobe Corporation

- 11:10 A **#794 Forced-Response Verification of Unique Additive Manufactured Vibration Suppressed Specimens**
O Scott-Emuakpor, Air Force Research Laboratory; T. George, Air Force Research Laboratory; B. Runyon, Air Force Research Laboratory; B. Langley, Air Force Research Laboratory; L. Sheridan, Air Force Research Laboratory; C. Holycross, Air Force Research Laboratory; R. O'Hara, Air Force Institution of Technology; P. Johnson, Universal Technology Corporation
- 11:30 A **#729 The Effect of Powder Reuse on the Fracture Toughness of Additive Manufactured Ti-6Al-4V**
E Huskins-Retzlaff, United States Naval Academy; 1. Tagliavolone, United States Naval Academy; S. Graham, United States Naval Academy
- 11:50 A **#91 Fatigue Characterization of 3D-printed Maraging Steel by Infrared Thermography**
C Douellou, University Clermont-Auvergne; X. Balandraud, University Clermont-Auvergne; E. Duc, University Clermont-Auvergne

Inverse Problems/Hybrid Techniques

005. Inverse Problems/Hybrid Techniques I

Organizer(s)

Chair Person E.M.C. Jones, Sandia National Laboratories

- 10:30 A **#### Non-parametric Identification of Material Behavior using DIC**
J Réthoré, Centrale Nantes; M. Coret, Centrale Nantes; A. Leygue, Centrale Nantes; L. Stainier, Centrale Nantes; E. Verron, Centrale Nantes
- 11:10 A **#518 Micromechanical Parameter Identification from Microstructural Volume Elements using IDIC**
J Hoefnagels, Eindhoven University of Technology, the Netherlands; O. Rokos, Eindhoven University of Technology, the Netherlands; R. Peerlings, Eindhoven University of Technology, the Netherlands; M. Geers, Eindhoven University of Technology, the Netherlands
- 11:30 A **#170 Joint DIC-Elasticity Imaging of Damage in the Presence of Material Inhomogeneity**
D Smyl, Aalto University; S. Bossuyt, Aalto University
- 11:50 A **#673 High Rate Fracture of Human Skull**
C Gunnarsson, U.S. Army Research Laboratory; S. Alexander, SURVICE Engineering Company; K. Rafaels, U.S. Army Research Laboratory; T. Walter, U.S. Army Research Laboratory; T. Weerasooriya, U.S. Army Research Laboratory
- 12:10 P **#489 Extraction of Dynamic Transfer Function in Dual-output Systems and Application to Passive Structural Health Monitoring**
F Lanza di Scalea, University of California San Diego; A. Liang, University of California San Diego; S. Sternini, University of California San Diego; M. Capriotti, University of California San Diego
- 12:30 P **#216 The Fundamental Reason Why Measuring Residual Stress is a Significant Experimental Mechanics Challenge**
M Prime, Los Alamos National Laboratory

Challenges in Mechanics of Time-Dependent Materials

006. Environmental Effects & Extreme Environments

Organizer(s)

Chair Person T. Sakai, Saitama University; A. Amirkhizi, University of Massachusetts, Lowell

- 10:30 A **#792 Keynote: Perspectives on Residual Stresses and Dimensional Stability in Polymeric Materials, Adhesives, and Coatings (40-min)**
D Dillard, Virginia Tech
- 11:10 A **#126 Temperature Dependence of Statistical Static Strengths for Unidirectional CFRP with Various Carbon Fibers**
Y Miyano, Kanazawa Institute of Technology; M. Nakada, Kanazawa Institute of Technology
- 11:30 A **#777 Experimentally Validated Closed Cell Foam Packaging Simulation**
A Arzoumanidis, Psylotech, Inc.; A. Panahon, Psylotech, Inc.
- 11:50 A **#137 Effect of Degradation on Viscoelasticity of Bedsore Prevention Mattress**
T Sakai, Saitama University; T. Uchiyama, Saitama University; K. Kageyama, Saitama University
- 12:10 P **#698 Strain Rate Dependent FEM of Laser Shock Induced Residual Stress**
C Engebretsen, Air Force Institute of Technology; A. Palazotto, Air Force Institute of Technology; K. Langer, Air Force Research Laboratory

8th International Symposium on the Mechanics of Biological Systems and Materials

007. Mechanics of Tissue & Bone

Organizer(s)

Chair Person M.E. Grady, University of Kentucky

- 10:30 A **#763 Keynote: Full-Field Characterization and Modeling of the Anterior Cruciate Ligament (40-min)**
E Arruda, University of Michigan
- 11:10 A **#123 Mechanical and Fracture Properties of Human Cortical Bone with Simulated Diabetes**
K Merlo, University of Massachusetts Dartmouth; J. Aaronson, University of Massachusetts Dartmouth; J. Riordan, University of Massachusetts Dartmouth; R. Ghrandiz, University of Massachusetts Dartmouth; L. Karim, University of Massachusetts Dartmouth; A. Louhghalam, University of Massachusetts Dartmouth; V. Chalivendra, University of Massachusetts Dartmouth
- 11:30 A **#312 Controlling Where and When Forces Are Generated During Tissue Morphogenesis**
K Kasza, Columbia University; R. Herrera-Perez, Columbia University

19th International Symposium on Micro- and Nanomechanics

008. Micromechanical Testing

Organizer(s)

Chair Person F. DelRio, NIST; J. Hay, Nanomechanics, Inc.

- 10:30 A **#155 Keynote: Nanomechanics of Threshold Effects in Ultra-high Strength Distributions (40-min)**
R Cook, NIST; F. DelRio, NIST
- 11:10 A **#621 Real-time Observation of Ballistic Deformation of Single CNT and Kevlar Filaments**
J Lee, University of Massachusetts; W. Xie, University of Massachusetts at Amherst; R. Headrick, Rice University; R. Zhang, Northeastern University; L. Taylor, Rice University; M. Pasquali, Rice University; S. Müftü, Northeastern University
- 11:30 A **#205 A MEMS Device for Displacement-controlled Tensile Testing of One-dimensional Nanomaterials**
C Li, North Carolina State University; Y. Zhu, North Carolina State University

- 11:50 A **#194 Real-time Measurement of Phase Boundary Propagation in Electrode Materials using Picosecond Ultrasonics**
S Rezazadeh-Kalehbasti, Brown University; L. Liu, Brown University; H. Maris, Brown University; P. Guduru, Brown University
- 12:10 P **#188 Measurement of Electrolyte Dependent Elastic Modulus of Solid Electrolyte Interphase (SEI) Formed on Li Thin Film Electrodes**
I Yoon, Brown University; S. Jurng, University of Rhode Island; D. Abraham, Argonne National Laboratory; B. Lucht, University of Rhode Island; P. Guduru, Brown University

Dynamic Behavior of Materials

009. Quantitative Visualization of Dynamic Events I

Organizer(s) L. Lamberson, Drexel University; T. Weerasooriya, US Army Research Laboratory

Chair Person L. Lamberson, Drexel University; T. Weerasooriya, US Army Research Laboratory

- 01:50 P **#530 Particle Tracking, Digital Image Correlation, and Image Processing Techniques in Shocked Granular and Heterogeneous Materials**
R Crum, Lawrence Livermore National Laboratory; J. Lind, Lawrence Livermore National Laboratory; E. Herbold, Lawrence Livermore National Laboratory; R. Hurley, Lawrence Livermore National Laboratory; D. Miller, Lawrence Livermore National Laboratory; M. Homel, Lawrence Livermore National Laboratory; M. Akin, Lawrence Livermore National Laboratory
- 02:10 P **#640 Quantitative Visualization of Sub-micron Deformations and Stresses at Sub-microsecond Intervals in Soda-lime Glass Plates**
C Miao, Auburn University; H. Tippur, Auburn University
- 02:30 P **#465 An Image-Based Approach for Measuring Dynamic Fracture Toughness**
L Fletcher, University of Southampton; L. Lamberson, Drexel University; F. Pierron, University of Southampton
- 02:50 P **#400 Inertial Microcavitation as a Neural Cell Damage Mechanism in an in vitro Model of Traumatic Brain Injury**
J Estrada, Brown University/University of Michigan; H. Cramer, III., Brown University; M. Scimone, Brown University; C. Franck, Brown University
- 03:10 P **#800 Application of High-speed DIC to Study Damage of Thin Membranes under Blast**
P Razavi, Worcester Polytechnic Institute; H. Tang, Worcester Polytechnic Institute; K. Pooladvand, Worcester Polytechnic Institute; M. Ravicz, Massachusetts Eye and Ear Infirmary; J. Rosowski, Massachusetts Eye and Ear Infirmary; A. Remenschneider, Massachusetts Eye and Ear Infirmary; T. Cheng, Massachusetts Eye and Ear Infirmary; C. Furlong, Worcester Polytechnic Institute

International Student Paper Competition

010. Int'l Student paper Competition II

Organizer(s)

Chair Person J.D. Rogers, Sandia National Laboratories

- 01:50 P **#652 Constitutive Model for Agarose Gel Based on Primary Deformation Modes**
K Upadhyay, University of Florida
- 02:10 P **#610 Identification of Anisotropic Properties of Metals using the Virtual Fields Method**
A Marek, University of Southampton

- 02:30 P **#305 Semi-quantitative De-convolution of the Measured Interphase in Particle-matrix Polymer Nanocomposites**
D Collinson, Northwestern University
- 02:50 P **#709 A Dynamic Scanning Indentation Technique for Quantitative Viscoelastic Property Mapping**
M Eaton, Northwestern University
- 03:10 P **#443 UV Radiation Effects on the Blast Response of Composite Structures**
C Javier, University of Rhode Island

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

011. Nanocomposites

Organizer(s) F. Gardea, U.S. Army Research Laboratory; P. Thakre, frank.gardea4.civ@mail.mil

Chair Person F. Gardea, U.S. Army Research Laboratory; P. Thakre, frank.gardea4.civ@mail.mil

- 01:50 P **#141 AlSi10Mg Nanocomposites Prepared by DMLS Using in-situ CVD Growth of CNTs: Process Effects and Mechanical Characterization**
P Thompson, NAVAIR; R. Poveda, NAVAIR; I. Bezsonov, NAVAIR; M. Rossini, NAVAIR; D. Orthner, NAVAIR; B. Leng, CarboMet; Z. Iqbal, CarboMet
- 02:10 P **#79 Stimulus-responsive Interfacial Chemistry in CNT/Polymer Nanocomposites**
F Gardea, U.S. Army Research Laboratory; Z. Huang, University of Maryland; B. Glaz, U.S. Army Research Laboratory; S. Karna, U.S. Army Research Laboratory; X. Cheng, University of Maryland; Z. Peng, University of Maryland; Y. Wang, University of Maryland
- 02:30 P **#429 Electro-Mechanical Response of Polymer Bonded Energetic Materials with CNT Sensing Networks for Structural Health Monitoring**
N Shirodkar, Virginia Polytechnic Institute and State University; S. Rucker, Virginia Polytechnic Institute and State University; T. McCoy, Virginia Polytechnic Institute and State University; G. Seidel, Virginia Polytechnic Institute and State University
- 02:50 P **#476 Strength and Energy Absorption Capability of Porous Magnesium Composites Reinforced by Carbon Nanofibers**
H Xu, Washington State University; Q. Li, Washington State University
- 03:10 P **#779 Influence of Nanoscale Phase Behavior on Ballistic Performance of Epoxy Networks**
K Masser, U.S. Army Research Laboratory; E. Bain, U.S. Army Research Laboratory; T. Long, Army Research Laboratory; F. Beyer, U.S. Army Research Laboratory; A. Savage, U.S. Army Research Laboratory; J. Yu, Army Research Laboratory; J. Lenhart, U.S. Army Research Laboratory

Advancement of Optical Methods in Experimental Mechanics

012. New Developments in Optical Methods & Fringe Pattern Analysis I

Organizer(s)

Chair Person C. Furlong, WPI-ME/CHSLT; M.T. Lin, National Chung Hsing University

- 01:50 P **#532 Computing DSPI Fringe Pattern with Location from Recorded Video Streamlines**
C Hwang, Instrument Technology Research Center; W. Wang, National Tsing Hua University
- 02:10 P **#383 Accurate Reconstruction of High-gradient Strain Field in Digital Image Correlation: A Local Hermite Scheme**
X Li, Tsinghua University; J. Zhao, Tsinghua University; J. Shuai, Tsinghua University; Z. Zhang, Tsinghua University; X. Wu, Tsinghua University

- 02:30 P **#101 A New Method of Fringe Pattern Analysis**
C Sciammarella, Illinois Institute of Technology; L. Lamberti, Politecnico di Bari
- 02:50 P **#168 Speckles and DIC or Checkerboards and LSA?**
M Grédiac, Université Clermont Auvergne; B. Blaysat, Université Clermont Auvergne; F. Sur, Université de Lorraine
- 03:10 P **#167 Speckle Image Rendering for DIC Performance Assessment**
F Sur, Université de Lorraine; B. Blaysat, Université Clermont Auvergne; M. Grédiac, Université Clermont Auvergne

Symposium on the Role of Digital Image Correlation in Experimental Mechanics in Honor of Prof. Michael Sutton

013. High Rate Loading I

Organizer(s)

Chair Person A. Shukla, University of Rhode Island; G. Ravichandran, Caltech

- 01:50 P **#219 DIC under Extreme Loading Conditions**
A Shukla, University of Rhode Island
- 02:10 P **#536 High-speed Visualization of Deformation Field inside Opaque Materials**
N Kerschen, Purdue University; J. Chu, Purdue University; N. Kedir, Purdue University; W. Chen, Purdue University; K. Fezzaa, Argonne National Lab; T. Sun, Argonne National Lab
- 02:30 P **#373 Characterization of the Constitutive Behavior of Polymeric Gels Using DIC**
K Upadhyay, University of Florida; G. Subhash, University of Florida; D. Spearot, University of Florida
- 02:50 P **#798 Measuring the Taylor-Quinney Coefficient**
D Rittel, Technion - Israel Institute of Technology
- 03:10 P **#176 The Use of Digital Image Correlation in Split Hopkinson (Kolsky) Bar Experiments**
A Gilat, The Ohio State University; J. Seidt, The Ohio State University

Challenges in Mechanics of Time-Dependent Materials

014. Soft Materials

Organizer(s)

Chair Person M. Silberstein, Cornell University

- 01:50 P **#100 Modified Hyper-viscoelastic Constitutive Model for Elastomeric Materials**
K Harban, University of Washington; M. Tuttle, University of Washington
- 02:10 P **#419 Modeling Dynamics of Pattern Formation in Hydrogel Membranes in Temperature Gradients**
Y Xiong, Clemson University; O. Kuksenok, Clemson University
- 02:30 P **#316 The Development of Time Dependent Constitutive Laws of Jujube Flesh**
Q Pham, Southern Taiwan University of Science and Technology; N. Liou, Southern Taiwan University of Science and Technology
- 02:50 P **#567 Theory for 3D Magnetic Rotational Spectroscopy of Complex Fluids**
V Palkar, Clemson University; P. Aprelev, Clemson University; B. McKinney, Clemson University; O. Kuksenok, Clemson University; K. Kornev, Clemson University
- 03:10 P **#507 Comparison of Porcine Brain Tissue with Surrogate Materials in Quasi-Static Compression and Dynamic Mechanical Analysis**
D Singh, University of Waterloo; S. Boakye-Yiadom, York University; D. Cronin, University of Waterloo

8th International Symposium on the Mechanics of Biological Systems and Materials

015. Biotribology & Collagen**Organizer(s)****Chair Person** J. Notbohm, University of Wisconsin-Madison

01:50 P **#358 Modeling of Atomic Force Microscope Contact Experiments on Escherichia Coli Bacteria Cellular Systems**

D Biggs, California Institute of Technology; H. Liu, California Institute of Technology; D. Tirrell, Caltech; G. Ravichandran, California Institute of Technology

02:10 P **#418 Strain Rate Experiments on the Mechanical Behavior of Collagen Fibrils**

F Yang, University of Illinois at Urbana-Champaign; I. Chasiotis, University of Illinois at Urbana-Champaign

02:30 P **#319 Nonaffine Displacements in Fibrous Biological Materials from Digital Image Correlation**

B Burkel, University of Wisconsin-Madison; M. Proestaki, University of Wisconsin-Madison; J. Notbohm, University of Wisconsin-Madison

19th International Symposium on Micro- and Nanomechanics

016. Adhesion & Fracture**Organizer(s)****Chair Person** R. Cook, NIST; G. Raiser, Medtronic

01:50 P **#651 Influence of Adhesion on the Mechanical Response of Granular Composites**

S Bhavanam, Worcester Polytechnic Institute; N. Karanjaokar, Worcester Polytechnic Institute

02:10 P **#593 Direct Measurements of the Mechanical Strength of Carbon Nanotube-Metal Interfaces**

C Yi, State University of New York at Binghamton; C. Dmuchowski, State University of New York at Binghamton; F. Gou, State University of New York at Binghamton; X. Chen, Xi'an Jiaotong University; C. Ke, State University of New York at Binghamton

02:30 P **#204 Development of Femtosecond Laser Based Microscale Fracture Methods**

D Magagnosc, U.S. Army Research Laboratory; B. Schuster, U.S. Army Research Laboratory

02:50 P **#203 Tensile Response of Ceramics at the Microscale**

D Magagnosc, U.S. Army Research Laboratory; B. Schuster, U.S. Army Research Laboratory

