Monday, August 8th, 2022

Opening Ceremony 8:30-9:30 AM (Ballroom: AB)	**Opening Ceremony** Jeongho Kim Conference Chairman Yoshikazu Shinohara Chairman of the International Advisory Board of FGM Michael DiDonato Business Development Manager, Innovation Partnership Building, UConn Tech Park Announcements
Plenary lecture 9:30-10:30 AM (Ballroom: AB)	**Additive Manufacturing of Functionally Graded Metallic Components** Rainer J Hebert Department of Materials Science and Engineering, Pratt &Whitney Additive Manufacturing Center, University of Connecticut **PL-1**
10:30-10:45 AM	Break

August 8th	Session 1A (Room #5)	Session 2A (Room #7)	Session 3A (Room #4)
Monday	**General FGM Topics** **Chair: O. Van der Biest**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering in honor of the NAE Recognition of Prof. Glaucio Paulino** **Chair: Alok Sutradhar**	**Multifunctional Surface Materials for Sustainable Infrastructure** **Chairs: Sung-Hwan Jang, Behzad Behnia, Huiming Yin**
10:45-11:05 AM	Functionally Graded Ceramics: a review* O. Van der Biest K U Leuven, Belgium	Computational Approaches for Architected Materials and Fracture in Solids* J.N. Reddy Texas A&M University	Recent Progress in Smart Skin for Structural Health Monitoring Yu-Jin, Jung, Seung-Jun, Lee, Sung-Hwan, Jang Hanyang University **OP-7**
11:05-11:25 AM	Functionally Graded Ceramics: a review (continued) **OP-1**	Computational Approaches for Architected Materials and Fracture in Solids (continued) **OP-4**	Improving the Thermo-mechanical Properties of Asphalt Binder by Use of Carbon Nanotubes Mehdi Zadshir, Huiming Yin Columbia University **OP-8**
11:25-11:45 AM	Bamboo A Wonderous of Nature from Nano to Culm* (INVITED) Nima Rahbar Worcester Polytechnic Institute **OP-2**	When Functionally Graded Materials Meet Strain Gradient Elasticity Theory Youn-Sha Chan University of Houston-Downtown **OP-5**	Designing Low-CO2 and Sustainable Concrete by Understanding Cement Hydration Mechanisms Hee Jeong Kim University of Arizona **OP-9**
11:45-12:05 PM	Random Nanocomposites with Functionally Graded Interfaces Shizhen Yin, Marek-Jerzy Pindera University of Virginia **OP-3**	Discrete Element Simulation of the Internal Structure of Asphalt Mixtures with High Content of Ground Tire Rubber Xiaodong Zhou, Zhanping You Michigan Technological University **OP-6**	Nonlinear Deformation of Large Building Integrated Photovoltaic Panels under Static Transverse Loading Linda Teka, Mehdi Zadshir, Huiming Yin Columbia University **OP-10**
12:05 – 1:00 PM	Lunch		

