



Society of Engineering Science 52nd Annual Technical Meeting



Texas A&M University
Memorial Student Center
October 26-28, 2015

www.ses-2015.org



ENGINEERING
TEXAS A&M UNIVERSITY



Conference Matrix at a Glance

Rooms	2401	2402	2403	2404	2405	2406A	2406B	2500	2501	2502	2503	2504	2505	1402	1403
M1	1a: Mechanobiology & Cell Mechanics	24a: Modeling Failure & Damage in Solid Materials	10a: First principles methods in the mechanics of materials	8a: Nanomaterials	3a: Analytical and Computational Modeling in Mechanobiology	4a: Professor Huijian Gao/Prager Medal Symposium	18a: Musculoskeletal Soft Tissue Biomechanics	36a: Mechanics in Energy Storage and Conversion	37a: Engineering Science of Architected Materials	15a: Mechanical Characterization of Soft Materials	19a: Mechanics and Physics of Soft Materials	5a: Mechanical behavior of nanostructured materials	11a: Mechanics of 2D Materials	21a: Fracture Mechanics	25a: Design, Mechanics & Control - Tensile Engineering
M2	1b: Mechanobiology & Cell Mechanics	24b: Modeling Failure & Damage in Solid Materials	8b: Nanomaterials	10b: First principles methods in the mechanics of materials	3b: Analytical and Computational Modeling in Mechanobiology	4b: Professor Huijian Gao/Prager Medal Symposium	18b: Musculoskeletal Soft Tissue Biomechanics	36b: Mechanics in Energy Storage and Conversion	37b: Engineering Science of Architected Materials	15b: Mechanical Characterization of Soft Materials	19b: Mechanics and Physics of Soft Materials	5b: Mechanical behavior of nanostructured materials	11b: Mechanics of Nanoscale phenomena - Mechanics of 2D Materials	21b: Fracture Mechanics	25b: Design, Mechanics & Control - Tensile Engineering
M3	1c: Mechanobiology & Cell Mechanics	10c: First principles methods in the mechanics of materials	9a: Computational Materials with emphasis on phase transformation	24c: Modeling Failure & Damage in Solid Materials	3c: Analytical and Computational Modeling in Mechanobiology	4c: Professor Huijian Gao/Prager Medal Symposium	14a: Soft Tissue Mechanics: Theoretical, Experimental results and Application	36c: Mechanics in Energy Storage and Conversion	37c: Engineering Science of Architected Materials	15c: Mechanical Characterization of Soft Materials	19c: Mechanics and Physics of Soft Materials	5c: Mechanical behavior of nanostructured materials	11c: Mechanics of 2D Materials	21c: Fracture Mechanics	5j: Mechanical behavior of nanostructured materials
M4	1d: Mechanobiology & Cell Mechanics	24d: Mechanics of Fracture & Damage in Solid Materials	9b: Computational Materials with emphasis on phase transformation	10d: First principles methods in the mechanics of materials	3d: Analytical and Computational Modeling in Mechanobiology	4d: Professor Huijian Gao/Prager Medal Symposium	14b: Soft Tissue Mechanics: Theoretical, Experimental results and Application	36d: Mechanics in Energy Storage and Conversion	37d: Engineering Science of Architected Materials	15d: Mechanical Characterization of Soft Materials	19d: Mechanics and Physics of Soft Materials	5d: Mechanical behavior of nanostructured materials	11d: Mechanics of 2D Materials	21d: Fracture Mechanics	29b: Engineering Education
T1	22: Strengthening and Toughening Polymers	1e: Mechanobiology & Cell Mechanics	27a: Dynamics, Estimation & Control of Aerospace Systems	14c: Soft Tissues Mechanics: Theoretical, Experimental results and Application	3e: Analytical and Computational Modeling in Mechanobiology	5i: Mechanical behavior of nanostructured materials	32a: Professor Mary Boyce/Engineering Science Medal Symposium	36e: Mechanics in Energy Storage and Conversion	37e: Engineering Science of Architected Materials	16a: Soft Mechanical Structures	19e: Mechanics and Physics of Soft Materials	5e: Mechanical behavior of nanostructured materials	11e: Mechanics of 2D Materials	21e: Fracture Mechanics	31a: Engineering Education and Innovation
T2	12a: Behavior & Mechanics of Active Materials & Structures	36f: Mechanics in Energy Storage and Conversion	27b: Dynamics, Estimation & Control of Aerospace Systems	14d: Soft Tissues Mechanics: Theoretical, Experimental results and Application	7a: Mechanics and Characterization of Micro/Nanoporous Materials and Applications in Energy and Environments	4e: Professor Huijian Gao/Prager Medal Symposium	32b: Professor Mary Boyce/Engineering Science Medal Symposium	39a: Fluid Hyperelasticity	37f: Engineering Science of Architected Materials	16b: Soft Mechanical Structures	19f: Mechanics and Physics of Soft Materials	5f: Mechanical behavior of nanostructured materials	11f: Mechanics of 2D Materials	21f: Fracture Mechanics	31b: Engineering Education and Innovation
T3	12b: Behavior & Mechanics of Active Materials & Structures	17a: Soft Tissues Mechanics: Theoretical, Experimental results and Application	27c: Dynamics, Estimation & Control of Aerospace Systems	36g: Mechanics in Energy Storage and Conversion	7b: Mechanics and Characterization of Micro/Nanoporous Materials and Applications in Energy and Environments	4f: Professor Huijian Gao/Prager Medal Symposium	32c: Professor Mary Boyce/Engineering Science Medal Symposium	39b: Fluid Hyperelasticity	28a: Advances in Continuum Computational Engineering Science - J.N. Reddy	20a: Ductile Fracture	19g: Mechanics and Physics of Soft Materials	5g: Mechanical behavior of nanostructured materials	6a: Small Scale Plasticity	21g: Fracture Mechanics	16c: Soft Mechanical Structures
T4	12c: Behavior & Mechanics of Active Materials & Structures	49: Professor Huijian Gao/Prager Medal Symposium	27d: Dynamics, Estimation & Control of Aerospace Systems	20b: Ductile Fracture	7c: Mechanics and Characterization of Micro/Nanoporous Materials and Applications in Energy and Environments	33a: Advances in Modeling of Manufacturing Process Mechanism	32d: Professor Mary Boyce/Engineering Science Medal Symposium	39c: Hyperelasticity	28b: Advances in Continuum Computational Engineering Science - J.N. Reddy	16d: Mechanics and Physics of Soft Materials	19h: Mechanics and Physics of Soft Materials	5h: Mechanical behavior of nanostructured materials	6b: Small Scale Plasticity	21h: Fracture Mechanics	17b: Soft Tissues Mechanics: Theoretical, Experimental results and Application
W1	29a: Panel - Women in Engineering Science	34a: Thermal & Mechanical Stability of Irradiated Metals & Metal Alloys	27e: Dynamics, Estimation & Control of Aerospace Systems	20c: Ductile Fracture	7d: Mechanics and Characterization of Micro/Nanoporous Materials and Applications in Energy and Environments	33b: Advances in Modeling of Manufacturing Process Mechanisms	23a: Friction, Fracture and Damage	38a: Multi-Scale Modeling of Fluid Dynamics	35a: Mechanics of Instability & Interfacial Adhesion in Bio-Compatible Electronics	12d: Behavior & Mechanics of Active Materials & Structures	2a: Multi-Scale Mechanics of Microtubule/Motor-Protein Assemblies	4h: Professor Huijian Gao/Prager Medal Symposium	6c: Small Scale Plasticity	13a: Micromechanics and Multifunctional Nano composites	17c: Multi-Scale Mechanics of particulate media
W2		34b: Thermal & Mechanical Stability of Irradiated Metals & Metal Alloys	27f: Dynamics, Estimation & Control of Aerospace Systems	17d: Multi-Scale Mechanics of particulate media	7e: Mechanics and Characterization of Micro/Nanoporous Materials and Applications in Energy and Environments	33c: Advances in Modeling of Manufacturing Process Mechanisms	23b: Friction, Fracture and Damage	38b: Multi-Scale Modeling of Fluid Dynamics	35b: Mechanics of Instability & Interfacial Adhesion in Bio-Compatible Electronics	30: Technology-Enabled Engineering Education	2b: Multi-Scale Mechanics of Microtubule/Motor-Protein Assemblies	26: Design, Mechanics & Control - Topology Optimization in Materials and Structures Design	6d: Small Scale Plasticity	13b: Micromechanics and Multifunctional Nano composites	20d: Ductile Fracture