03:10 P **#635 Measurements of Adhesion between Polymeric Nanofibers**

D Das, University of Illinois at Urbana-Champaign; I. Chasiotis, University of Illinois at Urbana-Champaign

Dynamic Behavior of Materials

017. Quantitative Visualization of Dynamic Events II**Organizer(s)** L. Lamberson, Drexel University; T. Weerasooriya, US Army Research Laboratory**Chair Person** T. Weerasooriya, US Army Research Laboratory; S. Koumlis, Drexel University

- 04:30 P **#601 High-Strain Rate Interlaminar Shear Testing of Fibre-Reinforced Composites Using an Image-Based Inertial Impact Test**
J Van Blitterswyk, University of Southampton; L. Fletcher, University of Southampton; F. Pierron, University of Southampton
- 04:50 P **#625 IBI Test for High Strain Rate Tensile Testing of Adhesives**
A Guigue, University of Southampton; L. Fletcher, University of Southampton; R. Seghir, University of Southampton; F. Pierron, University of Southampton
- 05:10 P **#328 Optimization of an Image-based Experimental Setup for the Dynamic Behaviour Characterization of Materials**
P Bouda, French Aerospace Research Center (ONERA); D. Notta-Cuvier, Université de Valenciennes; B. Langrand, French Aerospace Research Center (ONERA); E. Markiewicz, Université de Valenciennes; F. Pierron, University of Southampton
- 05:30 P **#722 The Utility of 3D Digital Image Correlation for Characterizing High-Rate Deformation**
P Jannotti, U.S. Army Research Laboratory
- 05:50 P **#546 High-Speed Microscopic Imaging of Initiation and Propagation of Adiabatic Shear Bands**
P Malhotra, Brown University; Y. Liu, Brown University; P. Guduru, Brown University

International Student Paper Competition

018. Int'l Student Paper Competition III

Organizer(s)

Chair Person J.D. Rogers, Sandia National Laboratories

- 04:30 P **#144 Electrical Response of Carbon Nanotube and Carbon Fiber Reinforced Jute/Epoxy Composites under Shear Loading**
S Yang, University of Massachusetts Dartmouth
- 04:50 P **#147 Mechanical and Fracture Characterization of Cortical Bone in Simulated Diabetic Condition**
K Merlo, University of Massachusetts Dartmouth
- 05:10 P **#666 Experimental Challenges in Explosively Loaded Ring Fragmentation**
S Ward, University of Cambridge
- 05:30 P **#714 Dynamic Failure of Brittle Heterogeneous Materials**
C Loeffler, Southern Methodist University
- 05:50 P **#687 Probing Deeper with Thermography: New Approaches for Rapid Defect Identification in Laminated Fibre Reinforced Polymers**
G Olafsson, University of Southampton

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

019. Mechanics of Composites

Organizer(s) B. Werner, Sandia National Laboratories; R. Singh, Oklahoma State University

Chair Person B. Werner, Sandia National Laboratories; R. Singh, Oklahoma State University

- 04:30 P **#648 Determination of Stress Free Temperature in Composite Laminates**
B Werner, Sandia National Laboratories; H. Jin, Sandia National Laboratories; T. Briggs, Sandia National Laboratories

- 04:50 P **#650 Calibration of a Simple Rate Dependent Elastic-Plastic Constitutive Model for a Toughened Carbon Epoxy Composite System**
B Werner, Sandia National Laboratories; J. Schaefer, The Boeing Company
- 05:10 P **#210 Testing the 2-3 Shear Strength of Unidirectional Composite**
J Fenner, Northwestern University; I. Daniel, Northwestern University
- 05:30 P **#495 Damage Detection and Visco-Elastic Property Characterization of Composite Aerospace Panels Using Ultrasonic Guided Waves**
F Lanza di Scalea, University of California San Diego; M. Capriotti, University of California San Diego; R. Cui, University of California San Diego
- 05:50 P **#341 Dynamic Mechanical Response of T800/F3900 Composite under Tensile and Compressive Loading**
Y Deshpande, The Ohio State University; P. Yang, The Ohio State University; J. Seidt, The Ohio State University; A. Gilat, The Ohio State University

Advancement of Optical Methods in Experimental Mechanics

020. New Developments in Optical Methods & Fringe Pattern Analysis II

Organizer(s)

Chair Person L. Lamberti, Politecnico di Bari; C. Furlong, WPI-ME/CHSLT

- 04:30 P **#161 Fast Adaptive Global Digital Image Correlation**
J Yang, California Institute of Technology; K. Bhattacharya, California Institute of Technology
- 04:50 P **#265 Fast, Sub-Pixel Accurate Digital Image Correlation Algorithm Powered by Heterogeneous (CPU-GPU) Framework**
M Thiagu, Indian Institute of Technology-Madras; S. Subramanian, Indian Institute of Technology-Madras; R. Nasre, Indian Institute of Technology-Madras
- 05:10 P **#365 Development of Optimal Multiscale Patterns for Digital Image Correlation via Local Grayscale Variation**
G Bomarito, National Aeronautics and Space Administration; J. Hochhalter, National Aeronautics and Space Administration; T. Ruggles, National Institute of Aerospace
- 05:30 P **#457 The Effect of Chamber Temperature on Residual Stresses of FDM Parts**
C Casavola, Politecnico di Bari; A. Cazzato, Politecnico di Bari; D. Karalekas, University of Piraeus; V. Moramarco, Politecnico di Bari; G. Pappalettera, Politecnico di Bari

Symposium on the Role of Digital Image Correlation in Experimental Mechanics in Honor of Prof. Michael Sutton

021. High Rate Loading II

Organizer(s)

Chair Person W. Fourney, University of Maryland; P. Reu, Sandia national Laboratories

- 04:30 P **#166 X-Ray based Digital Image Correlation for Fluid-Structure Interactions**
E Quintana, Sandia National Laboratories; E. Jones, Sandia National Laboratories; P. Reu, Sandia National Laboratories; J. Wagner, Sandia National Laboratories
- 04:50 P **#208 Using X-ray Tomography and DVC to Study Damage Evolution in Syntactic Foam**
H Jin, Sandia National Laboratories; B. Mills, Sandia National Laboratories; B. Croom, University of Virginia; X. Li, University of Virginia; J. Carroll, Sandia National Laboratories
- 05:10 P **#324 Ultra-High Speed Imaging for DIC Measurements in Kolsky Bar Experiments**
P Moy, U.S. Army Research Laboratory; T. Walter, U.S. Army Research Laboratory

- 05:30 P **#728 Meso-Macro Scale Digital Image Based Experiments to Understand the Response of Materials Subjected to Extreme Conditions**
A Kidane, University of South Carolina

Challenges in Mechanics of Time-Dependent Materials

022. Inhomogeneities and Interfaces

Organizer(s)

Chair Person H. Lu, The University of Texas at Dallas

- 04:30 P **#568 Multiscale Characterization of Time Dependent Properties of Carbon Nanotube Grafted Fiber-reinforced Polymer Composites**
A Krishnamurthy, National Institute of Standards and Technology; R. Tao, National Institute of Standards and Technology; E. Senses, National Institute of Standards and Technology; S. Doshi, University of Delaware; E. Thostenson, University of Delaware; A. Faraone, National Institute of Standards and Technology; A. Forster, National Institute of Standards and Technology
- 04:50 P **#469 Visualizing Nanoscale Deformation of Polymers by Atomic Force Microscopy and Digital Image Correlation**
R Savage, ExxonMobil Chemical Company; J. Furmanski, ExxonMobil Research & Engineering Company; J. Hobbs, University of Sheffield
- 05:10 P **#201 Dissipative Damage Theory for Strongly Time-Dependent Composite Materials**
R Hall, Air Force Research Laboratory; R. Brockman, University of Dayton Research Institute
- 05:30 P **#564 Novel Experiments to Capture Local Viscoelastic Mechanical Property Distributions in Soft Heterogeneous Materials**
P Kolluru, Northwestern University; M. Eaton, Northwestern University; D. Collinson, Northwestern University; D. Delgado, Northwestern University; K. Shull, Northwestern University; L. Brinson, Duke University
- 05:50 P **#801 Effect of Moisture Silicon/Epoxy Interactions**
D Ferreira, University of Texas at Austin; C. Wu, Missouri University of Science & Technology; R. Huang, University of Texas at Austin; K. Liechti, University of Texas at Austin

8th International Symposium on the Mechanics of Biological Systems and Materials

023. Cell Mechanics & Traumatic Brain Injury

Organizer(s)

Chair Person K. Kasza, Columbia University

- 04:30 P **#633 Experimental Study of the Mechanics of Blast-induced Traumatic Brain Injury**
J Kerwin, Michigan State University; F. Masoomi, Michigan State University; S. Vidhate, Michigan State University; A. Willis, San Antonio Military Medical Center; M. Tartis, New Mexico Institute of Mining and Technology; R. Mejia-Alvarez, Michigan State University
- 04:50 P **#84 DVC Measurement of Invasive Deformation Field of ECM Generated by Tumor Cell Induced EMT**
Y Morita, Nagoya University; T. Yamauchi, Nagoya University; Y. Toku, Nagoya University; Y. Ju, Nagoya University
- 05:10 P **#138 Valsartan Abates Epinephrine-induced ICAM-4 Activation on Normal, Sickle Cell Trait and Sickle Cell Disease Red Blood Cells**
J Zhang, University of Connecticut; S. Jones, University of Connecticut; G. Lykotrafitis, University of Connecticut; B. Andemariam, University of Connecticut

- 05:30 P **#646 Development of Biofilm-Surface Adhesion Technique via Laser-induced Stress Waves**
J Boyd, University of Kentucky; S. Ross, University of Kentucky; M. Grady, University of Kentucky

19th International Symposium on Micro- and Nanomechanics

024. MEMS Devices & Technology

Organizer(s)

Chair Person J. Walton, Wright-Patterson AFB; T. Berfield, University of Louisville

- 04:30 P **#451 Post Processed Foundry MEMS Actuators for Large Deflection Optical Scanning**
L Starman, U.S. Air Force Research Laboratory; D. Torres, U.S. Air Force Research Laboratory; H. Hall, U.S. Air Force Research Laboratory; J. Walton, U.S. Air Force Research Laboratory; R. Lake, U.S. Air Force Institute of Technology
- 04:50 P **#642 A MEMS-scale Nonlinear Vibration Energy Harvester Based on Coupled Component Structures and Bi-stable States**
M Derakhshani, University of Louisville; B. Allgeier, University of Louisville; T. Berfield, University of Louisville
- 05:10 P **#228 Modelling & Simulation of Post Processed Foundry Fabricated Large, Out-of-Plane MEMS Energy Harvester**
J Walton, Air Force Research Laboratory; L. Starman, Air Force Research Laboratory; D. Torres, Air Force Research Laboratory
- 05:30 P **#227 Programming Vanadium Dioxide based MEMS Mirror**
D Torres, Air Force Research Laboratory; S. Dooley, Air Force Research Laboratory; L. Starman, Air Force Research Laboratory; N. Sepúlveda, Michigan State University
- 05:50 P **#452 Torsional Structures to Enable Large Angle Deflections**
L Starman, U.S. Air Force Research Laboratory; D. Torres, U.S. Air Force Research Laboratory; J. Walton, U.S. Air Force Research Laboratory

Dynamic Behavior of Materials

Tuesday, June 5

025. Novel Experimental Techniques

Organizer(s) T. Walter, US Army Research Lab; O. Kingstedt, University of Utah

Chair Person T. Walter, US Army Research Lab; E. Retzlaff, United States Naval Academy

- 09:00 A **#153 Heterodyne Diffracted Beam Photonic Doppler Velocimeter (DPDV) for Pressure-Shear Shock Experiments**
M Mello, California Institute of Technology; C. Kettenbeil, California Institute of Technology; M. Bischann, California Institute of Technology; Z. Lovinger, California Institute of Technology; G. Ravichandran, California Institute of Technology
- 09:20 A **#636 Modified Digital Gradient Sensors with Higher Measurement Sensitivity for Evaluating Stress Gradients in Transparent Solids**
C Miao, Auburn University; H. Tippur, Auburn University
- 09:40 A **#237 Microstructure Characterization of Electrodeposited Nickel Tested at High Strain Rates**
J Ligda, U.S. Army Research Laboratory; D. Casem, U.S. Army Research Laboratory; H. Murdoch, U.S. Army Research Laboratory

- 10:00 A **#715 Influence of High Strain Rate Transverse Compression on the Tensile Strength of Polyethylene Ballistic Single Fibers**
F Thomas, University of South Carolina; D. Casem, U.S. Army Research Laboratory; T. Weerasooriya, U.S. Army Research Laboratory; S. Sockalingam, University of South Carolina; J. Gillespie Jr., University of Delaware

Highlights

026. Technology Applications

Organizer(s) J. Normandin, SEM
Chair Person P. Reynolds, University of Exeter

- 09:00 A **#95 Recent Enhancements in Stereo Calibration Methods for Single and Multiple Stereo Digital Image Correlation Systems**
A Tofts, Correlated Solutions, Inc.; H. Schreier, Correlated Solutions, Inc.; M. Simonsen, Correlated Solutions, Inc.; A. Balabokhin, Correlated Solutions, Inc.
- 09:15 A **#211 MatchID 's Performance Analysis: An Automated Approach to Determine the Optimum DIC user Settings**
P Lava, MatchID - Metrology Beyond Colors; L. Wittevrongel, MatchID - Metrology Beyond Colors
- 09:30 A **#90 High-speed 2D Polarization to Visualize Birefringence in Transparent Materials**
A Bridges, Photron
- 09:45 A **##### Monitoring the Fiber Separation from the Matrix with High-speed Infrared Thermal Imaging**
S Boubanga-Tombet, Telops; F. Marcotte, Telops
- 10:00 A **##### Advanced and Field Applications of The ARAMIS DIC System**
T Schmidt, Trillion Quality Systems
- 10:15 A **##### Comparing the Differences Between FT-CMOS2 Technology vs. In-Situ Storage CCD and Typical CMOS High-Speed Cameras**
T Rumbaugh, Hadland Imaging

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

027. Fracture & Fatigue of Composites

Organizer(s) V. Chalivendra, University of Massachusetts Dartmouth; B. Mukherjee, The Dow Chemical Company
Chair Person V. Chalivendra, University of Massachusetts Dartmouth; B. Mukherjee, The Dow Chemical Company

- 09:00 A **#426 2D Microscale Observations of Transverse Fracture in Carbon/Epoxy Composites**
A Smith, University of Utah; C. Arndt, University of Utah; M. Czabaj, University of Utah; D. Benson, University of Utah
- 09:20 A **#702 Effect of Process Induced Residual Stress on Interlaminar Fracture Toughness of Hybrid Composites**
B Werner, Sandia National Laboratories; K. Nelson, Sandia National Laboratories; C. Nelson, Sandia National Laboratories
- 09:40 A **#645 Investigating Intralaminar Crack Growth in Biaxially Stressed Composites for Extreme Aerospace Applications**
J French, University of Utah; J. Christensen, University of Utah; M. Czabaj, University of Utah
- 10:00 A **#268 Mode II Crack Initiation and Propagation of Carbon Fiber Epoxy under Extreme Conditions**
R Chavez, University of California San Diego

Advancement of Optical Methods in Experimental Mechanics

028. New Developments in Optical Methods & Fringe Pattern Analysis III

Organizer(s)

Chair Person C.A. Sciammarella, Illinois Institute of Technology; C. Furlong, WPI-ME/CHSLT

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- 09:00 A **#246 Eliminating Air Refraction Issues in DIC by Conducting Experiments in Vacuum**
P Reu, Sandia National Laboratories; E. Jones, Sandia National Laboratories
- 09:20 A **#273 DIC Image on FIB Ring-Core Analysis of Depth Sensing Residual Stress Measurement of Thin Films**
W Pan, National Chung Hsing University; A. Tsai, National Chung Hsing University; T. Chen, National Cheng Kung University; F. Cherng, National Cheng Kung University; M. Lin, National Chung Hsing University
- 09:40 A **#385 Development of a New Normalization Technique for Twelve- Fringe Photoelasticity (TFP)**
A Pandey, Indian Institute of Technology Madras; K. Ramesh, Indian Institute of Technology Madras
- 10:00 A **#626 Deflectometry on Curved Surfaces**
Y Surrel, University of Southampton; F. Pierron, University of Southampton
- 10:20 A **#748 Simulation of 3D Reconstruction of Conical Calibration Targets**
W Wang, National Tsing Hua University; C. Hwang, Instrument Technology Research Center, NARL; Y. Chen, Instrument Technology Research Center, NARL

Symposium on the Role of Digital Image Correlation in Experimental Mechanics in Honor of Prof. Michael Sutton

029. Biomechanics

Organizer(s)

Chair Person J. Dally, University of Maryland; P.G. Ifju, University of Florida

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- 09:00 A **#72 Combined Digital Volume Correlation and Confocal Microscopy for studying Cell-Matrix Interactions**
J Notbohm, University of Wisconsin-Madison; C. Franck, Brown University; G. Ravichandran, Caltech
- 09:20 A **#251 Identification of Deformation Mechanism in Biomaterials Through AFM and Digital Image Correlation**
H Espinosa, Northwestern University
- 09:40 A **#96 Beyond the Airbrush: Applications of Digital Image Correlation in Vascular Biomechanics**
S Lessner, University of South Carolina; J. Eberth, University of South Carolina
- 10:00 A **#278 Measurement of Local Strain Distribution and Its Variation Near Eyes During Blink Using Digital Image Correlation**
K Sakai, Aoyama Gakuin University; Y. Zhang, Aoyama Gakuin University; S. Yoneyama, Aoyama Gakuin University; Y. Miyazaki, Kao Corporation; Y. Nagai, Kao Corporation; T. Igarashi, Kao Corporation