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August 8th	Session 1B (Room #5)	Session 2B (Room #7)	Session 3B (Room #4)
Monday	**General FGM Topics** **Chair: Marek-Jerzy Pindera**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Youn-Sha Chan**	**Multifunctional Surface Materials for Sustainable Infrastructure** **Chairs: Sung-Hwan Jang, Behzad Behnia, Huiming Yin**
1:00-1:20 PM	Living Functional Material Umnia Doha and <u>M Taher A Saif</u> University of Illinois at Urbana-Champaign **OP-11**	Predicting the Elasticity of Prediction of Lattice Metamaterials and Composites by the Singum Model Huiming Yin Columbia University **OP-15**	~~Self-Healing in Functionally Graded Road Materials~~ ~~Behzad Behnia, Peyman Askarinejad, Noah LaRussa-Trott~~ ~~Clarkson University~~ ~~OP-19~~
1:20-1:40 PM	Saint Venant's Torsion of Functionally Graded Prismatic Bars by the Finite-Volume Method Heze Chen, Jose Gomez, Marek-Jerzy Pindera University of Virginia **OP-12**	Optimal Microstructures and Bounds for Multifunctional Composites Liping Liu Rutgers University **OP-16**	A Simplified Continuum Particle Model Based on the Equation of State of Solids Junhe Cui, Huiming Yin Columbia University **OP-20**
1:40-2:00 PM	Incompatible Graded Elements for Analysis of Orthotropic Functionally Graded Materials Asmita Rokaya[1], Jeongho Kim[2] [1]Collins Aerospace [2]University of Connecticut **OP-13**	Optimal and Continuous Multilattice Embedding Emily D. Sanders[1], Anderson Pereira[2], Glaucio H. Paulino[3] [1]Georgia Institute of Technology [2]Pontifical Catholic University of Rio de Janeiro [3]Princeton University **OP-17**	Heating Performance of the Carbon Nanotube Reinforced Coating for De-icing Transport Road System Seung-Jun Lee, Yu-Jin Jung, Sung-Hwan Jang Hanyang university, South Korea **OP-21**
2:00-2:20 PM	Design and Finite Element Analysis of Electromechanical Performance for Piezo-Functionally Graded Composites Kohei Maruyama, Zhenjin Wang, Fumio Narita Tohoku University, Sendai, Japan **OP-14**	Gurson-Cohesive Model (GCM) for Ductile Fracture Simulation Kyoungsoo Park[1], Jihyuk Park[1], Soondo Kweon[2] [1]Yonsei University [2]Southern Illinois University **OP-18**	Design and Optimization of a Passive Heat Exchanger toward a Self-Adaptive Thermal Management System Junhe Cui, <u>Savannah Bennett</u>, Jason Lou, Huiming Yin Columbia University **OP-22**

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August 8th	Session 1B (Room #5)	Session 2B (Room #7)	Session 3B (Room #4)
2:20-2:40 PM	Energy-Harvesting Functionally Graded Piezoelectric Composite Material Improvement Via Manufacturing Process Optimization Zhenjin Wang, Fumio Narita, Kohei Maruyama Tohoku University, Sendai, Japan **OP-23**	Programming Arbitrary Mechanical Responses into Free-form Multimaterial Structures - A Topology Optimization Approach Weichen Li[1], Fengwen Wang[2], Ole Sigmund[2], and Xiaojia Shelly Zhang[1] [1]University of Illinois Urbana–Champaign, [2]Technical University of Denmark **OP-24**	
2:40-3:00 PM		Optimally-Tailored Spinodal Architected Materials for Multiscale Design and Manufacturing Fernando V. Senhora[1], Emily D. Sanders[1], Glaucio H. Paulino[2] [1]Georgia Institute of Technology [2]Princeton University **OP-25**	
3:00-3:20 PM		Virtual experiments on the thermomechanical behavior of a functional graded material with the iBEM Chunlin Wu[1], Liangliang Zhang[2], Junhe Cui[1], Huiming Yin[1] [1]Columbia University, New York City, [2]*China Agricultural University* **OP-26**	
3:20-5:00PM	**Poster Session (Ballroom D)**		
5:00-7:00 PM	**Banquet (Capital Room)**		

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Tuesday, August 9th, 2022

Plenary lecture 8:30-9:30 AM (Ballroom: AB)	Discrete complex system modeling: the role of granular mechanics in predicting failure and instability from the grain scale to the structural scale José E. Andrade George W. Housner Professor of Civil and Mechanical Engineering California Institute of Technology **PL-2**		
August 9th	Session 1C (Room #5)	Session 2C (Room #7)	Session 3C (Room #4)
Tuesday Sessions	**Multi-material, Heterogeneous Additive Printing of 3D Materials** **Chair: SeungYeon Kang**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Kyoungsoo Park**	**Structural Health Monitoring and its Applications** **Chair: Shinae Jang**
9:30-9:50 AM	Additive Manufacturing of Architected and Functional Materials Christopher M. Spadaccini Lawrence Livermore National Laboratory **OP-29**	Modular Construction of Energy and Water Independent Houses with Lightweight Concrete Panels Mehdi Zadshir, Huiming Yin Columbia University **OP-32**	AI-enabled Smartphone Sensing for Automated Road Condition Assessment* Hongki Jo[1] and Jong-Hyun Jeong[2] [1]University of Arizona [2]Palo Alto Research Center **OP-35**
9:50-10:10 AM	3D Printed Medical Devices for Point of Care Diagnostic Applications Changchun Liu University of Connecticut Health Center **OP-30**	Investigating the Effects of Circular Materials on Reflective Cracking in Asphalt Pavements Through Demonstration Projects and High-fidelity Fracture Modeling William G. Buttlar, Oliver Giraldo-Londoño, Punyaslok Rath, Rogelio Muñeton-Lopez, University of Missouri **OP-33**	Fiber-Reinforced High-Performance Concrete for Prestressed Concrete Crossties ChangHoon Lee, Archer J. Parker, <u>Moochul Shin</u> Western New England University **OP-36**
10:10-10:30 AM	Functionally Graded Struts for Maximized Stiffness, Strength, and Toughness in Cellular Solids Sarah Propst, Jochen Mueller Johns Hopkins University **OP-31**	Biomimetic 'torene' architecture leads to ultra-flexural stiffness in plate and shell structures Maziyar Bazmara[1], Roger Sauer[2], Ashutosh Agrawal[1] [1]University of Houston [2]RWTH Aachen University/Gdansk University of Technology **OP-34**	Crack Detection in a Residential Building Using Cost-Effective RFID Analysis Rinchen T Sherpa, Pierre Fils, Shinae Jang University of Connecticut **OP-37**