Architected Materials & Manufacturing
Fluid Mechanics

Engineering Education
Mechanics of Soft Materials
Light Weight Structures

Mechanobiology
Mechanics of Nanoscale phenomena
Mechanics of Fracture and Damage



SUNDAY, OCTOBER 25, 2015	
4:00 p.m. – 7:00 p.m.	Student/General Poster Competition Setup (2400)
5:00 p.m. – 7:00 p.m.	Registration & Opening Reception (University Club – Rudder Tower 11th floor)
MONDAY, OCTOBER 26, 2015	
7:00 a.m. – 5:30 p.m.	Registration Open (2300 Prefunction Area)
7:00 a.m.	Continental Breakfast (2300 Prefunction Area)
7:30 a.m.–8:00 a.m.	General Assembly – Members Meeting (2507)
8:00 a.m. – 8:30 a.m.	Opening Ceremony (2300)
8:30 a.m. – 9:30 a.m.	Prager Medalist Plenary Presentation – Dr. Huajian Gao (2300)
9:30 a.m. – 9:40 a.m.	Transition
9:40 a.m. – 11:20 a.m.	1st set of Parallel Sessions (M1)
11:20 a.m. – 11:40 a.m.	Break (2400)
11:40 a.m. – 1:20 p.m.	2nd set of Parallel Sessions (M2)
1:20 p.m. – 2:20 p.m.	Lunch (2300)
2:20 p.m. – 2:30 p.m.	Transition
2:30 p.m. – 4:10 p.m.	3rd set of Parallel Sessions (M3)
4:10 p.m. – 4:30 p.m.	Break (2400)
4:30 p.m. – 6:10 p.m.	4th set of Parallel Sessions (M4)
6:30 p.m. – 7:30 p.m.	Student Social (2400-refreshments included)
TUESDAY, OCTOBER 27, 2015	
7:00 a.m. – 1:00 p.m.	Registration Open (2300 Prefunction Area)
7:00 a.m.	Continental Breakfast (2300 Prefunction Area)
8:00 a.m. – 9:00 a.m.	Engineering Science Medalist Plenary Presentation – Dr. Mary Boyce (2300)
9:00 a.m. – 9:10 a.m.	Transition
9:10 a.m. – 10:50 a.m.	1st set of Parallel Sessions (T1)
10:50 a.m. – 11:10 a.m.	Break (2400)
11:10 a.m. – 12:50 p.m.	2nd set of Parallel Sessions (T2)
12:50 p.m. – 1:50 p.m.	Lunch (2300)
1:50 p.m. – 2:00 p.m.	Transition
2:00 p.m. – 3:40 p.m.	3rd set of Parallel Sessions (T3)
3:40 p.m. – 4:00 p.m.	Break (2400)
4:00 p.m. – 5:40 p.m.	4th set of Parallel Sessions (T4)
5:00 p.m. – 7:00 p.m.	Poster Presentation and Judging (2400)
6:30 p.m. – 7:30 p.m.	Reception (2300 Prefunction Area)
7:30 p.m. – 10:00 p.m.	Banquet Dinner & Medalist Awards (2300)
WEDNESDAY, OCTOBER 28, 2015	
7:00 a.m.	Continental Breakfast (2300 Prefunction Area)
7:00 a.m. – 9:00 a.m.	Registration Open (2300 Prefunction Area)
8:00 a.m. – 9:00 a.m.	Taylor Medalist Plenary – Dr. Gary Leal (2300)
9:00 a.m. – 9:10 a.m.	Transition
9:10 a.m. – 10:50 a.m.	1st set of Parallel Sessions (W1)
10:50 a.m. – 11:10 a.m.	Break (2330)
11:10 a.m. – 12:50 p.m.	2nd set of Parallel Sessions (W2)
12:50 p.m. – 2:00 p.m.	Grand Finale Lunch & Poster Awards (2300)

Howdy!

On behalf of Texas A&M University, the local organizing committee, the symposia organizers and the Society of Engineering Science officers and board of directors, welcome to Texas A&M and the 52nd Annual Technical Meeting of the Society of Engineering Science. We look forward to this annual meeting continuing the tradition of providing an outstanding forum for exchanging ideas and insights in all fields of engineering science.

This year more than 600 abstracts will be presented in a broad range of focus areas including: mechanobiology, mechanics of nanoscale phenomena, soft materials, mechanics of fracture and damage, engineering education, architected materials, manufacturing and fluid mechanics. We hope that you will find this meeting both intellectually stimulating and personally enjoyable.

This year's medalists will be recognized at the conference banquet: Mary Boyce, recipient of the 2015 Engineering Science Medal; L. Gary Leal, recipient of the 2015 Taylor Medal; Huajian Gao, 2015 recipient of the Prager Medal; and Liping Liu, recipient of the 2015 Young Investigator Medal.