Challenges in Mechanics of Time-Dependent Materials

030. Damage, Fatigue, Fracture

Organizer(s)

Chair Person J. Furmanski, Exxon Mobil; B. Antoun, Sandia National Laboratories

- 09:00 A **#559 Experimental Investigation of Dynamic Strain Aging in 304L Stainless Steel**
B Antoun, Sandia National Laboratories; C. Alleman, Sandia National Laboratories; K. De La Trinidad, Sandia National Laboratories
- 09:20 A **#527 Modeling of Cavitation Erosion Resistance in Polymeric Materials Based on Strain Accumulation**
V Alizadeh, University of Massachusetts, Lowell; A. Amirkhizi, University of Massachusetts, Lowell
- 09:40 A **#762 Bond Strength in Non-woven Mechanics**
N Chen, Cornell University; M. Silberstein, Cornell University
- 10:00 A **#516 Direct Extraction of Traction-Separation Relationship for Polymer-Modified Bitumen Under Mode I Loading**
S Rajan Kattil, University of South Carolina; M. Sutton, University of South Carolina; F. Ryan, University of South Carolina; A. Kidane, University of South Carolina; Y. Farzana, University of South Carolina
- 10:20 A **#274 Understanding Creep-Fatigue Interaction in Fe-25Ni-20Cr (wt.%) Austenitic Stainless Steel**
N Kumar, North Carolina State University; A. Alomari, North Carolina State University; K. Murty, North Carolina State University

Inverse Problems/Hybrid Techniques

031. Inverse Problems/Hybrid Techniques II

Organizer(s)

Chair Person S. Bossuyt, Aalto University

- 09:00 A **#346 Experimentally Enhanced Computations: Calibration Methodology for an Anisotropic Metal, Part I – Traditional Approach**
E Corona, Sandia National Laboratories; S. Kramer, Sandia National Laboratories; A. Jones, Sandia National Laboratories
- 09:20 A **#367 Experimentally Enhanced Computations: Calibration Methodology for an Anisotropic Metal, Part II – Novel Approach/ Validation**
S Kramer, Sandia National Laboratories; A. Jones, Sandia National Laboratories; B. Lester, Sandia National Laboratories; E. Corona, Sandia National Laboratories
- 09:40 A **#742 Optimal Mechanical Testing for Constitutive Parameter Identification**
D Seidl, Sandia National Laboratories; D. Turner, Sandia National Laboratories; E. Jones, Sandia National Laboratories; K. Karlson, Sandia National Laboratories; S. Kramer, Sandia National Laboratories; J. Carroll, Sandia National Laboratories; P. Reu, Sandia National Laboratories
- 10:00 A **#585 Image-based Stress Field Reconstruction in Complex Media**
R Seghir, Université de Nantes; F. Pierron, University of Southampton; L. Fletcher, University of Southampton
- 10:20 A **#136 Inverse Identification of the Loading Applied by a Tire on a Landing Gear Wheel**
K Cosseron, LMT, ENS Paris-Saclay/Safran Group, Safran Landing Systems; R. Gras, LMT, ENS Paris-Saclay/EikoSim; D. Mellé, Safran Group, Safran Landing Systems; J. Diebold, Safran Group, Safran Landing Systems; F. Hild, LMT, ENS Paris-Saclay; S. Roux, LMT, ENS Paris-Saclay

19th International Symposium on Micro- and Nanomechanics

032. Nano-scale Deformation Mechanisms

Organizer(s)

Chair Person M. Linne, University of Michigan; N. Karanjgaokar, Worcester Polytechnic Institute

- 09:00 A **#582 Keynote: Investigating Small-Scale Deformation Mechanisms and Microstructure-Mechanical Property Relationships using SEM-DIC**
S Daly, University of California, Santa Barbara
- 09:40 A **#178 Investigation of Deformation Mechanisms in Columnar Aluminum**
M Linne, University of Michigan; A. Venkataraman, Purdue University; M. Sangid, Purdue University; S. Daly, University of California, Santa Barbara
- 10:00 A **#99 Superstrength through Icosahedral Bonding**
C Kunka, University of Florida; G. Subhash, University of Florida
- 10:20 A **#569 Temperature and Microstructural Dependence of Dwell Fatigue in Dual-Phase Titanium Alloys**
M Harr, University of Michigan; A. Pilchak, Air Force Research Laboratory; S. Daly, University of California, Santa Barbara

Dynamic Behavior of Materials

033. Dynamic Behavior of Geomaterials I

Organizer(s) B. Martin, Air Force Research Laboratory; X. Nie, Southern Methodist University

Chair Person X. Nie, Southern Methodist University; B. Williams, US Army ERDC

- 01:50 P **#148 Dynamic Damage Evolution in High-Strength Concrete**
C Loeffler, Southern Methodist University; Y. Qiu, Southern Methodist University; B. Martin, Air Force Research Laboratory; W. Heard, U.S. Army Engineer Research and Development Center; B. Williams, U.S. Army Engineer Research and Development Center; X. Nie, Southern Methodist University
- 02:10 P **#446 Residual Structural Capacity of a High-Performance Concrete**
G Vankirk, U.S. Army Engineer Research and Development Center; W. Heard, U.S. Army Engineer Research and Development Center; A. Frank, U.S. Army Engineer Research and Development Center; M. Hammons, U.S. Army Engineer Research and Development Center; J. Roth, U.S. Army Engineer Research and Development Center
- 02:30 P **#301 Revisit of Dynamic Brazilian Tests of Geomaterials**
B Sanborn, Sandia National Laboratories; E. Jones, Sandia National Laboratories; M. Hudspeth, Sandia National Laboratories; B. Song, Sandia National Laboratories; S. Broome, Sandia National Laboratories
- 02:50 P **#76 Effect of the Ratio of Charge Mass to Target Mass on Measured Impulse**
L Taylor, University of Maryland; W. Szymczak, Naval Research Laboratory; U. Leiste, University of Maryland; W. Fourney, University of Maryland
- 03:10 P **#805 High Strain Rate Multi-Axial Loading Behavior of Granular Phase Boron Carbide**
X Sun, Johns Hopkins University; A. Tonge, U.S. Army Research Laboratory; K. Ramesh, Johns Hopkins University; J. LaSalvia, U.S. Army Research Laboratory

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

035. Multifunctional Materials

Organizer(s) P. Thakre, The Dow Chemical Company; L. Bodelot, Ecole Polytechnique - LMS

Chair Person P. Thakre, The Dow Chemical Company; L. Bodelot, Ecole Polytechnique - LMS

- 01:50 P **#409 Layered Jamming Multifunctional Actuators**
R Acevedo, University of Maryland; L. Johnson, University of Maryland; S. Gupta, University of Maryland; H. Bruck, University of Maryland; J. Rohwerder, University of Maryland

- 02:10 P **#513 Mechanical Properties of Magnetic Microcapsules**
A Vancuren, University of Tulsa; M. Keller, University of Tulsa
- 02:30 P **#212 Experimental Characterization of Magneto-Rheological Elastomers for Constitutive Model Parameters Identification**
L Bodelot, Ecole Polytechnique; J. Voropaieff, Ecole Polytechnique

Advancement of Optical Methods in Experimental Mechanics

036. DIC Applications for Challenging Environments I

Organizer(s) H. Jin, Sandia National Laboratories; E.M.C. Jones, Sandia National Laboratories

Chair Person H. Jin, Sandia National Laboratories; E.M.C. Jones, Sandia National Laboratories

- 01:50 P **#483 DIC of Foam Materials at Cryogenic Temperatures**
S Quinn, University of Southampton; W. Bailey, University of Southampton; D. Crump, University of Southampton; J. Dulieu-Barton, University of Southampton; T. Bostock, University of Southampton; A. Robinson, University of Southampton
- 02:10 P **#109 Measuring Spallation Strength of Epoxy by Laser Spallation Technique**
S Singh, Indian Institute of Technology; R. Kitey, Indian Institute of Technology
- 02:30 P **#234 Strain Rate Effects on Stainless Steel Laser Welds**
H Jin, Sandia National Laboratories; K. Nelson, Sandia National Laboratories
- 02:50 P **#694 Measurement on a Sample of Fuel Cell at High Temperature**
N Li, University of South Carolina; N. Xu, University of South Carolina; M. Sutton, University of South Carolina; K. Huang, University of South Carolina
- 03:10 P **#331 Application of Digital Image Correlation to Structures in Fire**
C Smith, Berkshire Hathaway Specialty Insurance; M. Hoehler, National Institute of Standards and Technology

Symposium on the Role of Digital Image Correlation in Experimental Mechanics in Honor of Prof. Michael Sutton

037. Soft Materials/ Heterogeneous Materials

Organizer(s)

Chair Person D. Dawicke,

- 01:50 P **#501 A Method to Study Volumes Changes in Elastomers Using DIC**
F Davis, University of Southampton; F. Pierron, University of Southampton
- 02:10 P **#471 Full-field Deformation Measurements within a Granular Micro-hydrogel Support Medium During 3D Printing of Soft Matter**
P Ifju, University of Florida; A. McGhee, University of Florida; D. Nguyen, University of Florida; J. Famiglietti, University of Florida
- 02:30 P **#94 qDIC-based Experimental Characterization of Hyperelastic, Highly Compressible Elastomeric Foams**
C Franck, Brown University; A. Landauer, Brown University; X. Li, Brown University; D. Henann, Brown University
- 02:50 P **#581 Understanding Deformation Mechanisms through the Use of in-SEM DIC and Large Data Analysis: Advances and Challenges**
S Daly, University of California, Santa Barbara
- 03:10 P **#310 Use of DIC for Elucidation of Local Constitutive Laws in Heterogeneous Materials**
A Reynolds, University of South Carolina

Challenges in Mechanics of Time-Dependent Materials

038. Viscoelasticity

Organizer(s)

Chair Person A. Amirkhizi, University of Massachusetts, Lowell; A. Arzoumanidis, Psylotech, Inc.

01:50 P **#157 Time-Temperature Mechanical Response of a PVA Dual Cross-Link Self-Healing Hydrogel**

M Liu, Cornell University; J. Guo, Cornell University; C. Hui, Cornell University; A. Zehnder, Cornell University

02:10 P **#314 Measurement of the Visco-Elastic Properties of the Chinchilla Tympanic Membrane**

J Liang, University of Texas at Dallas; R. Gan, University of Oklahoma; H. Lu, University of Texas at Dallas

02:30 P **#356 Time-Temperature Dependent Creep and Recovery behavior of MWCNTs-Polypropylene Nanocomposites**

V Khare, IIT Kanpur; D. Kumar, IIT Kanpur; G. Kamath, IIT Kanpur; S. Kamle, IIT Kanpur

02:50 P **#822 Some Results on the Mechanics of Inverse Freezing Gels**

Y Rotbaum, Technion; G. Parvari, Technion; Y. Eichen, Technion; D. Rittel, Technion

Fracture & Fatigue

039. Novel Experimental Methods

Organizer(s) A. Kontsos, Drexel University; O. Scott-Emuakpor, Air Force Research Laboratory

Chair Person M. Matthew, Drexel University; O. Scott-Emuakpor, Air Force Research Laboratory

01:50 P **#789 DIC at Long Working Distances: The Effects of Diffraction Limits**

K Burn, Utah State University; E. Nickerson, Utah State University; R. Hansen, Utah State University; R. Berke, Utah State University

02:10 P **#78 Demonstration of Hybrid Crack Kinking Criterion**

S Grutzik, Sandia National Laboratories; E. Reedy, Sandia National Laboratories

02:30 P **#611 Experimental Control Volume Analysis of Strain Energy Density for Fatigue Crack Growth of Ti-6Al-4V**

C Holycross, Air Force Research Laboratory; L. Sheridan, Wright State University; O. Scott-Emuakpor, Air Force Research Laboratory

02:50 P **#404 Modification of Benthem Solution for Mode I Fracture of Cylinder with Spiral Crack Subjected to Torsion**

A Fahem, University of South Carolina; A. Kidane, University of South Carolina

19th International Symposium on Micro- and Nanomechanics

040. 1D & 2D Materials

Organizer(s)

Chair Person C. DiMarco, Columbia University; C. Ke, State University of New York at Binghamton

- 01:50 P **#420 An Investigation into the Effect of Surface Pores on Mechanical Behavior of Hollow Carbon Fibers and Nanofibers**
Y Chen, Texas A&M University; J. Cai, Texas A&M University; J. Boyd, Texas A&M University; M. Naraghi, Texas A&M University
- 02:10 P **#662 A Probability Density Function for Polycrystalline Two-dimensional Materials**
C DiMarco, Columbia University; J. Hone, Columbia University; J. Kysar, Columbia University
- 02:30 P **#594 Structural and Mechanical Properties of Boron Nitride Nanotubes in High Temperature Environment**
X Chen, Xi'an Jiaotong University; C. Dmuchowski, State University of New York at Binghamton; C. Park, NASA Langley Research Center; C. Fay, NASA Langley Research Center; C. Ke, State University of New York at Binghamton
- 02:50 P **#245 Effect of Thermo-mechanical Processing On Microstructural Evolution and Mechanics of Electrospun Carbon Nanofiber**
J Cai, Texas A&M University; M. Naraghi, Texas A&M University
- 03:10 P **#499 In situ Electrochemical Nanoindentation for Lithium Ion Battery Research**
Y Wang, University of Kentucky; Y. Cheng, University of Kentucky

Dynamic Behavior of Materials

041. Dynamic Behavior of Geomaterials II

- Organizer(s)** B. Martin, Air Force Research Laboratory; X. Nie, Southern Methodist University
Chair Person B. Martin, Air Force Research Laboratory; W. Heard, U.S. Army Corps of Engineers

- 04:10 P **#150 Mechanical Response and Damage Evolution of High-Strength Concrete under Triaxial Loading**
B Williams, U.S. Army Engineer Research and Development Center; W. Heard, U.S. Army Engineer Research and Development Center; S. Graham, U.S. Army Engineer Research and Development Center; B. Martin, Air Force Research Laboratory; C. Loeffler, Southern Methodist University; X. Nie, Southern Methodist University
- 04:30 P **#366 Ballistic and Material Tests and Simulations on Ultra-High Performance Concrete**
S Chocron, Southwest Research Institute; A. Carpenter, Southwest Research Institute; N. Scott, Southwest Research Institute; O. Spector, Rafael; A. Malka-Markovitz, Rafael; Z. Lovinger, Rafael; D. Havazelet, Israel Ministry of Defence
- 04:50 P **#670 In situ Visualization of the Dynamic Failure of Geomaterials Using Phase Contrast X-ray Imaging**
A Leong, Johns Hopkins University; E. Asare, Johns Hopkins University; R. Rex, Johns Hopkins University; N. Sinclair, Argonne National Laboratory; K. Fezzaa, Argonne National Laboratory; T. Sun, fezzaa@aps.anl.gov; X. Xiao, Argonne National Laboratory; B. Schuster, U.S. Army Research Laboratory; D. Casem, U.S. Army Research Laboratory; P. Lambert, Johns Hopkins University; V. Kannan, Johns Hopkins University; Y. Sun, Johns Hopkins University; H. Sheng, Johns Hopkins University; K. Ramesh, Johns Hopkins University; T. Hufnagel, Johns Hopkins University
- 05:10 P **#680 Effects of Liquid Viscosity on Wave Propagation Through Submerged Granular Media**
H Kocharyan, Worcester Polytechnic Institute; N. Karanjgaokar, Worcester Polytechnic Institute

Mechanics of Additive and Advanced Manufacturing

042. Additive Manufacturing of Polymers and Composites

- Organizer(s)**
Chair Person E.N. Brown, Los Alamos National Laboratory

- 04:10 P **#410 Experimental Homogenized Elastic Properties of Computer-generated 3D-printed Random Porous Materials**
O Zerhouni, Ecole Polytechnique; G. Tarantino, Ecole Polytechnique; K. Danas, Ecole Polytechnique
- 04:30 P **#202 Mechanical Structure-Property Relationships for 2D Polymers Comprised of Nodes and Bridge Units**
E Sandoz-Rosado, U.S. Army Research Laboratory; E. Wetzel, U.S. Army Research Laboratory
- 04:50 P **#454 Shrinkage Analysis of Resin-Based Dental Composite Filled with PA Microcapsules**
D Kafagy, George Mason University
- 05:10 P **#804 Computational and Experimental Characterization of 3D Printed Components by Fused Deposition Modeling**
K Pooladvand, Worcester Polytechnic Institute; C. Furlong, Worcester Polytechnic Institute

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

043. Damage Detection & Non-destructive Evaluation

Organizer(s) A.-D. Celestine, Harvard University; P. Thakre, The Dow Chemical Company

Chair Person A.-D. Celestine, Auburn University; P. Thakre, The Dow Chemical Company