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10:30-10:45 AM	Break		
August 9th	Session 1D (Room #5)	Session 2D (Room #7)	Session 3D (Room #4)
Tuesday	**Multi-material, Heterogeneous Additive Printing of 3D Materials** **Chair: SeungYeon Kang**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Huiming Yin**	**Structural health monitoring and its applications & Hazard Vulnerability, Performance Assessment, and Risk Reduction of Coastal Structures for Resilient Communities Chair: Wei Zhang**
10:45-11:05 AM	National Science Foundation (NSF) SHAP3D Center and Multi-Material 3D Printing SeungYeon Kang, Shing-Yun Chang, Anson Ma University of Connecticut **OP-38**	3D printed Ultra-High Performance Strain Hardening Cementitious Composites (UHP-SHCC) Yan Sun, Ye Qian The University of Hong Kong **OP-41**	Wireless Joint Monitoring System for New England's Highway Bridges Shinae Jang, Pierredens Fils, Daisy Ren, Jiachen Wang, Song Han, and Ramesh B. Malla University of Connecticut **OP-45**
11:05-11:25 AM	3D Additive Manufacturing of the Multimaterial Diffractive Optical Element (DOEs) Using Femtosecond Direct Laser Writing (Fs-DLW) Saurabh Awasthi, Amir Charminar, SeungYeon Kang University of Connecticut **OP-39**	Multi-Scale Characterization of Alkali-Silica Reaction Gels Modified with Magnesium Nitrate Arkabrata Sinha, Dayou Luo, Jianqiang Wei University of Massachusetts Lowell **OP-42**	A Modified Sub-Assembly Approach for Hurricane Induced Wind-Surge-Wave Vulnerability Assessment of Low-rise Wood Buildings in Coastal Communities Zhixia Ding, Wei Zhang, William Hughes, Dongping Zhu University of Connecticut **OP-46**
11:25-11:45 AM	Multimaterial Material Additive Manufacturing by Integrating Digital Light Processing and Direct Ink Writing* Xirui Peng[1], Roach Devin[1,2], Xiao Kuang[1,3], Yue Liang[1] , H. Jerry Qi[1] [1]Georgia Institute of Technology [2]Sandia National Labs [3]Harvard Med. School & Brigham & Women's Hospital **OP-40**	Optimization of the Structure and Mechanical Properties of Geopolymers using Carbon-Based Nanomaterials Ange-Therese Akono Jiaxin Chen, Yunzhi Xu, Haklae Lee Northwestern University **OP-43**	A Risk-based Debris Prediction Framework for Riverine Bridges During Storms William Hughes, Wei Zhang University of Connecticut **OP-47**
11:45-12:05 PM		Quantification of Aleatoric Uncertainties in Topological Structures Zihan Wang, Hongyi Xu University of Connecticut **OP-44**	