We thank our sponsors, the symposia organizers, and all of you for making this meeting a success. We are honored and pleased to be your hosts and hope that you enjoy your time at Texas A&M.

Sincerely,



Dimitris C. Lagoudas
Senior Associate Dean for Research
Associate Vice Chancellor for Engineering
Research
Deputy Agency Director,
Texas A&M Engineering Experiment Station



Alan Needleman
Professor, Department of Materials Science
and Engineering
TEES Distinguished Research Professor



Conference Matrix at a Glance.....	ii
Overall Conference Schedule at a Glance	iii
Welcome	iv
Forward and Acknowledgments	3
Planning Committees.....	4
Symposia Organizers	4
Social Events.....	6
Poster Competition Finalists	7
Notes	8
Practical Guide	9
2015 Medalists	10
Symposia Monday:	
M1 9:40 a.m.–11:20 a.m.	14
M2 11:40 a.m.–1:20 p.m.	22
M3 2:30 p.m.–4:10 p.m.	30
M4 4:30 p.m.–6:10 p.m.	38
Symposia: Tuesday	
T1 9:10 a.m.–10:50 a.m.	46
T2 11:10 a.m.–12:50 p.m.	54
T3 2:00 p.m.–3:40 p.m.	62
T4 4:00 p.m.–5:40 p.m.	70
Symposia: Wednesday	
W1 9:10 a.m.–10:50 a.m.	78
W2 11:10 a.m.–12:50 p.m.	86
City Map	94
Campus Map.....	95
Facilities Map	96
Restaurants with Private Space.....	98
Area Attractions	99



THE SOCIETY OF ENGINEERING SCIENCE (SES) TECHNICAL MEETING is held annually to foster and promote the exchange of ideas and information among the various disciplines of engineering and the fields of physics, chemistry, mathematics, bioengineering, and related scientific and engineering fields. The site for the 2015 SES 52nd Annual Technical Meeting will be on the Texas A&M University campus in College Station Texas at the Memorial Student Center (MSC). The MSC is a prominent symbol of the University's strong history and tradition. It stands as a tribute to Aggies who have given their lives for our country. April 21, 2012, after undergoing an extensive renovation and expansion, the MSC reopened making it one of the premier student unions in the country.



The Flag Room in the Memorial Student Center is also known as the "Living Room of Texas A&M."

Today the MSC houses three art galleries, includes multiple dining facilities, state-of-the-art meeting and ballroom areas, the Barnes & Noble Bookstore at Texas A&M University and The Flag Room. The Flag Room, also known as the "Living Room of Texas A&M," is a place where students enjoy the welcoming tones of the baby grand piano and meet, lounge, study and sleep among the columns, globes, cowhide benches and chandeliers within an open atmosphere.

Since the MSC is dedicated to all Aggies who have died in any war, past, present or future, it is a tradition to remove your hat before entering the building and not walk on the grass surrounding it. The Hall of Honor on the north side of the building provides a fitting tribute to those Aggies who died while serving our country. Here visitors can see the faces and read the stories of the seven Aggies who received the Medal of Honor, the nation's highest military award.

We acknowledge support of Texas A&M University Dwight Look College of Engineering, the Department of Aerospace Engineering, the Department of Material Science & Engineering and Texas A&M Engineering Experiment Station (TEES). In addition we acknowledge the National Science Foundation (NSF) for offering support for the student poster competition. We thank several hotels around town for providing special group rates all the way until the first day of the conference. We also thank i2i Technologies for the contribution of live streaming and recording services of the plenary sessions, banquet dinner and grand finale lunch.

Finally, this conference would not have been possible without the outstanding organizational contributions by Kristle Comley, Hanna Prichard, and Miriam Brown, the MSC Conference Services, the Bryan/College Station Visitors Bureau and the many staff and students who served as volunteers.



CONFERENCE CO-CHAIRS:



Lagoudas



Needleman

Dimitris C. Lagoudas,
Senior Associate Dean for Research
Associate Vice Chancellor for Engineering Research
Deputy Agency Director, Texas A&M Engineering Experiment Station

Alan Needleman
Professor, Department of Materials Science and Engineering
TEES Distinguished Research Professor

TECHNICAL PROGRAM CO-CHAIRS:

Amine Benzerga, Aerospace Engineering, Texas A&M University
Dwight Look College of Engineering

John Criscione, Biomechanical Engineering, Texas A&M University
Dwight Look College of Engineering

Arun R. Srinivasa, Mechanical Engineering, Texas A&M
University Dwight Look College of Engineering

POSTER COMPETITION CO-CHAIRS:

Zach Grasley, Civil Engineering, Texas A&M University,
Dwight Look College of Engineering

Zoya Heidari, Petroleum and Geosystems Engineering,
University of Texas at Austin, Cockrell School of Engineering
University Dwight Look College of Engineering

Anastasia Muliani, Mechanical Engineering, Texas A&M
University Dwight Look College of Engineering

FOCUS AREA ORGANIZERS:

MECHANOBIOLOGY

Bin Chen & Taher Saif

MECHANICS OF NANOSCALE PHENOMENA & MULTI-FUNCTIONAL MATERIALS

Haiyan Wang & Xinghang Zhang

MECHANICS OF SOFT MATERIALS

John Criscione & Ellen Arruda

MECHANICS OF FRACTURE AND DAMAGE

Amine Benzerga & Jay Walton

LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS, AND CONTROL

Richard Malak & Zach Grasley

ENGINEERING EDUCATION

P.K. Imbrie, Sheldon Wang & Marvin Adams

ARCHITECTURED MATERIALS & MANUFACTURING

Arun R. Srinivasa & Ibrahim Karaman

FLUID MECHANICS

Sharath Girimaji & Rodney Bowersox

LOCAL ORGANIZING COMMITTEE:

Marvin Adams

Ibrahim Karaman

Haiyan Wang

David Allen

Richard Malak

Sharath Girimaji

Jay Walton

PROGRAM COORDINATOR:

Kristle Comley

Email: ses2015@tamu.edu

Website: www.ses-2015.org



Symposia Organizers

- | | | |
|---|--|--|
| ■ Mechanobiology | ■ Engineering Education | ■ Architected Materials & Manufacturing |
| ■ Mechanics of Nanoscale phenomena | ■ Mechanics of Soft Materials | ■ Fluid Mechanics |
| ■ Mechanics of Fracture and Damage | ■ Light Weight Structures | |