- 04:10 P **#115 Damage Sensing in Multi-functional Natural Fiber Composites Under Shear Loading**
S Yang, University of Massachusetts Dartmouth; J. Zulu, University of Massachusetts Dartmouth; V. Chalivendra, University of Massachusetts Dartmouth; Y. Kim, University of Massachusetts Dartmouth
- 04:30 P **#368 Impact and Post-impact Behaviour of Composite Laminates Reinforced by Z-pins**
L Francesconi, Santa Clara University; F. Aymerich, University of Cagliari
- 04:50 P **#437 Multimodal Damage Detection in Fiber-reinforced Composite Materials Using Magnetic Nanoparticles**
M Crall, University of Tulsa; S. Laney, University of Tulsa; M. Keller, University of Tulsa
- 05:10 P **#218 Nondestructive Damage Detection of a Magnetostrictive Composite Structure**
M Coatney, U.S. Army Research Laboratory; A. Hall, U.S. Army Research Laboratory; M. Haile, U.S. Army Research Laboratory; J. Yoo, U.S. Naval Systems Warfare Center; N. Bradley, U.S. Army Research Laboratory; B. Williams, Clemson University
- 05:30 P **#473 Characterization of Composite Damage Using Magnetic Nanoparticles**
S Laney, University of Tulsa; M. Crall, University of Tulsa; M. Keller, University of Tulsa
- 05:50 P **#619 Early Damage Accumulation in CMCs**
B Swaminathan, University of California, Santa Barbara; J. Kiser, NASA Glenn Research Center; A. Almansour, NASA Glenn Research Center; K. Sevener, University of Michigan; S. Daly, University of California, Santa Barbara

Advancement of Optical Methods in Experimental Mechanics

044. DIC Applications (Incl. Hybrid Methods) for Challenging Environments II

Organizer(s) H. Jin, Sandia National Laboratories; E.M.C. Jones, Sandia National Laboratories

Chair Person E.M.C. Jones, Sandia National Laboratories; H. Jin, Sandia National Laboratories

- 04:10 P **#386 On Performing Spatiotemporal Stereocorrelation at Very High Temperatures**
M Berny, Université Paris-Saclay/SAFRAN; T. Archer, Université Paris-Saclay/SAFRAN/ONERA; F. Hild, Université Paris-Saclay; A. Mavel, Office National d'Etudes et de Recherches Aérospatiales (ONERA); P. Beauchêne, Office National d'Etudes et de Recherches Aérospatiales (ONERA); V. Herb, SAFRAN; B. Lacombe, SAFRAN

- 04:30 P **#555 Elevated Temperature Optical Microscopy DIC**
K Connolly, Southern Research; W. Ralph, Southern Research
- 04:50 P **#340 Full-Field Determination of the Taylor-Quinney Coefficient in Tension Tests of Ti-6Al-4V at Strain Rates up to 7000 s⁻¹**
J Smith, The Ohio State University; J. Seidt, The Ohio State University; A. Gilat, The Ohio State University
- 05:10 P **#165 Comparison of Material Model Calibration using Tensile Dog Bones Versus the Virtual Fields Method**
E Jones, Sandia National Laboratories; J. Carroll, Sandia National Laboratories; K. Karlson, Sandia National Laboratories; S. Kramer, Sandia National Laboratories; R. Lehoucq, Sandia National Laboratories; P. Reu, Sandia National Laboratories; D. Turner, Sandia National Laboratories
- 05:30 P **#861 Measurement of Coefficient of Thermal Expansion on Full Parts using Digital Image Correlation**
K Hammond, Los Alamos National Laboratory; M. Steinzig, Los Alamos National Laboratory

Symposium on the Role of Digital Image Correlation in Experimental Mechanics in Honor of Prof. Michael Sutton

045. Digital Image Correlation

Organizer(s)

Chair Person H. Schreier, Correlated Solutions, Inc.

- 04:10 P **#129 Uncertainty Quantifications for Multiviewcorrelation**
F Hild, University Paris-Saclay; S. Roux, University Paris-Saclay
- 04:30 P **#221 Update on the 2D-DIC Challenge: Results and Conclusions**
P Reu, Sandia National Laboratories; E. Toussaint, University Clermont; H. Bruck, University of Maryland; M. Iadicola, National Institute of Standards; R. Balcaen, KU Leuven; D. Turner, Sandia National Laboratories; T. Siebert, Dantec Dynamics; P. Lava, MatchID; M. Simonesen, Correlated Solutions; M. Grewer, LaVision
- 04:50 P **#415 Digital Image Correlation Beyond Experimental Mechanics: What I've Learned from Michael Sutton**
B Bay, Oregon State University

Dynamic Behavior of Materials

046. Metals

Organizer(s)

Chair Person O. Kingstedt, University of Utah; D. Casem, US Army Research Laboratory

- 04:10 P **#550 The Role of Texture on the Strain-Rate Sensitivity of Mg and Mg Alloy AZ31B**
O Kingstedt, University of Utah; M. Bischann, California Institute of Technology; O. Kingstedt, University of Utah
- 04:30 P **#348 Experimental Study on Dynamic Fracture Response of Al6063-T6 under High Rates of Loading**
A Pandouria, Indian Institute of Technology Delhi; P. Chakraborty, Indian Institute of Technology Delhi; S. Kumar, Indian Institute of Technology Delhi; V. Tiwari, Indian Institute of Technology Delhi
- 04:50 P **#391 Mechanical Behavior of Ta at Extreme Strain-rates**
D Casem, U.S. Army Research Laboratory; D. Magagnosc, U.S. Army Research Laboratory; J. Ligda, U.S. Army Research Laboratory; B. Schuster, U.S. Army Research Laboratory

- 05:10 P **#407 Phase Transformation in Single-crystal Silver Microcubes During High-velocity Impact**
R Thevamaran, University of Wisconsin-Madison; S. Yazdi, Rice University; M. Ponga, University of British Columbia; O. Lawal, Rice University; S. Jeon, Kumoh National Institute of Technology; E. Thomas, Rice University
- 05:30 P **#785 The Effect of Strain Rate on the Plastic Flow and Failure of an AZ31B Magnesium Alloy**
V Kannan, Johns Hopkins University; N. Krywopusk, Johns Hopkins University; L. Kesckes, US Army Research Laboratory; T. Weihs, Johns Hopkins University; K. Ramesh, Johns Hopkins University

Fracture & Fatigue

047. Extreme Environments

- Organizer(s)** R. Berke, Utah State University; K. Hazeli, University of Alabama in Huntsville
Chair Person R. Berke, Utah State University; K. Hazeli, University of Alabama in Huntsville

- 04:10 P **#439 Keynote: Development and Testing of Nuclear Materials (40-min)**
M Meyer, Idaho National Laboratory
- 04:50 P **#538 High Resolution Digital Image Correlation Study of Damage Accumulation During Creep-Fatigue of 709 Stainless Steel Alloy**
R Vieira, University of Illinois at Urbana-Champaign; S. Ravi, University of Illinois at Urbana-Champaign; H. Sehitoglu, University of Illinois at Urbana-Champaign; J. Lambros, University of Illinois at Urbana-Champaign
- 05:10 P **#790 Speckle Pattern Inversion in DIC at Extreme Temperatures**
T Thai, Utah State University; A. Smith, Utah State University; A. Dabb, Utah State University; R. Berke, Utah State University
- 05:30 P **#330 Crack Tip Stress Measurement at High Temperature in IN-617 Using Nano-indentation and Nano-mechanical Raman Spectroscopy**
Y Zhang, Purdue University; C. Prakash, Purdue University; V. Tomar, Purdue University

19th International Symposium on Micro- and Nanomechanics

048. Tribology & Wear

- Organizer(s)**
Chair Person D. Magagnosc, US Army Research Laboratory; G.A. Shaw, III, NIST

- 04:10 P **#643 Full Assessment of Micromachine Friction within the Rate-state Framework**
S Shroff, Carnegie Mellon University; M. de Boer, Carnegie Mellon University
- 04:30 P **#701 Measuring and Modeling Capillary Bridge Dynamics and Crack Healing between Surfaces of Nanoscale Roughness**
E Soylemez, Marmara University, Istanbul, Turkey; M. de Boer, Carnegie Mellon University
- 04:50 P **#500 Mechanical Properties of Thermal Barrier Coatings at Small Length Scale**
S Patibanda, Indian Institute of Technology Bombay; V. Nagda, Indian Institute of Technology Bombay; S. G, Center for Engineered Coatings; R. Abrahams, Monash University; K. Jonnalagadda, Indian Institute of Technology Bombay
- 05:10 P **#736 Contact Reliability of Pt- and TiN-coated Microswitches in Different Environments**
C Oh, Carnegie Mellon University; M. de Boer, Carnegie Mellon University
- 05:30 P **#302 Dynamic Tribology of Hard Coatings**
J Hay, Nanomechanics, Inc.

Dynamic Behavior of Materials

049. Dynamic Response of Low-Impedance Materials I**Organizer(s)** P. Moy, Army Research Lab; J. Jordan, Los Alamos National Laboratory**Chair Person** P. Moy, Army Research Lab

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- 10:30 A **#110 Experimental and Computational Investigation of Mode I Fracture of Hydrogels**
A Knapp, University of Florida; G. Subhash, University of Florida; D. Spearot, University of Florida
- 10:50 A **#299 Quasi-static and Dynamic Poisson's Ratio Evolution of Hyperelastic Foams**
B Sanborn, Sandia National Laboratories; B. Song, Sandia National Laboratories
- 11:10 A **#175 Radial Inertia Effect on Dynamic Compressive Response of Polymeric Foam Materials**
B Song, Sandia National Laboratories; B. Sanborn, Sandia National Laboratories; W. Lu, Sandia National Laboratories
- 11:30 A **#498 Storage and Loss Moduli of Low-impedance Materials at kHz Frequencies**
W Nantasetphong, SCG Chemicals Co., Ltd.; Z. Jia, University of Connecticut; M. Hasan, University of California, San Diego; A. Amirkhizi, University of Massachusetts, Lowell; S. Nemat-Nasser, University of California, San Diego
- 11:50 A **#197 Dynamic Shear Response of Soft Tissue Materials**
W Liang, National Kaohsiung University of Science and Technology; L. Tsai, National Kaohsiung University of Science and Technology
- 12:10 P **#436 Energy Absorption Characteristics of Graded Foams Subjected to High Velocity Loading**
A Wohlford, University of South Carolina; S. Ravindran, University of South Carolina; A. Kidane, University of South Carolina
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Dynamic Behavior of Materials

050. Dynamic Failure & Fragmentation I**Organizer(s)** B. Aydelotte, U.S. Army Research Laboratory; P. Jannotti, US Army Research Laboratory**Chair Person** S. Koumlis, Drexel University; B. Aydelotte, U.S. Army Research Laboratory

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- 10:30 A **#288 Proton Radiography of Reverse Ballistic Impacts**
B Aydelotte, U.S. Army Research Laboratory; M. Golt, U.S. Army Research Laboratory; B. Schuster, U.S. Army Research Laboratory; J. Allison, Los Alamos National Laboratory; F. Cherne, Los Alamos National Laboratory; M. Freeman, Los Alamos National Laboratory; J. Goett, III, Los Alamos National Laboratory; B. Hollander, Los Alamos National Laboratory; B. Jensen, Los Alamos National Laboratory; J. Lopez, Los Alamos National Laboratory; F. Mariam, Los Alamos National Laboratory; J. Medina, Los Alamos National Laboratory; C. Morris, Los Alamos National Laboratory; L. Neukirch, Los Alamos National Laboratory; A. Pacheco, Los Alamos National Laboratory; M. Sandstrom, Los Alamos National Laboratory; A. Saunders, Los Alamos National Laboratory
- 10:50 A **#290 The Effect of ECAE on the Ballistic Response of AZ31**
T Sano, U.S. Army Research Laboratory; P. Jannotti, U.S. Army Research Laboratory
- 11:10 A **#767 Dynamic Fragmentation of MAX Phase Ti3SiC2 from Edge-On Impact Experiments**
P Forquin, University of Grenoble; L. Lamberson, Drexel University; M. Barsoum, Drexel University; N. Savino, Drexel University; M. Morais, University of Grenoble

- 11:30 A **#663 Microstructural Effects in the High Strain Rate Ring Fragmentation of Copper**
S Ward, University of Cambridge; C. Braithwaite, University of Cambridge; A. Jardine, University of Cambridge
- 11:50 A **#720 Failure and Fragmentation of Pressed W-Al Composites**
J Kimberley, New Mexico Institute of Mining and Technology; M. Hargather, New Mexico Institute of Mining and Technology; A. Monclova, New Mexico Institute of Mining and Technology; G. Anderson, New Mexico Institute of Mining and Technology; S. Thoma, Reactive Metals International Incorporated
- 12:10 P **#463 An Image-Based Inertial Impact Test for the High Strain Rate Properties of Brittle Materials**
L Fletcher, University of Southampton; F. Pierron, University of Southampton

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

051. Recycled Constituent Composites II

Organizer(s) I. Miskoiglu, Michigan technological University; E. Bayraktar, SUPMECA-Paris

Chair Person I. Miskoiglu, Michigan technological University; E. Bayraktar, SUPMECA-Paris

- 10:30 A **#718 Analysis of Interfaces in AA7075/Recycled WC Particles Composites Produced via Liquid Route**
M Viana, FEM/UNICAMP; M. Robert, FEM/UNICAMP
- 10:50 A **#721 Investigation on Microstructure and Interfaces in Graded FE50007/WC Composites Produced by Casting**
R Leibholz, FEMAQ; H. Leibholz, FEMAQ; E. Bayraktar, Suomeca-Paris; M. Robert, FEM/UNICAMP
- 11:10 A **#294 Recycled Ti-17 based Composite Design; Optimization Process Parameters in Wire Cut Electrical Discharge Machining (WEDM)**
S Ezeddini, SUPMECA-Paris; M. Boujelbene, University of Tunis El Manar; E. Bayraktar, SUPMECA-Paris; S. Ben Salem, University of Tunis El Manar
- 11:30 A **#304 Alternative Composite Design from Recycled Aluminum Chips for Mechanical Pin-Joint (Knuckle) Applications**
D Katundi, SUPMECA-Paris; A. Irez, University Paris-Saclay; E. Bayraktar, SUPMECA-Paris; I. Miskoiglu, Michigan Technological University
- 11:50 A **#523 Optimization of Kerf Quality during CO₂ Laser Cutting of Titanium Alloy Sheet Ti-6Al-4V and Pure Titanium Ti**
B El-Aoud, SUPMECA-Paris; M. Boujelbene, University of Tunis El Manar; E. Bayraktar, SUPMECA-Paris; S. Ben Salem, University of Tunis El Manar
- 12:10 P **#524 A Study of the Surface Integrity of Titanium Alloy Ti-6Al-4V in The Abrasive Water Jet Machining Process**
M Douiri, SUPMECA-Paris; M. Boujelbene, University of Tunis El Manar; E. Bayraktar, SUPMECA-Paris; S. Ben Salem, University of Tunis El Manar

Advancement of Optical Methods in Experimental Mechanics

052. Optical Methods in SEM: History & Perspective I

Organizer(s) L. Lamberti, Politecnico di Bari; M.T. Lin, National Chung Hsing University

Chair Person L. Lamberti, Politecnico di Bari; C. Furlong, WPI-ME/CHSLT

- 10:30 A **#102 A Review: Optical Methods that Evaluate Displacement Information (40-min)**
C Sciammarella, Illinois Institute of Technology

- 11:10 A **#845 Holographic Interferometry - Then and Now**
K Stetson, Karl Stetson Associates, LLC
- 11:50 A **#377 Laser and White-light Speckle Techniques - A Brief Review (40-min)**
G Cloud, Michigan State University

Mechanics of Additive and Advanced Manufacturing

053. Additively Manufactured Metals & Structures I

Organizer(s)

Chair Person J. Jordan, Los Alamos National Laboratory

- 10:30 A **#67 Keynote: Structure/Property Behavior of Additively Manufactured (AM) Materials: Opportunities & Challenges (40-min)**
G Gray, III., Los Alamos National Laboratory; V. Livescu, Los Alamos National Laboratory; C. Knapp, Los Alamos National Laboratory; D. Jones, Los Alamos National Laboratory; S. Fensin, Los Alamos National Laboratory
- 11:10 A **#750 Additive Manufacturing of Nanotwinned Copper by Localized Pulsed Electrodeposition**
S Daryadel, The University of Texas at Dallas; A. Behroozfar, The University of Texas at Dallas; S. Morsali, The University of Texas at Dallas; R. Bernal, The University of Texas at Dallas; M. Minary-Jolandan, The University of Texas at Dallas
- 11:30 A **#215 Mechanical Behavior of Additively Manufactured Ti-6Al-4V Following a New Heat Treatment**
J Ligda, U.S. Army Research Laboratory; N. Saenz, CQL; J. Paramore, U.S. Army Research Laboratory; B. Butler, U.S. Army Research Laboratory
- 11:50 A **#350 Correlation between Process Parameters and Mechanical Properties in Parts Printed By the Fused Deposition Modeling Process**
S Attoye, IUPUI (CAMRI)/Purdue School of Engineering and Technology; E. Malekipour, IUPUI (CAMRI)/Purdue School of Engineering and Technology; H. El-Mounayri, IUPUI (CAMRI)/Purdue School of Engineering and Technology

Research in Progress

054. Research in Progress I

Organizer(s)

Chair Person E. Koricho, Georgia Southern University

- 10:30 A **#325 Realization and Dynamic Studies of CNTs-PDMS Membranes for Biomimetic Flapping Wing Applications**
D Kumar, Indian Institute of Technology Kanpur; G. Kamath, Indian Institute of Technology Kanpur; P. Mohite, Indian Institute of Technology Kanpur; S. Kamle, Indian Institute of Technology Kanpur
- 10:50 A **#573 Experimental Investigation of Segmental Post-tensioned Girders**
A Allawi, University of Bag; M. Al-Sherrawi, University of Baghdad; B. AL-Bayati, University of Baghdad; M. Al Gharawi, University of Missouri; A. El-Zohairy, University of Missouri
- 11:10 A **#603 Novel Technique for In Situ Characterization of Glulam Timber Bridge**
N Bechle, USDA Forest Service Forest Products Laboratory; J. Hermanson, USDA Forest Service Forest Products Laboratory; J. Michopoulos, U.S. Naval Research Laboratory; A. Iliopoulos, U.S. Naval Research Laboratory