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12:05 – 1:00 PM	Lunch		
August 9th	Session 1E (Room #5)	Session 2E (Room #7)	Session 3E (Room #4)
Tuesday	**Biomaterials and Interfaces** **Chair: Yu Zhang**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Kyoungsoo Park**	**Mesoscopic phenomena in functionally and compositionally graded materials** **Chair: Serge Nakhmanson**
1:00-1:20 PM	Load Bearing Capacity of Surface Modified Dental Ceramics Yu Zhang[1], Lahari Bhavishetty[2], Marina Kaizer[3], Sonaj Vardhaman[1] [1] University of Pennsylvania [2] New York University [3] Positivo University, Curitiba, Brazil **OP-48**	Under-water Suction Cups – How Octopus Uses Water as a Glue* Yue Wang[1], Zhengwei Li[2], Mohamed Elhebeary[2], René Hensel[1], Eduard Arzt[1] and <u>M Taher A Saif</u>[2] [1]NM -Leibniz Institute for New Materials, [2]University of Illinois at Urbana-Champaign	New Adventures in Mesoscale Modeling of Dielectrics: Connecting Patterns to Functionalities* Serge Nakhmanson University of Connecticut **OP-55**
1:20-1:40 PM	A Systematic Study on the Composition-Process-Properties Relationship of Dental Zirconia Materials Chek Hai Lim, Sonaj Vardhaman, Niyati Reddy, Yu Zhang University of Pennsylvania **OP-49**	Under-water Suction Cups – How Octopus Uses Water as a Glue (continued) **OP-52**	Electronic and Phonon Trends in Layered Oxides* Jing Kong[1], Serzat Safaltin[2], S. Pamir Alpay[2], Abhijit Pramanick[1], and <u>Sanjeev K. Nayak</u>[2] [1]City University of Hong Kong [2]University of Connecticut **OP-56**
1:40-2:00 PM	Wear and Fracture Resistance of Multilayer Zirconia Sonaj Vardhaman[1], Marcia Borba[2], DoKyung Kim[3], Yu Zhang[1] [1] University of Pennsylvania [2] University of Passo Fundo, Brazil. [3] KAIST, South Korea **OP-50**	Designing the Morphology of Separated Phases in Multicomponent Liquid Mixtures Andrej Košmrlj Princeton University **OP-53**	Surface Reactivity of Titanium Exposed to Atmosphere** Sanjubala Sahoo University of Connecticut **OP-57**
2:00-2:20 PM	Viscoelastic Analysis of Dental Crowns using Graded Finite Elements Sukirti Dhital[1], Jeongho Kim[1], Camila Rodrigues[2], Yu Zhang[3] [1]University of Connecticut [2] São Paulo State University [3] University of Pennsylvania **OP-51**	Snap-through Instability Enables Fast Soft Robots Based on Thermal Actuation Yong Zhu North Carolina State University **OP-54**	Harnessing Phase Transition as Means to Control Wave Propagation Osama R. Bilal University of Connecticut **OP-58**

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August 9th	Session 1E (Room #5)	Session 2E (Room #7)	Session 3E (Room #4)
Tuesday	**Manufacturing & Manufacturing Simulations** **Chair: Sukirt Dhital, David Manan**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Alok Sutradhar**	**Modeling of Multiscale and FGMs** **Chair: Glaucio H. Paulino** **& Emílio Carlos Nelli Silva**
2:20-2:40 PM	Manufacturing Simulations using Finite Element Analysis Jeongho Kim University of Connecticut **OP-59**	Stretchable Hybrid Response Pressure Sensors (SHRPS) Nanshu Lu The University of Texas at Austin **OP-62**	Topology Optimized Design of Functionally Graded Porous Structures for Low-energy Impact Applications Francisco J. Ramírez-Gil [1], Emilio C. N. Silva [2], Wilfredo Montelagre-Rubio [3] [1] Institución Universitaria Pascual Bravo [2] Universidade de São Paulo [3] Universidad Nacional de Colombia **OP-66**
2:40-3:00 PM	Optimization of Die-Quenching Process David Manan[1] & Jeongho Kim[2] [1] Standard Builders, Inc [2] University of Connecticut **OP-60**	Functional Shape Morphing Origami Evgueni T. Filipov University of Michigan **OP-63**	Effect of Mushroom Formation on Leakage of Optimized Labyrinth Seals André Dantas Freire, Shahin Ranjbarzadeh, Emilio Carlos Nelli Silva, Izabel Fernanda Machado University of Sao de Paulo **OP-67**
3:00-3:20 PM	Heat Treatment of AISI 9310 Asim Gautam, Kevin Sala, Dong Xu, Jiong Tang, Lesley Frame, Jeongho Kim University of Connecticut **OP-61**		A CFD investigation of erosion in optimized labyrinth seals André Dantas Freire, Shahin Ranjbarzadeh, Emilio Carlos Nelli Silva, Izabel Fernanda Machado University of Sao de Paulo **OP-68**
3:20-3:40 PM		Multimaterial Functional Structures by Grayscale Digital Light Processing 3D Printing Liang Yue[1], Xiao Kuang[1,2], S. Macrae Montgometry[1], H. Jerry Qi[1] [1] Georgia Institute of Technology [2] Harvard Medical School & Brigham and Women's Hospital **OP-65**	