Symposium Title	Organizers	Email
1 Mechanobiology & Cell Mechanics	Bin Chen, Baohua Ji, Taher Saif and Christian Franck	chenb6@zju.edu.cn; bhji@bit.edu.cn; saif@illinois.edu; franck@brown.edu
2 Multi-Scale Mechanics of Microtubule/Motor-Protein Assemblies	Michael Shelley and Dan Needleman	shelley@cims.nyu.edu; dan.needleman@gmail.com
3 Analytical and Computational Modeling in Mechanobiology	Daniel N. Riahi	d-riahi@illinois.edu
4 Professor Huajian Gao/Prager Medal Symposium	Markus Buehler and Yujie Wei	mbuehler@mit.edu; yujie_wei@lnm.imech.ac.cn
5 Mechanical behavior of Nanostructured Materials	Xinghang Zhang, Frederic Sansoz, Xiaodong (Chris) Li, Nan Li and Haiyan Wang	zhangx@tamu.edu; frederic.sansoz@uvm.edu; xl3p@virginia.edu; nanli@lanl.gov; wangh@ece.tamu.edu
6 Small Scale Plasticity	Christian Niordson and Lucia Nicola	cn@mek.dtu.dk; l.nicola@tudelft.nl
7 Mechanics and Characterization of Micro/Nanoporous Materials and Applications in Energy and Environments	Baoxing Xu and Weiyi Lu	bx4c@virginia.edu; wylu@egr.msu.edu
8 Nanomaterials	Julia Greer, Seok-Woo Lee and Dennis Kochmann	jrgreer@caltech.edu; kochmann@caltech.edu; swlee@engr.uconn.edu
9 Computational Materials with emphasis on phase transformation	Raymundo Arroyave and Theocharis Baxevanis	rarroyave@tamu.edu; theocharis@tamu.edu
10 First Principles Methods in the Mechanics of Materials	Phanish Suryanarayana and Amartya Banerjee	phanish.suryanarayana@ce.gatech.edu; amartya.s.banerjee@gmail.com
11 Mechanics of 2D Materials	Ellad B. Tadmor and Ilia Nikiforov	tadmor@aem.umn.edu; nikif002@umn.edu
12 Behavior and Mechanics of Active Materials and Structures	Dimitris Lagoudas, Ibrahim Karaman, Theocharis Baxevanis and George Chatzigeorgiou	lagoudas@tamu.edu; theocharis@tamu.edu; georges.chatzigeorgiou@ensam.eu; karaman@tamu.edu
13 Micromechanics & Multifunctional Nano composites	Gary Seidel	gdseidel@vt.edu
14 Soft Tissues Mechanics: Theoretical Considerations, Experimental Results and Application	Michael Sacks, Alan Freed and John Criscione	jccriscione@tamu.edu; msacks35@gmail.com; afreed@tamu.edu
15 Mechanical Characterization of Soft Materials	Yuhang Hu and Shengqiang Cai	shqcai@ucsd.edu; yuhanghu@gmail.com
16 Soft Mechanical Structures	Perdro Reis, Katia Bertoldi and James Hanna	preis@mit.edu; bertoldi@seas.harvard.edu; hannaj@vt.edu
17 Multi-Scale Mechanics of particulate media	David Henann, Jose Andrade, Rich Regueiro and Ken Kamrin	david_henann@brown.edu; jandrade@caltech.edu; kkamrin@mit.edu; richard.regueiro@colorado.edu
18 Musculoskeletal Soft Tissue Biomechanics	Ellen Arruda	arruda@umich.edu



■ Mechanobiology
 ■ Mechanics of Nanoscale phenomena
 ■ Mechanics of Fracture and Damage

■ Engineering Education
 ■ Mechanics of Soft Materials
 ■ Light Weight Structures

■ Architected Materials & Manufacturing
 ■ Fluid Mechanics

	Symposium Title	Organizers	Email
19	Mechanics and Physics of Soft Materials	Oscar Lopez-Pamies, Xuanhe Zhao, Yuhang Hu and Stephan Rudykh	pamies@illinois.edu; zhaox@mit.edu; yuhanghu@illinois.edu; rudykh@technion.ac.il
20	Ductile Fracture	Amine Benzerga and Dirk Mohr	benzerga@tamu.edu
21	Fracture Mechanics	K. Ravi-Chandar	ravi@utexas.edu
22	Strengthening and Toughening Polymers	Erik Van der Giessen and K. Ravi Chandar	E.van.der.Giessen@rug.nl; ravi@utexas.edu
23	Friction, Fracture and Damage	Ahmed Ettaf Elbanna	elbanna2@illinois.edu
24	Modeling Failure & Damage in Solid Materials	Christian Linder, Adrian Lew and Natarajan Sukumar	linder@stanford.edu; lewa@stanford.edu; nsukumar@ucdavis.edu
25	Tensegrity Engineering	Bob Skelton	bobskelton@ucsd.edu
26	Topology Optimization in Materials and Structures Design	Ahmed Ettaf Elbanna and Kai James	elbanna2@illinois.edu; kaijames@illinois.edu
27	Dynamics, Estimation & Control of Aerospace Systems	John Junkins, Rao Vadali, John Hurtado, Daniele Mortari, John Valasek, Dave Hyland, Raktin Chattacharya, Suman Chakravorty, Moble Benedict	junkins@tamu.edu
28	Advances in Continuum Mechanics and Computational Engineering Science - J.N. Reddy	Samit Roy, Dimitris Lagoudas, and J.N. Reddy	sroy@eng.ua.edu; jnreddy@tamu.edu
29	Engineering Education	P.K. Imbrie and Teri Reed	imbrie@tamu.edu; terireed@tamu.edu
30	Technology-Enabled Engineering Education	Yakut Gazi	yakut@tamu.edu
31	Engineering Education and Innovation	Sheldon Wang and Dale McDonald	sheldon.wang@mwsu.edu; dale.mcdonald@mwsu.edu
32	Professor Mary Boyce/Engineering Science Medal Symposium	Jian Cao, Ellen Arruda, and Jerry Qi	qih@me.gatech.edu; arruda@umich.edu; jcao@northwestern.edu
33	Advances in Modeling of Manufacturing Process Mechanisms	Satish Bukkapatnam, Jyhwen Wang, and Arun R. Srinivasa	satish@tamu.edu; asrinivasa@tamu.edu; jwang@tamu.edu
34	Thermal & Mechanical Stability of Irradiated Metals and Metal Alloys	Daniel Bufford and Khalid Hatter	khattar@sandia.gov; dcbuffo@sandia.gov
35	Mechanics of Instability & Interfacial Adhesion in Bio-Compartible Electronics	Shuodao Wang, Jianliang Xiao, Jizhou Song and Yonggang Huang	shuodao.wang@okstate.edu; Jianliang.Xiao@Colorado.edu; jzsong@zju.edu.cn; y-huang@northwestern.edu
36	Mechanics in Energy Storage and Conversion	Kejie Zhao	kjzhao@purdue.edu
37	Engineering Science of Architected Materials	Francois Barthelat and Thomas Siegmund	francois.barthelat@mcgill.ca; Siegmund@purdue.edu
38	Multi-Scale Modeling of Fluid Dynamics	Sharath Girimaji	girimaji@tamu.edu
39	Hypersonic Aerothermochemistry Professor Gary Leal/Taylor Medal Symposium	Rodney Bowersox J.D. Goddard	bowersox@tamu.edu



SUNDAY, OCTOBER 25

Welcoming Reception/ Registration

Rudder Tower

Join us in The University Club on the 11th floor of Rudder Tower for a meet & greet after stopping by the registration desk on the 1st floor of Rudder Tower to complete your on-site check in/registration.