- 11:30 A **#572 A Case Study to Evaluate Live Load Distributions for Pre-stressed RC Bridge**
A Allawi, University of Baghdad; M. Al-Sherrawi, University of Baghdad; M. Al Gharawi, University of Missouri; A. El-Zohairy, University of Missouri
- 11:50 A **#574 Experimental and Numerical Evaluations of Live Load Distributions of Steel-Concrete Composite Bridge**
A Allawi, University of Baghdad; A. AlBayati, University of Baghdad; M. Al Gharawi, University of Missouri; A. El-Zohairy, University of Missouri
- 12:10 P **#697 Assessment of Fluid Cavitation Threshold Using a Polymeric Split Hopkinson Bar-Confinement Chamber Apparatus**
M Bustamante, University of Waterloo; D. Cronin, University of Waterloo

Fracture & Fatigue

055. Interfacial Fracture

Organizer(s) S. Grutzik, Sandia National Laboratories; C. Wu, Missouri University of Science and Technology

Chair Person S. Grutzik, Sandia National Laboratories; C. Wu, Missouri University of Science and Technology

- 10:30 A **#86 Observations of Adhesive Fracture for an Evolving Cohesive-Length Scale**
J Gorman, University of Michigan; M. Thouless, University of Michigan
- 10:50 A **#447 Cohesive Zone Smoothing of Bending Stiffness Heterogeneities in Tape Peeling Experiments**
L Avellar, California Institute of Technology; T. Reese, California Institute of Technology; K. Bhattacharya, California Institute of Technology; G. Ravichandran, California Institute of Technology
- 11:10 A **#260 Characterization of Transverse Deformation and Failure Initiation at the Fiber/Matrix Interface using DIC in a SEM**
C Montgomery, University of Illinois at Urbana-Champaign; A. Klepacki, University of Illinois at Urbana-Champaign; B. Koohbor, University of Illinois at Urbana-Champaign; P. Geubelle, University of Illinois at Urbana-Champaign; N. Sottos, University of Illinois at Urbana-Champaign
- 11:30 A **#705 Adhesion of Silver Nanowire and Graphene Composite Film**
Y Li, Missouri University of Science and Technology; C. Guo, Missouri University of Science and Technology; C. Wu, Missouri University of Science and Technology
- 11:50 A **#806 Correlating Interfacial Fracture Toughness to Surface Roughness in Polymer-based Interfaces**
D Yavas, Iowa State University; A. Bastawros, Iowa State University
- 12:10 P **#733 Atomistic Modeling on Adhesion of Polyurea and Silica Aerogel Interface**
A Ghasemi, The University of Texas at San Antonio; Y. Li, Missouri University of Science and Technology; W. Gao, The University of Texas at San Antonio; C. Wu, Missouri University of Science and Technology

Thermomechanics and Infra-red Imaging

056. Material Characterizations Using Thermography I

Organizer(s)

Chair Person J. Dulieu-Barton, University of Southampton; R. Tighe, University of Waikato

- 10:30 A **#855 Keynote: New Horizons in Thermoelastic Stress Analysis and its Application to Airframe Structural Fatigue Testing (40-min)**
N Rajic, Defence Science and Technology Group; C. Brooks, Monash University; S. vandervelden, Defence Science and Technology Group

- 11:10 A **#606 Infrared Thermography for Material Characterization at Intermediate Strain Rates**
T Fourest, ONERA; J. Berthe, ONERA
- 11:30 A **#545 Towards Integrating Imaging Techniques to Assess Manufacturing Features and In-service Damage in Composite Components**
I Jiménez-Fortunato, University of Southampton; D. Bull, University of Southampton; J. Dulieu-Barton, University of Southampton; O. Thomsen, University of Southampton
- 11:50 A **#281 Experimental Investigation of Emissivity Influence to Obtain Thermal Field by Near Infrared Thermography**
C Zhang, Université de Lyon; J. Marty, Université de Lyon; A. Maynadier, Univ. Bourgogne Franche-Comté; P. Chaudet, Université de Lyon; J. Rethore, Université de Nantes; M. Baietto, Université de Lyon

Dynamic Behavior of Materials

057. Dynamic Response of Low-Impedance Materials II

Organizer(s) P. Moy, Army Research Lab; J. Jordan, Los Alamos National Laboratory

Chair Person J. Jordan, Los Alamos National Laboratory

- 02:30 P **#479 The Effect of In-plane Properties on the Ballistic Response of Polyethylene Composites**
J Cline, U.S. Army Research Laboratory
- 02:50 P **#327 Interface Chemistry Dependent Mechanical Properties in Energetic Material using Nano-scale Impact Experiment**
C Prakash, Purdue University; A. Olokun, Purdue University; I. Gunduz, Purdue University; V. Tomar, Purdue University
- 03:10 P **#432 On the Response of Polymer Bonded Explosives at Different Impact Velocities**
S Ravindran, University of South Carolina; A. Tessema, University of South Carolina; A. Kidane, University of South Carolina
- 03:30 P **#491 Experimental Measurement of Time and Temperature Dependent Interfacial Strength**
L Lea, University of Cambridge; D. Williamson, University of Cambridge

Dynamic Behavior of Materials

058. Dynamic Failure & Fragmentation II

Organizer(s) B. Aydelotte, U.S. Army Research Laboratory; P. Jannotti, US Army Research Laboratory

Chair Person L. Fletcher, University of Southampton; P. Jannotti, US Army Research Laboratory

- 02:30 P **#98 Comparison of Structure and Deformation Mechanisms in Boron Carbide and Boron Suboxide**
G Subhash, University of Florida; C. Kunka, University of Florida
- 02:50 P **#235 Mechanical Characterization of ZrO₂ Rich Glass Ceramic**
B Sundaram, Corning Research and Development Corporation; J. Westbrook, Corning Research and Development Corporation; C. Smith, Corning Research and Development Corporation; J. Finkeldey, Corning Research and Development Corporation
- 03:10 P **#119 Mitigation of Amorphous Effects in Boron Carbide through Grain Size Reduction and Secondary Phase Addition**
M DeVries, University of Florida; J. Pittari, III., U.S. Army Research Laboratory; G. Subhash, University of Florida

- 03:30 P **#681 X-Ray Computed Tomography Characterization of Damage in Advanced Ceramics**
*C Lo, University of Alberta; B. Koch, University of Alberta; T. Walter, U.S. Army Research Laboratory;
 T. Sano, U.S. Army Research Laboratory; J. Hogan, University of Alberta*
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4th International Symposium on the Mechanics of Composite and Multifunctional Materials

059. Composites for Wind Energy & Aerospace Applications

- Organizer(s)** M. Eydani Asl, University of Massachusetts Lowell; R. Singh, Oklahoma State University
Chair Person M. Eydani Asl, University of Massachusetts Lowell; R. Singh, Oklahoma State University
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- 02:30 P **#458 A new Approach for Assessing the Load Response and Failure of Wind Turbine Blade Substructures**
*J Callaghan, University of Southampton; J. Dulieu-Barton, University of Southampton; O. Thomsen,
 University of Southampton; S. Laustsen, Siemens Gamesa Renewable Energy; C. Burchardt, Siemens
 Gamesa Renewable Energy*
- 02:50 P **#580 Sub-Components of Wind Turbine Blades - Proof of a Novel Trailing Edge Testing Concept**
*M Rosemeier, Fraunhofer Institute for Wind Energy Systems; A. Antoniou, Fraunhofer Institute for
 Wind Energy Systems; C. Lester, Fraunhofer Institute for Wind Energy Systems*
- 03:10 P **#441 Fatigue Life Assessment of Recyclable Bio-Based Resins for Wind Turbine Blades**
*M Asl, University of Massachusetts Lowell; C. Niezrecki, University of Massachusetts Lowell; J.
 Sherwood, University of Massachusetts Lowell; P. Avaitabile, University of Massachusetts Lowell*
- 03:30 P **#487 High-fidelity Testing and Integrated Modelling of Composite Structures and Components**
*D Bull, University of Southampton; J. Dulieu-Barton, University of Southampton; O. Thomsen,
 University of Southampton*
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Advancement of Optical Methods in Experimental Mechanics

060. Optical Methods in SEM: History & Perspective II

- Organizer(s)** L. Lamberti, Politecnico di Bari; M.T. Lin, National Chung Hsing University
Chair Person M.T. Lin, National Chung Hsing University; L. Lamberti, Politecnico di Bari
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- 02:30 P **#430 Recent Digital Image Correlation Measurements and Observations for Civil Engineering Structures and Materials**
*M Sutton, Department of Mechanical Engineering, University of South Carolina; S. Rajan, Department
 of Mechanical Engineering, University of South Carolina; A. Kidane, Department of Mechanical
 Engineering, University of South Carolina; R. Fuerte, Department of Mechanical Engineering,
 University of South Carolina; J. Seidt, Department of Mechanical and Aerospace Engineering, Ohio
 State University; A. Gilat, Department of Mechanical and Aerospace Engineering, Ohio State
 University*
- 03:00 P **#757 Recent Advancements and Perspective about Digital Holography: A Super-tool in Biomedical and Bioengineering Fields**
*F Merola, Institute of Applied Sciences & Intelligent Systems (ISASI-CNR); B. Mandracchia, CNR-ISASI;
 P. Memmolo, CNR-ISASI; L. Miccio, CNR-ISASI; M. Mugnano, CNR-ISASI; M. Villone, University of
 Naples Federico II; P. Maffettone, University of Naples Federico II; E. Di Maio, University of Naples
 Federico II; V. Ferraro, University of Naples Federico II; Z. Wang, CNR-ISASI; V. Pagliarulo, CNR-ISASI;
 P. Ferraro, Institute of Applied Sciences & Intelligent Systems (ISASI-CNR)*
- 03:30 P **#816 Recent Advances in the Development of Optical Metrology for the Hearing and Speech Sciences**
*C Furlong, WPI-ME/CHSLT; R. Franco, MEEI/Harvard Medical School; J. Cheng, MEEI/Harvard Medical
 School; J. Rosowski, MEEI/Harvard Medical School*

Mechanics of Additive and Advanced Manufacturing

061. Additively Manufactured Metals & Structures II

Organizer(s)

Chair Person J. Carroll, Sandia National Laboratories

- 02:30 P **#674 Multiscale Digital Image Correlation Study of Additively Manufactured Ti-6Al-4V**
D Foehring, University of Illinois Urbana-Champaign; R. VanSickle, University of Illinois Urbana-Champaign; H. Chew, University of Illinois Urbana-Champaign; J. Lambros, University of Illinois Urbana-Champaign
- 02:50 P **#686 Microstructure and Deformation Mechanisms of Stainless Steel 316L Made by Selective Laser Melting**
T Voisin, Lawrence Livermore National Laboratory; J. McKeown, Lawrence Livermore National Laboratory; J. Ye, Lawrence Livermore National Laboratory; N. Caltà, Lawrence Livermore National Laboratory; Z. Li, Lawrence Livermore National Laboratory; W. Chen, Lawrence Livermore National Laboratory; T. Roehling, Lawrence Livermore National Laboratory; M. Santala, Oregon State University; Y. Wang, Lawrence Livermore National Laboratory
- 03:10 P **#688 Deformation Mechanics of Ti-6Al-4V Alloys Made by Selective Laser Melting**
T Voisin, Lawrence Livermore National Laboratory; N. Caltà, Lawrence Livermore National Laboratory; J. Ye, Lawrence Livermore National Laboratory; R. Cunningham, Carnegie Mellon University; A. Rollett, Carnegie Mellon University; Y. Wang, Lawrence Livermore National Laboratory
- 03:30 P **#424 A Novel Auxetic Structure with Enhanced Impact Performances by Means Of Periodic Tessellation with Variable Poisson's Ratio**
M Taylor, Santa Clara University; L. Francesconi, Santa Clara University; A. Baldi, Università degli Studi di Cagliari; X. Liang, Santa Clara University; F. Aymerich, University of Cagliari

Research in Progress

062. Research in Progress II

Organizer(s)

Chair Person A. Kidane, University of South Carolina

- 02:30 P **#672 A Progression on the Determination of Dynamic Fracture Initiation Toughness using Spiral Crack**
A Fahem, University of South Carolina; A. Kidane, University of South Carolina
- 02:50 P **#392 Selection of Shear Sample Test Geometry for Bulk Adhesive Characterization**
B Watson, University of Waterloo; M. Worswick, University of Waterloo; D. Cronin, University of Waterloo
- 03:10 P **#422 An Investigation of Stress Concentration, Crack Nucleation, and Fatigue Life of Thin Low Porosity Metallic Auxetic Structures**
L Francesconi, Santa Clara University; M. Taylor, Santa Clara University; A. Baldi, Università degli Studi di Cagliari
- 03:30 P **#131 Investigating Dynamic Fracture Parameters for Al7075-T651 using Modified Hopkinson Pressure bar (MHPB)**
S Kumar, Delhi Technological University; A. Pandouria, Indian Institute of Technology; V. Tiwari, Indian Institute of Technology

Fracture & Fatigue

063. Integration of Models & Experiments I**Organizer(s)** J. Carroll, Sandia National Laboratories; S. Grutzik, Sandia National Laboratories**Chair Person** S. Grutzik, Sandia National Laboratories02:30 P **#209 Keynote: The Sandia Fracture Challenge: How Ductile Failure Predictions Fare (40-min)***S Kramer, Sandia National Laboratories; B. Boyce, Sandia National Laboratories; A. Jones, Sandia National Laboratories; J. Gearhart, Sandia National Laboratories; B. Salzbrenner, Sandia National Laboratories*03:10 P **#146 Failure Testing Under In-Plane Biaxial Tension and Out-of-Plane Compression***N Spulak, The Ohio State University; R. Lowe, University of Dayton; J. Seidt, The Ohio State University; A. Gilat, The Ohio State University*03:30 P **#571 Experimental Study on Fatigue Performance of Steel-concrete Composite Girders***A El-Zohairy, University of Missouri; H. Salim, University of Missouri; A. Saucier, University of Missouri*

Thermomechanics and Infra-red Imaging

064. Thermoelastic Stress Analysis**Organizer(s)****Chair Person** B. Boyce, Stress Photonics Inc.; S. Quinn, University of Southampton02:30 P **#668 Thermographic Assessment of Sub-surface Damage in Composite Overwrapped Pressure Vessels***R Tighe, University of Waikato, New Zealand; D. Crump, University of Southampton; T. Allen, University of Southampton; N. Sathon, University of Southampton; P. Reed, University of Southampton; J. Dulieu-Barton, University of Southampton*02:50 P **#765 Thermoelastic Measurement Techniques Enabled by Self-Reference***B Boyce, Stress Photonics Inc; J. Lesniak, Stress Photonics Inc.*03:10 P **#657 Thermoelastic Stress Field Investigation of a Multiply-Loaded Disk***M Yousefi, Rochester Institute of Technology; X. Balandraud, Université Clermont-Auvergne; W. Samad, Rochester Institute of Technology*03:30 P **#230 Experimentally Determined Stresses in a Deep-Notched Aluminum Tensile Plate***Y Ro, University of Wisconsin-Madison; A. Alshaya, Kuwait University; B. Yang, University of Wisconsin-Madison; S. Kurunthottikkal Philip, Cummins Inc.; J. Freire, Pontifical Catholic University; R. Rowlands, University of Wisconsin-Madison*

Dynamic Behavior of Materials

065. Dynamic Response of Low-Impedance Materials III**Organizer(s)** P. Moy, Army Research Lab; J. Jordan, Los Alamos National Laboratory**Chair Person** J. Jordan, Los Alamos National Laboratory04:20 P **#477 A Tensile Split Hopkinson Pressure Bar for Low Impedance Materials***D Williamson, University of Cambridge*

- 04:40 P **#401 Investigating the Mechanical and Thermal Relationship for Epoxy Blends**
M Harr, U.S. Army Research Laboratory; P. Moy, U.S. Army Research Laboratory; T. Walter, U.S. Army Research Laboratory; K. Masser, U.S. Army Research Laboratory
- 05:00 P **#542 Effects of Pressure and Strain Rate on the Mechanical Behavior of Glassy Polymers**
A Wohlford, University of South Carolina; T. Walter, U.S. Army Research Laboratory; D. Casem, U.S. Army Research Laboratory; P. Moy, U.S. Army Research Laboratory; A. Kidane, University of South Carolina
- 05:20 P **#345 Experimental Investigation of Rate Sensitive Mechanical Response of Polyurea**
S Kasimahanthi, Indian Institute of Technology Madras; L. Rao C, Indian Institute of Technology Madras; V. Parameswaran, Indian Institute of Technology Kanpur
- 05:40 P **#448 Dynamic Mode II Fracture Response of PMMA Within an Aquatic Environment**
V Gomez, University of California, San Diego; I. Delaney, University of California, San Diego; R. Chavez, University of California, San Diego; V. Eliasson, University of California, San Diego
- 06:00 P **#704 Dynamic Characterization and Damping Capacity of Polyurethane Foams**
S Koumlis, Drexel University; A. Kelbaugh, Drexel University; L. Lamberson, Drexel University