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August 9th	Session 1E (Room #5)	Session 2E (Ballroom AB)
Tuesday	**Design of Architected Materials, Metamaterials & Programmable Structures** **Chair: Alok Sutradha, Hongyi Xu**	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Kyoungsoo Park**
3:40-4:00 PM	Topology Optimization-Based Design of Bio-inspired Architected Materials Alok Sutradhar and Fariha Haque Ohio State University **OP-69**	Some Rational Designs of Transformable Surfaces Tian Chen University of Houston **OP-71**
4:00-4:20 PM	Generative Design of Stochasticity Graded Structures Leidong Xu, Hongyi Xu University of Connecticut **OP-70**	Enhanced Virtual Element Method for Computational Mechanics Heng Chi, Lucia Mirabella Siemens Technology **OP-72**
4:20-4:40 PM		Discovery of Multi-Functional Polyimides through High-Throughput Screening using Explainable Machine Learning Lei Tao[1], Jinlong He[1], Vikas Varshney[2], Wei Chen[3], <u>Ying Li</u>[1] [1]University of Connecticut [2]Air Force Research Laboratory, [3]Northwestern University **OP-73**
4:40-5:00 PM		Limiting the first principal stress in topology optimization: A local & consistent approach Oliver Giraldo-Londoño[1], Jonathan B. Russ[2], Miguel A. Aguiló[3,4], Glaucio H. Paulino[2] [1]Univ. of Missouri,[2]Princeton University [3]Sandia Nat. Laboratories [4]Morphorm LLC **OP-74**
5:00-5:20 PM		3D Re-Entrant Truss Lattice Composite 2-Phase Materials for Civil Infrastructure Thomas Vitalis[1], George Tzortzinis[2], Andrew Gross[3], Simos Gerasimidis[1] [1] University of Massachusetts Amherst [2] Technische Universität Dresden, Germany, [3]University of South Carolina **OP-75**

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Wednesday, August 10th, 2022

Plenary lecture 8:30-9:30 AM (Ballroom: AB)	**Optimization of carrier transfer mechanism of thermoelectric FeSi$_2$ for wide temperature applications** Y. Shinohara Center for Green Research on Energy and Environmental Materials (GREEN) National Institute for Materials Science, Tsukuba, Japan **PL-3**
August 10th	Session 1G (Room #7)
Wednesday	**Optimized Multi-Scale & Multifunctional Materials and Structures in Engineering** **Chair: Youn-Sha Chan**
9:30-9:50 AM	Multi-objective Multi-physics Topology Optimization of Electromagnetic Waveguide Structures Fariha Haque and Alok Sutradhar The Ohio State University **OP-76**
9:50-10:10 AM	Dynamic Fracture Simulation of Composite Materials Using Virtual Element Method and Adaptive Polygonal Element Splitting Chulmin Kweon[1], Kyoungsoo Park[2] [1]Columbia University, [2]Yonsei University **OP-77**
10:10-10:30 AM	On Topology Optimization Methods Considering Gradient-Enhanced Damage Jonathan B. Russ, Glaucio H. Paulino Princeton University **OP-78**
10:30-10:45 AM	Break
11:00-11:30 AM	**Closing Ceremony**
11:30-12:30 PM	Lunch
12:30-02:30 PM	**UConn IPB Tour** (159 Discovery Dr, Storrs, CT 06269)

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