Light refreshments will be provided. This is a come and go event, and will run the course of 2 hours during registration between 5 p.m.–7 p.m.

MONDAY–WEDNESDAY, OCTOBER 26–28

Breakfast and Lunch

*Bethancourt Ballroom (2300),
Memorial Student Center*

Join other conference guests daily for a continental breakfast and a buffet lunch. This is a great networking opportunity to interact and create connections with other conference attendees.

Continental breakfast will be available daily in the Bethancourt Ballroom from 7 a.m.–8 a.m.

Lunch will also be available daily in the Bethancourt Ballroom. Wednesday's Grand Finale Lunch will feature a special guest.



TUESDAY, OCTOBER 27

Student Poster Competition

Gates Ballroom (room 2400), Memorial Student Center

View the student posters and mingle with other conference guests while posters are being judged from 5 p.m.–7 p.m.

Reception

Bethancourt Ballroom Prefunction Area (room 2300)

The reception will be from 6:30 p.m.–7:30 p.m. with passed appetizers and a cash bar. A three piece jazz band will accompany the event throughout dinner.

Banquet

Bethancourt Ballroom, Memorial Student Center (room 2300)

This event is available to conference guests who have pre-registered and purchased a banquet ticket. If you are interested in attending the banquet, please visit the registration desk for more information. SES medalist will be announced and recognized. This event will be recorded.

The Banquet dinner will be from 7:30 p.m.–10 p.m. Buses will be available to transport you back to your hotel at the conclusion of the event.

Student Social

Gates Ballroom (room 2400), Memorial Student Center

All students attending the conference are invited to gather in the Gates Ballroom from 6:30 p.m.–7:30 p.m. for a meet and greet with other students from across the nation. Get to know your peers and start new friendships. Light refreshments will be available and then take your new friends out to see the College Station sites. Don't miss out on the fun!

WEDNESDAY, OCTOBER 28

“Meet the Astronauts” Grand Finale Plated Lunch & Student Poster Awards

*Bethancourt Ballroom (2300),
Memorial Student Center*

Join us and noted Astronauts Bonnie Dunbar and Greg Chamitoff for a grand finale plated lunch. Here you can meet and greet with America's Hero's.

Student poster competition awards will also be handed out with the help of our astronauts. You don't want to miss this!



***Congratulations to our finalists for the
2015 SES Annual Technical Meeting Student Poster Competition.***

Nazanin Afsar Kazerooni, Texas A&M University
Mark Wierzbicki, Texas A&M University
Sayyeda Marziya Hasan, Texas A&M University
Jayavel Arumugam, Texas A&M University
Yue Mei, Texas A&M University
Hunter Storaci, Texas A&M University
Benjamin Marchi, University of Michigan
Sina Askarinejad, Worcester Polytechnic Institute
Ruike Zhao, Brown UNIV
Linlin Cao, Rice University
Pavel Galich, Technion-Israel Institute of Technology
Craig Hamel, New Jersey Institute of Technology
Arnab Chanda, University of Alabama
Valeria Vasconcellos, Johns Hopkins University
Payam Poorsolhjoui, University of Kansas
Satyaki Bhattacharjee, University of Notre Dame
Kun Wang, Columbia University
Vasav Dubey, Texas A&M University
Chien-Fan Chen, Texas A&M University
Daniel Juarez Robles, Texas A&M University
Ethan Kamphaus, Texas A&M University
Zhixiao Liu, Texas A&M University
Aashutosh Mistry, Texas A&M University
Naveen Thomas, Texas A&M University
Jin Li, Texas A&M University
Rajasekhar Tripuraneni, NJIT
Brooke Sarley, University of Central Florida
Unchalisa Taetrageool, Virginia Polytechnic Institute and State University
Joanna Tsenn, California Institute of Technology
Emma Lejeune, Stanford University
Salvador Moreno, UT- Dallas
Omid Saber, Texas A&M University
Shamik Basu, Texas A&M University
Mohamed Hamza, Johns Hopkins University
Devendra Verma, Purdue University
Brandon Talamini, Massachusetts Institute of Technology
Andreas Krischok, Stanford University
Maurizio M. Chiaramonte, Stanford University
Yang Zhang, Purdue University
Joshua Hogancamp, Texas A&M University

Lei Xu, Texas A&M University
Mahdi Mohajer, Texas A&M University
Sameer Jape, Texas A&M University
Kendal Ezell, Texas A&M University
Mohammad Mashhadian, Texas A&M University
Harsh Tamakuwala, Texas A&M University
Sichuang Xue, Texas A&M University
Zhe Fan, Texas A&M University
Parisa Khodabakhshi, Texas A&M University
Heejeong Kim, Korea Advanced Institute of Science and Technology (KAIST)
Kevin (Jiacheng) Huang, University of Texas at Dallas
Engin Cem Sengezer (Krishna Talamadupula), Virginia Tech
Priyal Shah, Virginia Tech
Lucas R. Meza, California Institute of Technology
Weibing Chen, Rice University
Dingyi Sun, California Institute of Technology
Rohit Sarkar, Arizona State University
Vinamra Agrawal, California Institute of Technology
Shuozhi Xu, Georgia Institute of Technology
Naveen Prakash, Virginia Tech
Swarnava Ghosh, Georgia Institute of Technology
Arunabha Roy, Iowa State University
Robyn Woodlands, Texas A&M University
Julie Read, Texas A&M University
Benjamin Morrell, Texas A&M University
Derek Kuether, Texas A&M University
Jean-Baptiste Bouquet, Georgia Institute of Technology
Balachandar Guduri, Virginia Tech,
Davood Mousanezhad, Northeastern University
Arka Chattopadhyay, Virginia Tech
Tanaz Rahimzadeh, University of Michigan
Zesheng Zhang, University of Nebraska,
Alireza Hooshanginejad, Texas A&M University
Travis Kocian, Texas A&M University
Yun Chen, Texas A&M University
Syeda Rahman, Texas A&M University
Fend Xu, Texas A&M University
Daniel McBride, Texas A&M University
Alfredo Costilla-Reyes, Texas A&M University
Surupa Shaw, Texas A&M University



Notes

[illegible]



PRINTING, COPYING AND FAXING

COPY CORNER AT MSC

(979) 691-2679

Providing faculty, staff and students with b/w and color prints, copying, binding, laminating, scanning and faxing services. Conveniently located in the southwest corner of the MSC, adjacent to Chase Bank.