Dynamic Behavior of Materials

066. Dynamic Failure & Fragmentation III

Organizer(s) B. Aydelotte, U.S. Army Research Laboratory; P. Jannotti, US Army Research Laboratory
Chair Person L. Fletcher, University of Southampton; C. Meredith, Army Research Lab

- 04:20 P **#107 Compression Strength of Ceramics**
J Swab, U.S. Army Research Laboratory; C. Meredith, U.S. Army Research Laboratory; G. Bobby, Bowhead; J. Pittari, III, Oak Ridge Institute for Science and Engineering
- 04:40 P **#106 Comparison of Pressure-Sensitive Strength Models for Ceramics under Ultrahigh Confinement**
S Bavdekar, University of Florida; G. Subhash, University of Florida
- 05:00 P **#87 Fracture and Failure Characterization of Transparent Acrylic based graft Interpenetrating Polymer Networks (graft-IPNs)**
B Sundaram, Auburn University; R. Mendez, Auburn University; H. Tippur, Auburn University; M. Auad, Auburn University
- 05:20 P **#88 Dynamic Crack Branching in Soda-lime Glass: An Optical Investigation using Digital Gradient Sensing**
B Sundaram, Auburn University; H. Tippur, Auburn University
- 05:40 P **#66 Ballistic Impact Experiments and Quantitative Assessments of Mesoscale Damage Modes in a Single-layer Woven Composite**
C Meyer, U.S. Army Research Laboratory/University of Delaware; B. Haque, University of Delaware; D. O'Brien, U.S. Army Research Laboratory; J. Gillespie, Jr., University of Delaware; E. Bonyi, Morgan State University; K. Aslan, Morgan State University

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

067. Computed Tomography of Composites

Organizer(s) P. Thakre, The Dow Chemical Company; H. Truong, The Dow Chemical Company
Chair Person P. Thakre, The Dow Chemical Company; H. Truong, The Dow Chemical Company

- 04:20 P **#272 Quantitative Relationships between Composite Microstructure and Mechanics by Digital Volume Correlation**
B Croom, University of Virginia; X. Li, University of Virginia
- 04:40 P **#306 3D Characterisation of Fibre-orientation and Voids at the Microscale in Ceramic Matrix Composites**
W Christian, University of Liverpool; K. Dvurecenska, University of Liverpool; E. Patterson, University of Liverpool; C. Przybyla, Air Force Research Laboratory
- 05:00 P **#754 In-situ Imaging of Flexure-induced Fracture in Fiber-reinforced Composites Using High-resolution X-ray Computed Tomography**
B Wingate, University of Utah; M. Czabaj, University of Utah
- 05:20 P **#653 Imaging the Life-Cycle of CMCs using High-Resolution X-ray Computed Tomography**
P Creveling, University of Utah; N. LeBaron, University of Utah; M. Czabaj, The University of Utah
- 05:40 P **#481 Mechanical Characterization of Open Cell Aluminum Foams Using X-ray Computed Tomography**
K Matheson, University of Utah; M. Czabaj, University of Utah

Advancement of Optical Methods in Experimental Mechanics

068. Optical Methods in SEM: History & Perspective III

Organizer(s) L. Lamberti, Politecnico di Bari; M.T. Lin, National Chung Hsing University
Chair Person C. Furlong, WPI-ME/CHSLT; M.T. Lin, National Chung Hsing University

- 04:20 P **#379 Advanced Applications of Polarized Light- Mueller Matrix Polarimetry/Ellipsometry**
Y Lo, National Cheng Kung University
- 04:50 P **#128 A Stress Measurement Method by Analyzing Spectroscopy of White Light Photoelasticity**
W Wang, National Tsing Hua University; P. Sung, National Tsing Hua University
- 05:20 P **#269 Vibration Modal Analysis by High-Speed and Accurate Shape Measurement using One-Pitch Phase Analysis Method**
Y Morimoto, 4D Sensor Inc.; A. Takagi, 4D Sensor Inc.; M. Ueki, 4D Sensor Inc.; L. Pirsig, 4D Sensor Inc.
- 05:50 P **#470 Evaluation of Residual Stress with Optical Methods**
C Pappalettere, Politecnico di Bari

Mechanics of Additive and Advanced Manufacturing

069. AM Process Characterization

Organizer(s)
Chair Person S.L.B. Kramer, Sandia National Laboratories

- 04:20 P **#179 Real Time Monitoring of Additive Manufacturing Processes using High-speed Synchrotron X-ray Imaging**
N Parab, Advanced Photon Source; C. Zhao, Advanced Photon Source; K. Fezzaa, Advanced Photon Source; T. Sun, Advanced Photon Source
- 04:40 P **#191 Buckling of Prepreg Slit Tape during Automated Fiber Placement Process: A DIC Based Study**
S Rajan Kattil, University of South Carolina; M. Sutton, University of South Carolina; R. Wehbe, University of South Carolina; B. Tattling, University of South Carolina; Z. Gurdal, University of South Carolina
- 05:00 P **#369 Tribomechanics of Ultrasonic Additive Manufacturing**
A Ward, Rice University; Y. Zhang, Rice University; Z. Cordero, Rice University

- 05:20 P **#488 Residual Stresses Involved in the 3D Printing of Biomaterials in a Granular Microgel**
A Mcghee, University of Florida; D. Nguyen, University of Florida; P. Ifju, University of Florida
- 05:40 P **#744 A Framework for Estimating of Mold Performance Using Experimental and Numerical Analysis of Injection Mold Tooling Prototypes**
S Jahan, Purdue University; H. El-Mounayri, IUPUI; A. Tovar, IUPUI; Y. Shin, Purdue University

Fracture & Fatigue

071. Mechanics of Energy & Energetic Materials

Organizer(s) S. Xia, Georgia Institute of Technology; S. Nadimpalli, NJIT

Chair Person S. Xia, Georgia Institute of Technology; S. Nadimpalli, NJIT

- 04:20 P **#82 In-Situ Strain Measurement in Solid-State Li-ion Batteries**
B Koochbor, University of Illinois; L. Sang, University of Illinois; O. Capraz, University of Illinois; A. Gewirth, University of Illinois; S. White, University of Illinois; N. Sottos, University of Illinois
- 04:40 P **#566 Characterization of Stress-Diffusion Coupling in Lithiated and Sodiated Germanium by Dynamic Nanoindentation**
M Papakyriakou, Georgia Institute of Technology; X. Wang, Georgia Institute of Technology; S. Xia, Georgia Institute of Technology
- 05:00 P **#613 An Improved Diffusion Coefficient Measurement Method for Li-ion anode Materials**
R Tripuraneni, New Jersey Institute of Technology; S. Rakshit, New Jersey Institute of Technology; S. Nadimpalli, New Jersey Institute of Technology
- 05:20 P **#614 Structural Changes and Associated Stress Evolution in Na-ion Battery Electrodes during Sodiation/De-sodiation Cycling**
S Rakshit, New Jersey Institute of Technology; S. Nadimpalli, New Jersey Institute of Technology; E. Detsi, University of Pennsylvania
- 05:40 P **#521 In-Situ Characterizations of Mechanical Degradation in All-Solid-State Rechargeable Batteries**
M Lu, Georgia Institute of Technology; S. Xia, Georgia Institute of Technology

Thermomechanics and Infra-red Imaging

072. Fatigue & Damage Evaluation Using Infrared Thermography

Organizer(s)

Chair Person J.L.F. Freire, Pontifical Catholic University of Rio de Janeiro; X. Balandraud, University Clermont-Auvergne Sigma-Clermont

- 04:20 P **#92 Comparison between 0D and 1D Heat Source Reconstruction for Fatigue Characterization**
P Jongchansitto, Chiang Mai University; C. Douellou, University Clermont-Auvergne; I. Preechawuttipong, Chiang Mai University; X. Balandraud, University Clermont-Auvergne
- 04:40 P **#158 Fatigue Properties Assessment of API 5L Gr. B Pipeline Steel using Infrared Thermography**
V Paiva, PUC-Rio; R. Vieira, PU-Rio; J. Freire, PUC-Rio
- 05:00 P **#655 Evaluation of Fatigue Damage in Short Carbon Fiber Reinforced Plastics Based on Thermoelastic Stress and Phase Analysis**
T Sakagami, Kobe University; D. Shiozawa, Kobe University; Y. Nakamura, Kobe University; S. Nonaka, DIC Corporation; K. Hamada, DIC Corporation

Dynamic Behavior of Materials

073. Hybrid Experimental/Computational Studies**Organizer(s)** T. Weerasooriya, US Army Research Laboratory; S. Sockalingam, University of South Carolina**Chair Person** S. Sockalingam, University of South Carolina

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- 09:00 A **#104 A Hybrid Experimental-Numerical Study of Crack Initiation and Growth in Transparent Bilayers across a Weak Interface**
S Dondeti, Auburn University; H. Tippur, Auburn University
- 09:20 A **#226 Full-Scale Testing and Numerical Modeling of Adhesively Bonded Hot Stamped Ultra-High Strength Steel Hat Sections**
Y Liu, University of Waterloo; D. Cronin, University of Waterloo; M. Worswick, University of Waterloo
- 09:40 A **#334 High Strain Rate Response of Adhesively Bonded Fiber-Reinforced Composite Joints – A Computational Study to Guide Experimental Design**
S Ravindran, University of South Carolina; S. Sockalingam, University of South Carolina; A. Kidane, University of South Carolina; M. Sutton, University of South Carolina; B. Justusson, Boeing Research & Technologies; J. Pang, Boeing Research & Technologies
- 10:00 A **#565 A Combined Experimental and Computational Approach for the Observation of Rayleigh Waves and Impact Surface Motion in Glass**
J McDonald, U.S. Army Research Laboratory; S. Satapathy, U.S. Army Research Laboratory; M. Pena, NSTech; M. Trabia, University of Nevada; B. O'toole, University of Nevada
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Dynamic Behavior of Materials

074. Novel Experimental Techniques II**Organizer(s)** T. Walter, US Army Research Lab; O. Kingstedt, University of Utah**Chair Person** O. Kingstedt, University of Utah; E. Retzlaff, United States Naval Academy

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- 09:00 A **#160 An Optimization Based Approach to Design a Complex Loading Pattern Using a Modified Split Hopkinson Pressure Bar**
S Vidhate, Michigan State University; A. Yucesoy, Michigan State University; R. Mejia-Alvarez, Michigan State University; A. Willis, San Antonio Military Medical Center; T. Pence, Michigan State University
- 09:20 A **#174 Development of “Dropkinson” Bar for Intermediate Strain-rate Testing**
B Song, Sandia National Laboratories; B. Sanborn, Sandia National Laboratories; J. Heister, Sandia National Laboratories; R. Everett, Sandia National Laboratories; T. Martinez, Sandia National Laboratories; G. Groves, Sandia National Laboratories; E. Johnson, Sandia National Laboratories; D. Kenney, Sandia National Laboratories; M. Knight, Sandia National Laboratories; M. Spletzer, Sandia National Laboratories
- 09:40 A **#395 Constitutive Modeling of Polyamide Split Hopkinson Pressure Bars for the Design of a Pre-stretched Apparatus**
A Bracq, University of Valenciennes; G. Haugou, University of Valenciennes; H. Morvan, University of Valenciennes
- 10:00 A **#435 Meso-scale Dynamic Behavior of Cast Magnesium at High Strain Rate Loading**
P Malchow, University of South Carolina; S. Ravindran, University of South Carolina; A. Kidane, University of South Carolina

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

075. Multifunctional Materials II

Organizer(s) P. Thakre, The Dow Chemical Company; L. Bodelot, Ecole Polytechnique - LMS

Chair Person P. Thakre, The Dow Chemical Company; L. Bodelot, Ecole Polytechnique - LMS

09:00 A **#118 Characterization of Multi-functional Glass Fiber/Epoxy Reinforced Composites**

J O'Donnell, University of Massachusetts Dartmouth; A. Hall, U.S. Army Research Laboratory; M. Haile, U.S. Army Research Laboratory; L. Nataraj, U.S. Army Research Laboratory; V. Chalivendra, University of Massachusetts Dartmouth; Y. Kim, University of Massachusetts Dartmouth

09:20 A **#121 Multi-functional Carbon Fiber/Epoxy Reinforced Composites**

R Sherman, University of Massachusetts Dartmouth; A. Hall, U.S. Army Research Laboratory; M. Haile, U.S. Army Research Laboratory; L. Nataraj, U.S. Army Research Laboratory; V. Chalivendra, University of Massachusetts Dartmouth; Y. Kim, University of Massachusetts Dartmouth

09:40 A **#689 Mechanical Behavior of Electromagnetically Detectable Polyethylene**

L Waldman, The University of Tulsa; A. Evans, The University of Tulsa; P. Hawrylak, The University of Tulsa; M. Keller, The University of Tulsa

10:00 A **#116 Electro-Mechanical Response of Multi-functional Natural Fiber Composites under Inter-laminar Fracture Loading**

S Yang, University of Massachusetts Dartmouth; J. Zulu, University of Massachusetts Dartmouth; V. Chalivendra, University of Massachusetts Dartmouth; Y. Kim, University of Massachusetts Dartmouth

Advancement of Optical Methods in Experimental Mechanics

076. Mechanical Characterization of Materials & Structures with Optical Methods I

Organizer(s) H. Jin, Sandia National Laboratories

Chair Person P.L. Reu, Sandia National Laboratories

09:00 A **#669 Digital Volume Correlation and Cohesive Zone Modeling Study of Interfacial Debonding in Particulate Composites**

M Martinez, University of Illinois Urbana-Champaign; J. Li-Mayer, Imperial College of Science Technology and Medicine; M. Charalambides, Imperial College of Science Technology and Medicine; J. Lambros, University of Illinois at Urbana-Champaign

09:20 A **#271 Role of Anisotropic Microstructural Features on Accuracy of Digital Volume Correlation**

B Croom, University of Virginia; H. Jin, Sandia National Laboratories; B. Mills, Sandia National Laboratories; J. Carroll, Sandia National Laboratories; X. Li, University of Virginia

09:40 A **#510 Determining a Relationship between Digital Volume Correlation and Digital Image Correlation for Polyurethane Foams**

J Gearhart, Sandia National Laboratories; E. Quintana, Sandia National Laboratories; A. Jones, Sandia National Laboratories; P. Reu, Sandia National Laboratories; S. Kramer, Sandia National Laboratories

10:00 A **#620 A Digital Laser Speckle Technique for Generating Slope Contours of Bent Plate**

A Giordano, Stony Brook University; F. Chiang, Stony Brook University

Mechanics of Additive and Advanced Manufacturing

077. Processing & Mechanical Behavior of AM Materials

Organizer(s)

Chair Person H. Jin, Sandia National Laboratories

- 09:00 A **#813 Keynote: Linking Thermal History to Mechanical Behavior in Directed Energy Deposited Materials (40-min)**
J Cao, Northwestern University
- 09:40 A **#739 High Stiffness-to-weight Ratio Zero Coefficient of Thermal Expansion Lattices Fabricated by Additive Manufacturing Methods**
M de Boer, Carnegie Mellon University; S. Sun, University of Wisconsin; M. Miller, Carnegie Mellon University; J. Beuth, Carnegie Mellon University
- 10:00 A **#749 Effect of Processing Parameters on Interlayer Fracture Toughness of Fused Filament Fabrication Thermoplastic Materials**
D Young, University of Utah; C. Otten, University of Utah; M. Czabaj, University of Utah

Applications

078. Applications I

Organizer(s)

Chair Person P. Reynolds, University of Exeter

- 09:00 A **#289 Dynamic Response of Thermally Stressed Plates with Reinforced Edges**
A Santos Silva, University of Liverpool; J. Lambros, University of Illinois at Urbana-Champaign; E. Patterson, University of Liverpool
- 09:20 A **#343 Experimental and Theoretical Study on the Robustification of Acoustic Emission Inspection with Recurrent Neural Networks**
C Hsu, U.S. Army Research Laboratory; M. Haile, U.S. Army Research Laboratory; N. Epps-Bradley, U.S. Army Research Laboratory; J. Chen, U.S. Army Research Laboratory
- 09:40 A **#474 Mode I Delamination Behaviour of Fused Deposition Modelling Parts**
C Barile, Politecnico di Bari; C. Casavola, Politecnico di Bari; A. Cazzato, Politecnico di Bari
- 10:00 A **#575 Effect of Crack Tip Radius on Cutting Strength in Elastomers**
B Zhang, University of Illinois at Urbana-Champaign

Fracture & Fatigue

079. Integration of Models & Experiments II

Organizer(s) J. Carroll, Sandia National Laboratories; S. Grutzik, Sandia National Laboratories

Chair Person S. Grutzik, Sandia National Laboratories; J. Carroll, Sandia National Laboratories

- 09:00 A **#241 Low Modulus Composite Patched Aluminum Center Crack Tension Specimen DIC Surface Displacements Compared with Predictions**
D Hart, Naval Surface Warfare Center; H. Bruck, University of Maryland, College Park

- 09:20 A **#659 Numerical Modeling of Charpy Impact Test to Determine the Fracture Characteristics of Aluminium Alloy 6061**
W Samad, Rochester Institute of Technology; W. Samad, Rochester Institute of Technology; K. Ram, BITS Pilani - Dubai Campus; W. Samad, Rochester Institute of Technology
- 09:40 A **#706 Combined Modelling and Experimental Approach to Improve Mechanical Impact Survivability of GaN Power FET**
J Ferguson, U.S. Air Force Research Laboratory; S. Sihn, University of Dayton Research Institute; A. Hilton, U.S. Air Force Research Laboratory; C. McKinion, U.S. Air Force Research Laboratory; S. Dooley, U.S. Air Force Research Laboratory; A. Roy, U.S. Air Force Research Laboratory; A. Schrand, U.S. Air Force Research Laboratory; E. Heller, U.S. Air Force Research Laboratory
- 10:00 A **#127 Crack-tip Plastic Zone Size and Shape via DIC**
G Gonzáles, PUC-Rio; J. González, PUC-Rio; V. Paiva, PUC-Rio; J. Freire, PUC-Rio

Thermomechanics and Infra-red Imaging

080. Integration of Infrared Thermography & DIC

Organizer(s)

Chair Person R. Tighe, University of Waikato; W. Samad, Rochester Institute of Technology

- 09:00 A **#321 Experimental Validation of the Energy Balance Equation in the Presence of Acoustic Emission**
N Bradley, U.S. Army Research Laboratory; M. Haile, U.S. Army Research Laboratory; B. Northington, Tennessee state University; M. Coatney, U.S. Army Research Laboratory; A. Eure, Frostburg University
- 09:20 A **#459 Understanding Heterogeneity in Discontinuous Compression Composite Materials for High-volume Applications**
D Bull, University of Southampton; J. Dulieu-Barton, University of Southampton; O. Thomsen, University of Southampton
- 09:40 A **#389 Multi-instrumentation of Very High Temperature Tests**
T Archer, ONERA; P. Beauchêne, ONERA; C. Huchette, ONERA; M. Berny, LMT; F. Hild, LMT

Dynamic Behavior of Materials

081. Advances in Material Modeling I

Organizer(s) P. Allison, University of Alabama

Chair Person O. Rodriguez, NASA-MSFC; B. Sundaram, Corning Inc.