BANKS AND CREDIT UNION LOCATED NEAR THE TEXAS A&M CAMPUS

Chase Bank and ATM

Located on the MSC first level near the Respect Entrance, the bank features a storefront ATM that is available for use after lobby hours.

Wells Fargo ATM

Located in the first level Respect Lounge area.

Wells Fargo Bank, Northgate Branch

Full Service Retail Office
321 University Drive
College Station, TX 77840
800-432-1000

Bank of America

615 University Dr E (Between MacArthur St and Tarrow St)
College Station, TX 77840

A Wells Fargo ATM is located in the first level Respect Lounge area.

AIRPORT

College Station Easterwood Airport (CLL)
1 McKenzie Terminal Blvd #112, College Station, TX 77845
(979) 775-9900

EMERGENCIES

Campus Police..... (979) 845-2345
College Station Fire/Police/Ambulance..... 911
College Station Medical Center..... (979) 764-5100
Scott & White Clinic (University Drive) (979) 207-3300
St. Joseph's Regional Health Center (979) 776-3777
The Physicians Center Hospital..... (979) 731-3100
Brazos Valley Urgent Care..... (979) 764-2882

LIVE STREAMING AND RECORDINGS

We thank i2i Technologies for sponsoring the live streaming and recording of the plenary sessions and the award ceremonies.



Access to live streaming and recording of the plenary sessions and award ceremonies:

<http://tx.ag/SES2015live>

Texas A&M University VISITOR WIRELESS ACCESS



1. Connect to the "Tamu-Visitor" Wireless network on your device.
2. Open your Web Browser. (Safari, Chrome, Firefox, etc...)
3. This will open a login portal.
4. Click on "Create Account".
5. Provide your Name, Email address, and cell phone number.
6. You will receive both a text and an email with the 24 hour access information.
7. Enter your email address as used for step 5, and the 24 hour password that was sent to your phone.
8. If you have problems connecting, call Texas A&M Information Technology Help Desk Central at 979.845.8300 or email helpdesk@tamu.edu.

HOTEL ACCOMMODATIONS

Country Inn Suites (979) 693-7777
Courtyard by Marriott (979) 695-8111
Hilton College Station
& Conference Center (979) 694-4903
Hilton Garden Inn College Station (979) 703-7919
TownePlace Suites by Marriott..... (979) 260-8500
Hampton Inn (979) 846-0184
Vineyard Court: Designer Suites Hotel (979) 693-1220
La Quinta Inn College Station (979) 696-7777

TRANSPORTATION BETWEEN VENUES

Texas A&M buses will provide free transportation between the conference hotels above and the Memorial Student Center (MSC) for conference attendees. The buses will leave on 10-15 minute intervals Monday and Tuesday between 6:30 a.m.–8:30am and 5:45 p.m.–8:00 p.m. Tuesday night of the Banquet dinner buses will also run from 9:30 p.m.–10:30 p.m. On Wednesday buses will run between 6:30 a.m.–8:30 a.m. and 1:00 p.m.–3:00 p.m. Buses will pick-up/drop off only at the main hotel entrances.

Some hotels have free shuttle services. Please check with the front desk to determine availability. Additionally, one van will be available on an as needed basis for those requiring special transportation between the hotels and the MSC. Please contact registration desk for assistance.

LIMOUSINE/TAXI SERVICE

Aggieland Limousine..... (979) 777-8700
Traditions Limousine..... (979) 587-1727
Gold Star Taxi (979) 776-5566
Maroon Cab (979) 695-9999
AA Aggieland Cab (979) 693-5532

LOST AND FOUND

Maintained by the MSC Hospitality student organization which is located in the MSC Student Programs Office on the second level. Lost an item? Lost items are logged as soon as they are received.

To see which items have been turned into lost & found, visit <http://msclostfound.tamu.edu/returnity>.



HUAIJIAN GAO *2015 Prager Medalist*



HUAIJIAN GAO received his bachelor's degree from Xian Jiaotong University of China in 1982, and his masters and doctoral degrees in engineering science from Harvard University in 1984 and 1988, respectively. He served on the faculty of Stanford University between 1988 and 2002, and as professor and director at the Max Planck Institute for Metals Research in Germany between 2001 and 2006. He is now Walter H. Annenberg University Professor of Brown University.

Professor Gao has a background in engineering science and applied mechanics. His current research interests are focused on nanomechanics of engineering and biological systems, including mechanical properties and behaviors of bone, gecko, cell, protein, DNA, carbon nanotubes, thin films and nanocrystalline materials. He has more than 25 years of research experience with more than 300 publications.



**MARY BOYCE*****2015 Engineering Science Medalist***

MARY C. BOYCE is dean of engineering and Morris A. and Alma Schapiro Professor at Columbia University's Fu Foundation School of Engineering and Applied Science. Prior to joining Columbia, Dean Boyce served on the faculty of Massachusetts Institute of Technology (MIT) for over 25 years, leading the Mechanical Engineering Department from 2008 to 2013. Her research focuses on materials and mechanics, particularly in the areas of molecular and nanomechanics of polymers and soft composites, both those that are man-made and those formed naturally. Her leadership in the field of the mechanics of materials has expanded understanding of the interplay between micro-geometry and the inherent physical behavior of a material, which has led to innovative hybrid material designs with novel properties. Models and results from her group have the potential to influence a range of industrial and academic fields from polymer processing to composite material design, tire mechanics, protective armor designs, and transformative meta-material design. She is well known for her collaborative work and leadership in overseeing research teams that

bring together faculty from different departments and universities and is the author of more than 150 archival journal publications with her group.

Dean Boyce has been widely recognized for her scholarly achievements, including election as a fellow of the American Society of Mechanical Engineers, the American Academy of Arts and Sciences, and the National Academy of Engineering. She also has been honored for her teaching at MIT, where she was named a MacVicar Faculty Fellow and received the Joseph Henry Keenan Innovation in Undergraduate Education Award. Dean Boyce earned her bachelor's degree in engineering science and mechanics from Virginia Tech, and her masters and doctoral degrees in mechanical engineering from MIT.





L. GARY LEAL *2015 Taylor Medalist*



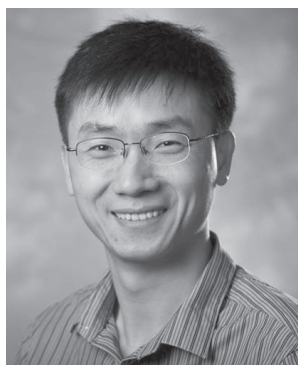
L. GARY LEAL is the Warren & Katharine Schlinger Professor of Chemical Engineering at the University of California, Santa Barbara. He is known for his research work in the dynamics of complex fluids.

Leal received his bachelor's degree from the University of Washington in 1965, masters degree from the Stanford University in 1968, and doctoral degree from the Stanford University in 1969; all in chemical engineering.

Leal began his academic career in 1970 as an assistant professor in chemical engineering at California Institute of Technology. He became full professor in 1978. During 1986-1989, he was Chevron Distinguished Professor of Chemical Engineering. In 1989, Leal joined University of California, Santa Barbara as professor and chair in the Department of Chemical Engineering.

Leal's research covers a wide range of topics in fluid dynamics, including dynamics of complex fluids, such as polymeric liquids, emulsions, polymer blends, and liquid crystalline polymers. He also works on large-scale computer simulation of complex fluid flows. Leal and his coworkers made pioneering contributions to the study of drop deformation under different flow conditions. They have developed a scheme based on a finite difference approximation of the equations of motion, applied on a boundary-fitted orthogonal curvilinear coordinate system, inside and outside the drop.[3][4] Leal has published more than 250 papers on fluid dynamics. He has directed 55 doctoral theses in various topics in fluid dynamics. Several of his students have gone on to become professors at prestigious universities including Howard Stone who is currently at Princeton and Gerald Fuller at Stanford. Leal comes from a long line of researchers that can be traced back from mentor to mentor all the way to Sir Isaac Newton.



**LIPING LIU*****2015 Young Investigator Medalist***

LIPING LIU is an associate professor of Mathematics and Mechanical Aerospace Engineering at Rutgers University, the State University of New Jersey. He is known for his research work in micromechanics and multifunctional composite materials. Liu received his bachelor's degree from the Beijing (or Peking) University in 2000 and doctoral degree from the University of Minnesota, Twin Cities in 2006 in aerospace engineering. He was a postdoctoral fellow in Division of Engineering and Applied Science at California Institute of Technology in 2006-2008. He began his academic career in 2008 as an assistant professor in Mechanical Engineering at the University of Houston. He moved to a joint position in math and MAE at Rutgers in 2012 and became associate professor in 2014.

Liu's research focuses on mathematics and mechanics of materials. Liu and his coworkers made interesting contributions to the generalizations of ellipsoids in the study of Eshelby inclusion problems under different boundary conditions, rigorous optimal bounds for multiphase composite materials, and modeling of magneto-electro-elastic materials. They have developed some useful techniques to construct analytically solvable microstructures and variational formulations for solving multiscale-multiphysics problems.





M1	MECHANOBIOLOGY: MECHANOBIOLOGY & CELL MECHANICS (1a)
ROOM 2401	SESSION CHAIRS: Bin Chen, Baohua Ji, Christian Franck and Taher Saif

- | | |
|------------------------|--|
| 9:40 a.m.– 10:20 a.m. | Local Pinching Controls Adhesion-Dependent Mechanosensing-Keynote
Bo Yang, National University of Singapore; Zi Zhao Lieu, National University of Singapore;
Haguy Wolfenson, Columbia University; Feroz M. Hameed, National University of Singapore;
Alexander D. Bershadsky, Weizmann Institute of Science; and Michael P. Sheetz, Columbia University |
| 10:20 a.m.– 10:40 a.m. | Cell Mechanosensing in Cell-Substrate Interaction on Patterned Substrate
Baohua Ji, Beijing Institute of Technology |
| 10:40 a.m.–11:00 a.m. | Mechanical Stress Directs Metastatic-Like Cell Migration and Malignant Transformation in Cancerous Microtissues
Sulin Zhang and Yao Zhang, Pennsylvania State University |
| 11:00 a.m.–11:20 a.m. | Mechanics Model of Cell Reorientation Under Cyclic Stretches
Bin Chen, Zhejiang University, Hangzhou |

M1	MECHANICS OF FRACTURE AND DAMAGE; MODELING FAILURE & DAMAGE IN SOLID MATERIALS (24a)
ROOM 2402	SESSION CHAIR: Christian Linder

- | | |
|------------------------|--|
| 9:40 a.m.– 10:00 a.m. | Modeling And Numerical Simulation of Tearing Brittle Thin Sheets
Bin Li, Daniel Millan and Marino Arroyo, Universitat Politècnica de Catalunya-Barcelona Tech |
| 10:00 a.m.– 10:20 a.m. | Metadynamics Simulation of Avalanches in Compressed Amorphous Solids
Penghui Cao, Michael P. Short, and Sidney Yip, Massachusetts Institute of Technology |
| 10:20 a.m.– 10:40 a.m. | An Efficient Methodology for Uncertainty Propagation Across Multiple Length Scales for Structural reliability predictions in engineering applications
J.M. Emery, R.V. Field Jr., J.D. Carroll and J.E. Bishop, Sandia National Laboratories |
| 10:40 a.m.–11:00 a.m. | The Alternating Schwarz Method for Concurrent Multiscale in Finite Deformation Solid Mechanics
Alejandro Mota and Irina K. Tezaur, Sandia National Laboratories |
| 11:00 a.m.–11:20 a.m. | Modeling Strong Discontinuities Without Element-partitioning in the Extended Finite Element Method
E. B. Chin, N. Sukumar, University of California; and J. B. Lasserre, University of Toulouse |

**M1**
**MECHANICS OF NANOSCALE PHENOMENA:
FIRST PRINCIPLES METHODS IN THE MECHANICS OF MATERIALS (10a)**
ROOM 2403**SESSION CHAIR: Phanish Suryanarayana**

- 9:40 a.m.– 10:20 a.m. **Finite Elements for Accurate, Large-scale Quantum Mechanical Materials Calculations: From Classical to Enriched to Discontinuous-Keynote**
John E. Pask, Lawrence Livermore National Laboratory
- 10:20 a.m.– 10:40 a.m. **Large-scale Real Space Electronic-structure Calculations Using Adaptive Finite-element Discretization**
Phani Motamarri and Vikram Gavini, University of Michigan
- 10:40 a.m.–11:00 a.m. **DGDF: Massively Parallel Method for Large Scale Density Functional Theory Calculations**
Wei Hua, Lin Linba and Chao Yang, University of California Berkeley
- 11:00 a.m.–11:20 a.m. **Understanding Grain Boundary Embrittlement and Its Correlation with Polycrystalline Tungsten Fracture**
Hongsuk Lee and Vikas Tomar, Purdue University