- 10:50 A **#597 Modeling of the Temperature Influence on the Dynamic Behavior of AFS Additive Manufactured Inconel 625**
O Rodriguez, NASA-MSFC; C. Mason, University of Alabama; P. Allison, University of Alabama; J. Jordon, University of Alabama
- 11:10 A **#609 Internal State Variable Plasticity Modeling of Temperature Influence on Dynamically Loaded PBF EBM AM Ti6Al4V**
O Rodriguez, NASA; P. Allison, The University of Alabama; W. Whittington, Mississippi State University; S. Mates, NIST
- 11:30 A **#629 Plasticity and Damage Modeling of Stress Asymmetry and Dynamic Behavior of AFS Additive Manufactured Aluminum Alloy 2219**
O Rivera, Sikorsky Aircraft Corporation; P. Allison, University of Alabama; J. Jordon, University of Alabama; W. Whittington, Mississippi State University; L. Brewer, University of Alabama; O. Rodriguez, NASA; R. Martens, University of Alabama; N. Hardwick, Aeroprope Corporation

- 11:50 A **#616 Developing an Alternative to Roma Plastilina #1 as a Ballistic Backing Material for Body Armor Evaluation**
R Mrozek, U.S. Army Research Laboratory; T. Edwards, U.S. Army Research Laboratory; E. Bain, U.S. Army Research Laboratory; S. Cole, U.S. Army Research Laboratory; E. Napadensky, U.S. Army Research Laboratory; R. Freeney, Aberdeen Test Center

Dynamic Behavior of Materials

082. Novel Experimental Techniques III

Organizer(s) T. Walter, US Army Research Lab; O. Kingstedt, University of Utah
Chair Person J. Ligda, Air Force Research Lab

- 10:50 A **#292 Development of an Interferometer and Schlieren-based Measurement Technique for Resolving Cavitation Pressure Fields**
S Buyukozturk, Brown University; A. Landauer, Brown University; C. Franck, Brown University
- 11:10 A **#399 Novel Inertial Impact Tests to Characterize the Plastic Properties of Metals**
F Davis, University of Southampton; L. Fletcher, University of Southampton; F. Pierron, University of Southampton
- 11:30 A **#740 Dynamic Spherical Indentation of Single Crystal Quartz with Compression and Torsion**
K Andes, Johns Hopkins University; K. Ramesh, Johns Hopkins University
- 11:50 A **#149 Back Face Deformation Reconstruction of Soft Body Armor During Ballistic Impact Using Fiber Bragg Gratings**
D Hackney, North Carolina State University; F. Seng, Brigham Young University; A. Noevere, North Carolina State University; T. Goode, North Carolina State University; G. Shoemaker, Naval Undersea Warfare Center; M. Pankow, North Carolina State University; S. Schultz, Brigham Young University; K. Peters, North Carolina State University

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

083. Manufacturing & Joining of Composites

Organizer(s) G. Miller, The Boeing Company ; C. Degen, South Dakota School of Mines & Technology
Chair Person G. Miller, The Boeing Company

- 10:50 A **#492 Crack-Growth Rates of Interfacial Cracks in Bonded Composite Repairs**
I Alnaser, The University of Tulsa; M. Keller, The University of Tulsa
- 11:10 A **#270 Thermo-mechanical Properties of Thermoset Polymers and Composites Fabricated by Frontal Polymerization**
M Yourdkhani, University of Illinois at Urbana-Champaign; B. Koohbor, University of Illinois at Urbana-Champaign; D. Ivanoff, University of Illinois at Urbana-Champaign; L. Dean, University of Illinois at Urbana-Champaign; C. Lamuta, University of Illinois at Urbana-Champaign; P. Centellas, University of Illinois at Urbana-Champaign; I. Robertson, University of Illinois at Urbana-Champaign; S. White, University of Illinois at Urbana-Champaign; N. Sottos, University of Illinois at Urbana-Champaign
- 11:30 A **#162 Optimization of Surface Integrity of Titanium-Aluminum Intermetallic Composite Machined by Wire EDM**
S Ezeddini, SUPMECA-Paris; E. Bayraktar, SUPMECA-Paris; M. Boujelbene, University of Hail; S. Ben Salem, University of Tunis El Manar

- 11:50 A **#548 Experimental comparison of the microstructure and Surface roughness in CO2 laser cutting of the Titanium alloy Ti-6Al-4V and the Pure Titanium Ti**
B El-Aoud, SUPMECA-Paris; M. Boujelbene, University of Tunis El Manar; E. Bayraktar, SUPMECA-Paris; S. Ben Salem, University of Tunis El Manar

Advancement of Optical Methods in Experimental Mechanics

084. Mechanical Characterization of Materials & Structures with Optical Methods II

Organizer(s)

Chair Person H. Jin, Sandia National Laboratories

- 10:50 A **#296 Investigating Fatigue Striation Morphology in Crystallisable Elastomers by using a Phase Extraction Algorithm**
B Ruellan, Cooper Standard; E. Robin, University of Rennes; J. Le Cam, University of Rennes; I. Jeanneau, Cooper Standard; F. Canévet, Cooper Standard; D. Loison, University of Rennes; G. Mauvoisin, University of Rennes
- 11:10 A **#461 A Combined High-Resolution Full-Field Imaging and Metallography approach to Assess the Local Properties of FSW (Cu-SS) Joints**
S Ramachandran, University of Southampton; J. Dulieu-Barton, University of Southampton; P. Reed, University of Southampton; A. Lakshminarayanan, SSN College of Engineering
- 11:30 A **#533 Effect of Heat Treatment Processing on the Dynamic Performance of Alpha+Beta and Metastable-Beta Titanium Alloys**
S Mujahid, Mississippi State University; C. Krivanec, Mississippi State University; A. Oppedal, Mississippi State University; W. Whittington, Mississippi State University; P. Allison, University of Alabama; A. Booztani, Mississippi State University; J. Bhattacharya, University of Virginia; S. Agnew, University of Virginia; H. ElKadiri, Mississippi State university
- 11:50 A **#460 Compression Tests on CFRP Analyzed by Digital Image Correlation**
C Barile, Politecnico di Bari; C. Casavola, Politecnico di Bari; G. Pappalettera, Politecnico di Bari

Mechanics of Additive and Advanced Manufacturing

085. Dynamic Response of AM Materials

Organizer(s)

Chair Person A. Beese, Pennsylvania State University

- 10:50 A **#552 Shock Propagation and Deformation of Additively-Manufactured Polymer Foams with Engineered Porosity**
J Spowart, Air Force Research Laboratory; D. Lacina, University Of Dayton Research Institute; K. Neel, Air Force Research Laboratory; G. Frank, University of Dayton Research Institute; A. Abbott, University of Dayton Research Institute; B. Branch, Los Alamos National Laboratory
- 11:10 A **#114 Quasi-Static and Dynamic Fracture of Additively Printed ABS Studied using DIC: Role of Build Architecture and Loading Rate**
J Isaac, Auburn university; H. Tippur, Auburn university
- 11:30 A **#511 Mechanical Behaviors of new Developed PDMS-based Inks for Additive Manufacturing**
S Crum, Los Alamos National Laboratory; J. Dumont, Los Alamos National Laboratory; C. Park, Gyeongnam National University of Science and Technology; A. Labouriau, Los Alamos National Laboratory; K. Lee, Los Alamos National Laboratory

Applications

086. Applications II**Organizer(s)****Chair Person** J. Helm, Lafayette College

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- 10:50 A **#713 Ultrasonic Imaging of Rail Flaws using Transducer Wedge and GPU Processing**
S Sternini, University of California, San Diego; A. Liang, University of California, San Diego; F. Lanza di Scalea, University of California, San Diego; R. Wilson, U.S. Federal Railroad Administration
- 11:10 A **#618 Finite Element Model Updating using Digital Image Correlation Data**
M Mathew, Drexel University; A. Ellenberg, Drexel University; S. Ye, Drexel University; I. Bartoli, Drexel University; A. Kotsos, Drexel University
- 11:30 A **#428 A Design of Experiments Approach for Determining Sensitivities of Forming Limit Analyses to Experimental Parameters**
M Iadicola, National Institute of Standards and Technology; D. Banerjee, National Institute of Standards and Technology
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Fracture & Fatigue

087. In Situ Techniques for Fatigue & Fracture I**Organizer(s)** G. Pataky, Clemson University; R. Berke, Utah State University**Chair Person** G. Pataky, Clemson University; R. Berke, Utah State University

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- 10:50 A **#699 Damage Evolution and Local Strain Redistribution in Composite Laminate with Various Fiber Arrangements**
A Tessema, University of South Carolina; S. Ravindran, University of South Carolina; A. Kidane, University of South Carolina
- 11:10 A **#180 An Experimental Method to Induce and Measure Crack Propagation in Brittle Polymers with Heterogeneities**
K Mac Donald, California Institute of Technology; G. Ravichandran, California Institute of Technology
- 11:30 A **#791 Full-Field Vibration Fatigue Strains at Extreme Temperatures**
M Nelson, Utah State University; J. Matsen, Utah State University; S. Burton, Utah State University; R. Berke, Utah State University
- 11:50 A **#707 Effect of Adhesion on Graphene-Optical Fiber Sensor in Corrosion Detection**
Y Li, Missouri University of Science and Technology; C. Guo, Missouri University of Science and Technology; C. Wu, Missouri University of Science and Technology
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Thermomechanics and Infra-red Imaging

088. Materials Characterizations Using Thermography II**Organizer(s)****Chair Person** X. Balandraud, University Clermont-Auvergne Sigma-Clermont; S. Quinn, University of Southampton

- 10:50 A **#93 Analysis of the Thermomechanical Response of Granular Materials by Infrared Thermography**
P Jongchansitto, Chiang Mai University; X. Balandraud, University Clermont-Auvergne; I. Preechawuttipong, Chiang Mai University; J. Le Cam, University of Rennes 1; P. Garnier, PCM Technologies S.A.S.
- 11:10 A **#361 Measuring Strain-induced Crystallinity in Rubbers from IR Thermography**
J Le Cam, University of Rennes

Dynamic Behavior of Materials

089. Advances in Material Modeling II

- Organizer(s)** P. Allison, University of Alabama
Chair Person O. Rodriguez, NASA-MSFC; J. Kimberley, New Mexico Institute of Mining and Technology

- 01:20 P **#632 Additive Friction Stir Simulations by Smoothed Particle Hydrodynamics of Additive Manufactured Aluminum Alloy 6061**
G Stubblefield, University of Alabama; K. Fraser, National Research Council Canada; P. Allison, University of Alabama; B. Jordon, University of Alabama
- 01:40 P **#732 Material Modeling of Al-Li Alloys**
A Cisko, University of Alabama; J. Jordon, University of Alabama
- 02:00 P **#751 Meshfree Simulation of Oxide Dispersion in Additive Friction Stir Deposition of Aluminum Alloy 5083**
R Escobar, Jr., The University of Alabama; K. Fraser, National Research Council Canada; J. Jordon, The University of Alabama; P. Allison, The University of Alabama
- 02:20 P **#683 Numerical Study of the Failure Mechanism of Ceramics during Low Velocity Impact Used In Protective Systems**
C Fountzoulas, U.S. Army Research Laboratory; R. Brennan, U.S. Army Research Laboratory
- 02:40 P **#725 Investigating Anisotropic Failure response in Rolled AZ31B Under Dynamic Tensile Loading**
A Matejunas, New Mexico Institute of Mining and Technology; J. Lloyd, Army Research Laboratory; M. Priddy, Mississippi State University; T. Walter, Army Research Laboratory; J. Kimberley, New Mexico Institute of Mining and Technology

Dynamic Behavior of Materials

090. Shock & Blast I

- Organizer(s)** V. Eliasson, University of Southern California; B. Koohboor, University of Illinois at Urbana-Champaign
Chair Person M. Pankow, North Carolina State University

- 01:20 P **#75 A Novel Approach for Plate Impact Experiments to Obtain Properties of Materials under Extreme Conditions**
B Zuanetti, Case Western Reserve University; T. Wang, Case Western Reserve University; V. Prakash, Case Western Reserve University
- 01:40 P **#65 Error Analysis for Shock Equation of State Measurements in Polymers using Manganin Gauges**
J Jordan, Los Alamos National Laboratory; D. Casem, U.S. Army Research Laboratory
- 02:00 P **#97 Shock Compression of Molybdenum Single Crystals to High Stresses**
T Oniyama, California Institute of Technology; Y. Toyoda, Washington State University; Y. Gupta, Washington State University; G. Ravichandran, California Institute of Technology

- 02:20 P **#140 Inelastic Behavior of Tungsten-Carbide in Pressure-Shear Shock Experiments beyond 20 GPa**
Z Lovinger, California Institute of Technology; C. Kettenbeil, California Institute of Technology; M. Mello, California Institute of Technology; G. Ravichandran, California Institute of Technology
- 02:40 P **#214 Improved Richtmyer-Meshkov Instability Experiments for Very-High-Rate Strength & Application to Tantalum**
M Prime, Los Alamos National Laboratory; W. Buttler, Los Alamos National Laboratory; S. Fensin, Los Alamos National Laboratory; D. Jones, Los Alamos National Laboratory; R. Manzanares, Los Alamos National Laboratory; D. Martinez, Los Alamos National Laboratory; J. Martinez, Los Alamos National Laboratory; D. Schmidt, Los Alamos National Laboratory; C. Trujillo, Los Alamos National Laboratory

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

091. Nanoparticulate Based Recycled Constituent Composites III

Organizer(s) I. Miskoiglu, Michigan technological University; E. Bayraktar, SUPMECA-Paris

Chair Person I. Miskoiglu, Michigan technological University; E. Bayraktar, SUPMECA-Paris

- 01:20 P **#134 Toughening Mechanism in Epoxy Resin Modified Recycled Rubber Based Composites Reinforced with Gamma-Alumina, Graphene and CNT**
A Irez, University Paris-Saclay; E. Bayraktar, SUPMECA-Paris; I. Miskioglu, Michigan Technical University
- 01:40 P **#193 Reinforcement of Recycled Rubber Based Composite with Nano-Silica and Graphene Hybrid Fillers**
A Irez, University Paris-Saclay; I. Miskioglu, Michigan Technological University; E. Bayraktar, SUPMECA-Paris
- 02:00 P **#590 Toughening Mechanisms on Recycled Rubber Modified Epoxy Based Composites Reinforced with Graphene Nanoplatelets**
A Irez, University Paris - Saclay; I. Miskioglu, Michigan Technological University; E. Bayraktar, SUPMECA-Paris
- 02:20 P **#282 Design of Magnetic Aluminium (AA356) Composites (AMCs) Reinforced with Nano Fe₃O₄, and Recycled Nickel - Copper Particles**
L Ferreira, Federal University of Southern and Southeastern, PA; E. Bayraktar, SUPMECA-Paris; I. Miskioglu, Michigan Technology University; M. Robert, University of Campinas
- 02:40 P **#291 Reinforcement Effect of Nano Fe₃O₄ and Nb₂Al on the Mechanical and Physical Properties of Cu-Al Based Composites**
L Ferreira, Federal University of Southern and Southeastern, PA; I. Miskioglu, Michigan Technology University; E. Bayraktar, SUPMECA-Paris; D. Katundi, SUPMECA-Paris

Advancement of Optical Methods in Experimental Mechanics

092. Bioengineering

Organizer(s)

Chair Person C. Furlong, WPI-ME/CHSLT; L. Lamberti, Politecnico di Bari

- 01:20 P **#799 High-speed Holographic Shape and Transient Response Measurements of Mammalian Tympanic Membrane**
P Razavi, Worcester Polytechnic Institute; H. Tang, Worcester Polytechnic Institute; N. Maftoon, Harvard Medical School; J. Cheng, Harvard Medical School; J. Rosowski, Harvard Medical School; C. Furlong, Worcester Polytechnic Institute

- 01:40 P **#803 High-speed Digital Image Correlation for Endoscopy: a Feasibility Study**
H Tang, Worcester Polytechnic Institute; K. Pooladvand, Worcester Polytechnic Institute; P. Razavi, Worcester Polytechnic Institute; J. Rosowski, Massachusetts Eye and Ear Infirmary; T. Cheng, Massachusetts Eye and Ear Infirmary; C. Furlong, Worcester Polytechnic Institute
- 02:00 P **#678 Use of Digital Image Correlation Method to Measure Bio-tissue Deformation**
T Chen, National Cheng Kung University; L. Chang, National Cheng Kung University
- 02:20 P **#151 Image Analysis of Curvature Using Classical Mechanics, The Elastica**
C Wilson, Medtronic, Inc.; J. Dawson, Medtronic, Inc.

Mechanics of Additive and Advanced Manufacturing

093. Additively Manufactured Polymers

Organizer(s)

Chair Person B. Antoun, Sandia National Laboratories

- 01:20 P **#125 3D Printed Polymers for Enhanced Fracture Properties**
S Yang, University of Massachusetts Dartmouth; J. Li, University of Massachusetts Dartmouth; D. Li, University of Massachusetts Dartmouth; V. Chalivendra, University of Massachusetts Dartmouth
- 01:40 P **#120 Compression and Shear Response of 3D Printed Foam Pads**
W Lu, Sandia National Laboratories
- 02:00 P **#124 Dynamic Fracture Characterization of 3D Printed Materials**
M Rabbi, University of Massachusetts Dartmouth; D. Li, University of Massachusetts Dartmouth; V. Chalivendra, University of Massachusetts Dartmouth
- 02:20 P **#712 Influence of an Extreme Environment on the Tensile Mechanical Properties of a 3D Printed Thermoplastic Polymer**
J Torres, St. Mary's University; O. Onwuzurike, St. Mary's University; A. McClung, St. Mary's University; J. Ocampo, St. Mary's University

Inverse Problems/Hybrid Techniques

094. Inverse Problems/Hybrid Techniques III

Organizer(s)

Chair Person S. Bossuyt, Aalto University

- 01:20 P **#307 Identification of Local Stiffness of Lodgepole Pine: Simulation and Example**
J Considine, USDA, Forest Service, Forest Products Laboratory
- 01:40 P **#535 System Identification of Structures with Incomplete Modal Information**
C Lin, National Pingtung University of Science and Technology; M. Lin, National Pingtung University of Science and Technology
- 02:00 P **#263 Determination of Constitutive Parameters in Inverse Problem using Thermoelastic Data**
A Alshaya, Kuwait University; J. Considine, USDA, Forest Service, Forest Products Laboratory
- 02:20 P **#169 Identification of Plasticity Parameters and Failure Criteria of Ship-building Steel**
M Korgesaar, Aalto University; D. Smyl, Aalto University; S. Bossuyt, Aalto University

Fracture & Fatigue

095. In Situ Techniques for Fatigue & Fracture II**Organizer(s)** G. Pataky, Clemson University; R. Berke, Utah State University**Chair Person** R. Berke, Utah State University; G. Pataky, Clemson University01:20 P **#403 In Situ Observations of Cracking during Constrained Sintering***J Carazzone, Rice University; M. Bonar, Rice University; Z. Cordero, Rice University*01:40 P **#298 Injection Initiated Fracture in Soft Solids***S Yang, University of Illinois Urbana-Champaign; M. Milner, University of Illinois Urbana-Champaign; D. Bahk, University of Illinois Urbana-Champaign; A. Kataruka, University of Illinois Urbana-Champaign; S. Hutchens, University of Illinois Urbana-Champaign*02:00 P **#280 Influence of the Temperature on the Lifetime Reinforcement of a Filled NR***B Ruellan, Cooper Standard; J. Le Cam, University of Rennes; E. Robin, University of Rennes; I. Jeanneau, Cooper Standard; F. Canévet, Cooper Standard; F. Mortier, Cooper Standard*02:20 P **#807 Integrated Measurement and Modeling of Closure Stresses During Fatigue Crack Propagation***B Schiefelbein, Iowa State University; C. Giuffre, Iowa State University; S. Holland, Iowa State University; A. Bastawros, Iowa State University*02:40 P **#727 Mechanics of Materials and Fracture for High School Students***L Avellar, California Institute of Technology; K. Mac Donald, California Institute of Technology*

Thermomechanics and Infra-red Imaging

096. Material Characterizations Using Thermography III**Organizer(s)****Chair Person** J.-B. Le Cam, University de Rennes; J. Dulieu-Barton, University of Southampton01:20 P **#677 Dissipative Heat Source Distribution in a Laser Welded 316 L Stainless Steel***V Seelan, University of Southampton; F. Pierron, University of Southampton; J. Dulieu-Barton, University of Southampton*01:40 P **#363 Mechanical and Thermomechanical Characterization of Different Leathers***N Di Cesare, Université Bretagne Sud; G. Corvec, University of Rennes; X. Balandraud, SIGMA Clermont; J. Le Cam, University of Rennes; J. Gauffreteau, SIGMA Clermont*02:00 P **#349 Mechanical Response and Energy Stored During Deformation of Crystallizing TPU***A Lachhab, Cooper Standard; E. Robin, University of Rennes; J. Le Cam, University of Rennes; F. Mortier, Cooper Standard; Y. Tirel, Cooper Standard; F. Canévet, Cooper Standard*02:20 P **#679 Fatigue Limit Estimation for Single Bead-on-plate weld Based on Dissipated Energy Measurement***D Shiozawa, Kobe University; Y. Ogino, Kobe University; T. Washio, Kobe University; T. Sakagami, Kobe University; H. Ueda, Nippon Steel & Sumitomo Metal Corporation; T. Makino, Nippon Steel & Sumitomo Metal Corporation*

Dynamic Behavior of Materials

097. Industrial Applications**Organizer(s)** S. Mates, NIST**Chair Person** S. Mates, NIST

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- 03:20 P **#253 The Flow Stress of AM IN 625 Under Conditions of High Strain and Strain Rate**
R Ananda-Kumar, Wichita State University; H. Lopez-Hawa, Wichita State University; W. Moscoso-Kingsley, Wichita State University; V. Madhavan, Wichita State University
- 03:40 P **#258 Dynamic Thermal Softening Behavior of Additive Materials for Hybrid Manufacturing**
S Mates, NIST; M. Stoudt, NIST; W. Moscoso-Kingsley, Wichita State University; V. Madhavan, Wichita State University
- 04:00 P **#192 Historical Note: Machining, Strain Gages, and a Pulse-heated Kolsky Bar**
R Rhorer, National Institute of Standards and Technology; S. Mates, National Institute of Standards and Technology; E. Whitenton, National Institute of Standards and Technology; T. Burns, National Institute of Standards and Technology
- 04:20 P **#731 Characterization of Dynamic Deformation and Failure of Novel Light Weight Steel Alloy**
T Walter, U.S. Army Research Laboratory; P. Moy, U.S. Army Research Laboratory; T. Sano, U.S. Army Research Laboratory; K. Limmer, U.S. Army Research Laboratory
- 04:40 P **#133 Combining Viscoelastic Properties and Architecture to Control the Dynamic Response of Soft Materials**
A Forster, NIST; M. Riley, NIST
- 05:00 P **#122 Impact Energy Absorption Characterization of Novel Energy Absorbing Materials for Sport Helmet Applications**
J Corriea, University of Massachusetts Dartmouth; J. Paquette, University of Massachusetts Dartmouth; V. Chalivendra, University of Massachusetts Dartmouth; Y. Kim, University of Massachusetts Dartmouth; A. Lewis, University of Massachusetts Dartmouth
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Dynamic Behavior of Materials

098. Shock & Blast II**Organizer(s)** V. Eliasson, University of Southern California; B. Koohboor, University of Illinois at Urbana-Champaign**Chair Person** B. Koohboor, University of Illinois at Urbana-Champaign

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- 03:20 P **#335 Pressure-Shear Plate Impact Experiments on Soda-Lime Glass at Pressures Beyond 20 GPa**
C Kettenbeil, California Institute of Technology; Z. Lovinger, California Institute of Technology; M. Mello, California Institute of Technology; T. Jiao, Brown University; R. Clifton, Brown University; G. Ravichandran, California Institute of Technology
- 03:40 P **#544 Dynamic Shearing Resistance of Constituents of a Simulant of an Active Material**
P Malhotra, Brown University; T. Jiao, Brown University; R. Clifton, Brown University; P. Guduru, Brown University
- 04:00 P **#570 Compression Wave Profiles in Shock Loaded Polymer-metal Composites**
D Bober, Lawrence Livermore National Laboratory; Y. Toyoda, Washington State University; B. Maddox, Lawrence Livermore National Laboratory; R. Minich, Lawrence Livermore National Laboratory; E. Herbold, Lawrence Livermore National Laboratory; Y. Gupta, Washington State University; M. Kumar, Lawrence Livermore National Laboratory

- 04:20 P **#675 Uncertainties in Low-Pressure Shock Experiments on Heterogeneous Materials**
T Vogler, Sandia National Laboratories; M. Hudspeth, Sandia National Laboratories; S. Root, Sandia National Laboratories
- 04:40 P **#222 Mechanical Characterization and Numerical Material Modeling of Polyurea**
J LeBlanc, Naval Undersea Warfare Center; S. Bartyczak, Naval Surface Warfare Center; L. Edgerton, Naval Surface Warfare Center

4th International Symposium on the Mechanics of Composite and Multifunctional Materials

099. Novel Developments in Composites

Organizer(s) D. Sequera, Baker Hughes Inc; G. Slipper, U.S. Army Research Laboratory
Chair Person D. Sequera, Baker Hughes Inc; G. Slipper, U.S. Army Research Laboratory

- 03:20 P **#509 Microscale Investigation of Transverse Tensile Failure of Fiber-Reinforced Polymer Composites**
C Arndt, University of Utah; P. DaBell, University of Utah; M. Czabaj, University of Utah
- 03:40 P **#130 Study of Mechanical Characteristics of Banana and Jute Fiber Reinforced Polyester Composites**
G Easwara Prasad, Mangalore Institute of Technology and Engineering; B. Megha, Maharaja Institute of Technology; B. Keerthi Gowda, Visvesvaraya Technological University
- 04:00 P **#644 Improvement of Mechanical Properties of Carbon Fiber Reinforced Hybrid Aluminum Matrix Composites (HAMCs)**
A Rahman, Pennsylvania State University
- 04:20 P **#320 Manufacturing of Copper based Composites reinforced with Ceramics and Hard intermetallics for Applications of Electric Motor Repair Parts**
G Zambelis, Airbus-Helicopter; E. Bayraktar, SUPMECA-Paris; D. Katundi, SUPMECA-Paris; I. Miskioglu, Michigan Technological University
- 04:40 P **#526 Optimization of the high Energy Milling Process of Chips of a Stainless Steel Using the Response Surface Modeling**
F Gatamorta, University of Campinas; E. Bayraktar, SUPMECA-Paris; C. Mendonça, University of Itajubá; M. Silva, University of Itajubá; M. Melo, University of Itajubá; G. Silva, University of Itajubá
- 05:00 P **#525 Process Reliability of Abrasive Water Jet to Cut Shapes of the Titanium Alloy Ti-6Al-4V**
M Douiri, SUPMECA-Paris; M. Boujelbene, University of Tunis El Manar; E. Bayraktar, SUPMECA-Paris; S. Ben Salem, University of Tunis El Manar

Advancement of Optical Methods in Experimental Mechanics

100. Mechanical Characterization of Materials & Structures with Optical Methods III

Organizer(s)
Chair Person F. Pierron, University of Southampton

- 03:20 P **#802 An Optimization Approach for Improving Geometric Moire Resolution**
S Palvadi, Saint-Gobain Northboro R&D Center; K. Liechti, University of Texas at Austin
- 03:40 P **#309 Inferring Material Parameters from Imprecise Biaxial Experiments on Soft Materials**
N Afsar Kazerooni, Texas A&M University; Z. Wang, Texas A&N University; A. Srinivasa, Texas A&M University

Mechanics of Additive and Advanced Manufacturing

101. Additively Manufactured Polymers & Composites

Organizer(s)

Chair Person K. Dannemann, Rensselaer Polytechnic Institute

- 03:20 P **#69 Thermomechanical Evaluation of Additively Manufactured Polymeric Structures Fabricated With Novel, Multi-Material Filaments**
K Hart, U.S. Army Research Laboratory; R. Dunn, U.S. Army Research Laboratory; E. Wetzel, U.S. Army Research Laboratory
- 03:40 P **#384 3D Free-form Printing by Frontal Polymerization**
J Aw, University of Illinois at Urbana-Champaign; A. Nelson, University of Illinois at Urbana-Champaign; I. Robertson, University of Illinois at Urbana-Champaign; M. Yourdkhani, University of Illinois at Urbana-Champaign; R. Ewoldt, University of Illinois at Urbana-Champaign; N. Sottos, University of Illinois at Urbana-Champaign; J. Moore, University of Illinois at Urbana-Champaign; S. White, University of Illinois at Urbana-Champaign
- 04:00 P **#411 Mechanical Characterization of Cellulose Nanofibril Materials made by Additive Manufacturing**
L Mariani, University of Pennsylvania; J. Considine, USDA Forest Service; K. Turner, University of Pennsylvania
- 04:20 P **#684 Mechanical Characterization of Fused Filament Fabrication Polyvinylidene Fluoride Printed (PVDF) Composites**
N Momenzadeh, University of Louisville; T. Berfield, University of Louisville; C. Stewart, University of Louisville
- 04:40 P **#515 Experimental Quantification of Path Dependencies when 3D Printing in a Granular Microgel System**
D Nguyen, University of Florida; A. McGhee, University of Florida; P. Ifju, University of Florida

Fracture & Fatigue

103. Microscale & Microstructural Effects on Mechanical Behavior

Organizer(s) J. Carroll, Sandia National Laboratories; A. Beese, Pennsylvania State University

Chair Person J. Carroll, Sandia National Laboratories

- 03:20 P **#81 Microstructural Fatigue Damage on the Mechanical Properties of α -Iron**
J Indeck, The University of Alabama in Huntsville; C. Williams, U.S. Army Research Laboratory; K. Hazeli, The University of Alabama in Huntsville
- 03:40 P **#85 Strain Measurement during Plastic Deformation of Polycrystalline Materials under Electron Microscopy by Heaviside-DIC**
J Stinville, University of California Santa Barbara; F. Bourdin, Institut PPRIME; M. Echlin, University of California Santa Barbara; W. Lenthe, University of California Santa Barbara; F. Bridier, DCNS Research; J. Cormier, Institut PPRIME; P. Villechaise, Institut PPRIME; V. Valle, Institut PPRIME; T. Pollock, University of California Santa Barbara

- 04:00 P **#517 Ultra-Stretchable Interconnects for High-Density Stretchable Electronics – a multi-scale experimental analysis**
J Hoefnagels, Eindhoven University of Technology, the Netherlands; S. Shafqat, Eindhoven University of Technology, the Netherlands; S. Kleinendorst, Eindhoven University of Technology, the Netherlands; J. Neggers, Eindhoven University of Technology, the Netherlands; O. van der Sluis, Philips Research, Eindhoven, the Netherlands; A. Savov, Philips Research, Eindhoven, the Netherlands; S. Joshi, Philips Research, Eindhoven, the Netherlands; R. Dekker, Philips Research, Eindhoven, the Netherlands; M. Geers, Eindhoven University of Technology, the Netherlands
- 04:20 P **#693 Investigating Microscale Deformation across Large Sample Area via Multi-tile SEM-DIC**
Z Chen, University of California Santa Barbara; S. Daly, University of California Santa Barbara
- 04:40 P **#355 Void Initiation in Pure Metals During Ductile Rupture**
P Noell, SANDIA NATIONAL LABS; J. Carroll, SANDIA NATIONAL LABS; K. Hattar, SANDIA NATIONAL LABS; B. Clark, SANDIA NATIONAL LABS; B. Boyce, SANDIA NATIONAL LABS
- 05:00 P **#225 Developing Crystal Plasticity Models from the Basics—Single Crystal Experiments**
J Carroll, Sandia National Laboratories; H. Lim, Sandia National Laboratories; M. Lane, Sandia National Laboratories; C. Battaile, Sandia National Laboratories; B. Boyce, Sandia National Laboratories
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Thermomechanics and Infra-red Imaging

104. Thermographic Non Destructive Evaluation (NDE)

Organizer(s)

Chair Person T. Sakagami, Kobe University; R. Tighe, University of Waikato

- 03:20 P **#685 Effects of Surface Coatings on Pulse Thermography Inspections of Composite Materials**
G Olafsson, University of Southampton; R. Tighe, Defence Academy of the UK; J. Dulieu-Barton, University of Southampton
- 03:40 P **#322 Model Based Inversion for Pulse Thermography**
S Holland, Iowa State University
- 04:00 P **#425 Detection of Damage during Quasi-Static Loading of a Single Stringer Panel using Passive Thermography and Acoustic Emission**
J Zalameda, NASA Langley Research Center; W. Winfree, NASA Langley Research Center; M. Horne, National Institute of Aerospace
- 04:20 P **#703 Identification of Lightning Strike Damage using Pulse Thermography Through Integration of Thermal Data**
T Harrell, University of Southampton; J. Dulieu-Barton, University of Southampton; O. Thomsen, University of Southampton