M1
MECHANICS OF NANOSCALE PHENOMENA: NANOMATERIALS (8a)
ROOM 2404**SESSION CHAIRS: Dennis Kochmann and Seok-Woo Lee**

- 9:40 a.m.– 10:00 a.m. **The Structural and Mechanical Properties of the Zeta Ta₄C₃ Phase: A Bulk Nanostructure Ceramic**
Christopher Weinberger, Hang Yu, Gregory Thompson, and Bradford Schultz, University of Alabama; HeDong Lee, UES Inc., Dayton Ohio; and Lawrence Matson, Air Force Research Laboratories
- 10:00 a.m.– 10:20 a.m. **Brittle Intergranular Fracture Frustrated by intermittent Dislocation Emission**
Guoqiang Xu and Michael J. Demkowicz, Massachusetts Institute of Technology
- 10:20 a.m.– 10:40 a.m. **Size Effect Suppresses Brittle Failure in Hollow Cu₆₀Zr₄₀ Metallic Glass Nanolattices Deformed at Cryogenic Temperatures**
Seok-Woo Lee, California Institute of Technology; Mehdi J. Zadeh, Institute of High Performance Computing; David Z. Chen, California Institute of Technology; Yong-Wei Zhang, Institute of High Performance Computing; and Julia R. Greer, California Institute of Technology
- 10:40 a.m.–11:00 a.m. **Concurrent and Sequential Multiple Length/Time Scale Modeling: From Molecular Dynamics to Continuum Mechanics**
James D. Lee and Zhen Zhang, George Washington University; Jiaoyan Li, Brown University



M1

MECHANOBIOLOGY: ANALYTICAL AND COMPUTATIONAL MODELING IN MECHANOBIOLOGY (3a)

ROOM 2405

SESSION CHAIR: Wonmuk Hwang

- 9:40 a.m.– 10:20 a.m. **Virtual Treatment of Basilar Aneurysms Using Shape Memory Polymer Foam-Keynote**
Jason M. Ortega, J. Hartman, J.N. Rodriguez, John Horn, and Duncan J. Maitland, Texas A&M University
- 10:20 a.m.– 10:40 a.m. **Computational Modeling of Thrombus Development in Shape Memory Polymer Foam-Treated Aneurysms**
John Horn, Jason M. Ortega, Duncan J. Maitland, Texas A&M University
- 10:40 a.m.–11:00 a.m. **Principal Axis Based Analysis of DNA Elasticity**
Wonmuk Hwang and Xiaojing Teng, Texas A&M University
- 11:00 a.m.–11:20 a.m. **The Hearing Mechanism on the Verge of Instability–An Atomistics and Continuum Perspective**
Qian Deng and Pradeep Sharma, University of Houston

M1

**MECHANICS OF NANOSCALE PHENOMENA:
PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4a)**

ROOM 2406A

SESSION CHAIR: Vicky Nguyen

- 9:40 a.m.– 10:00 a.m. **From Waves in Blood Vessels to Power Extraction from the Ocean**
Chiang C. Mei, Massachusetts Institute of Technology
- 10:00 a.m.– 10:20 a.m. **Mechanical Properties of Metallic Glasses**
Yi Li, National University of Singapore
- 10:20 a.m.– 10:40 a.m. **Nonlocal effects in Yield of Granular Materials**
David Henann, Brown University; Ken Kamrin, Massachusetts Institute of Technology
- 10:40 a.m.–11:20 a.m. **Brownian Motion of Molecular Probes in Supercooled Liquids-Keynote**
Qihan Liu, Shicheng Huang and Zhigang Suo, Harvard University

**M1**
**MECHANICS OF SOFT MATERIALS:
MUSCULOSKELETAL SOFT TISSUE BIOMECHANICS (18a)**
ROOM 2406B**SESSION CHAIR: Ellen Arruda**

- 9:40 a.m.– 10:20 a.m. **Mechanical Characterization of the Extracellular Matrix During Musculoskeletal Development-Keynote**
Sarah Calve, Purdue University
- 10:20 a.m.– 10:40 a.m. **Image-Based Deformation Mapping and Inverse Modeling for Soft Musculoskeletal Tissues and Hydrogels**
Luyao Cai and Corey P. Neu, Purdue University
- 10:40 a.m.–11:00 a.m. **Estimation of Fully Three-Dimensional Properties of Passive Soft Tissues: A Coupled Inverse Model-Experimental Study**
Reza Avazmohammadi, John Lesicko and Michael Sacks, The University of Texas at Austin
- 11:00 a.m.–11:20 a.m. **Fragility, Robustness and Optimality in Bone: The Role of Disorder and Entropy Maximization at Different Scales**
Ahmed Elbanna, University of Illinois Urbana Champaign

M1
**ARCHITECTURED MATERIALS & MANUFACTURING:
MECHANICS IN ENERGY STORAGE AND CONVERSION (36a)**
ROOM 2500**SESSION CHAIRS: Kejie Zhao and Sulin Zhang**

- 9:40 a.m.– 10:20 a.m. **Surface-coated and Porous Silicon as Durable High-rate Anodes for Lithium Ion Batteries -Keynote**
Sulin Zhang, The Pennsylvania State University
- 10:20 a.m.– 10:40 a.m. **Experimental Measurement of Stress-Potential Coupling in Lithiated Silicon**
Michael J. Chon, Allan F. Bower and Pradeep R. Guduru, School of Engineering, Brown University
- 10:40 a.m.–11:00 a.m. **Diffusion-deformation Theory for Amorphous Silicon Anodes: The Role of Plastic Deformation on Electrochemical Performance**
Claudio V. Di Leo, Elisha Rejovitzky and Lallit Anand, Massachusetts Institute of Technology
- 11:00 a.m.–11:20 a.m. **Stress Evolution in lithium-ion composite electrodes during Electrochemical Cycling and Resulting internal pressures on the cell casing**
Siva P.V. Nadimpalli, New Jersey Institute of Technology; Vijay A. Sethuraman; Pradeep R. Guduru, Brown University; Daniel P. Abraham, Argonne National Laboratory



M1

**ARCHITECTURED MATERIALS & MANUFACTURING:
ENGINEERING SCIENCE OF ARCHITECTURED MATERIALS (37a)**

ROOM 2501

SESSION CHAIR: Thomas Siegmund

- 9:40 a.m.– 10:00 a.m. **Architected Materials in Engineering and in Nature**
Francois Barthelat, McGill University
- 10:00 a.m.– 10:20 a.m. **Mechanical Characterization of 3D Hierarchical (Fractal) Nanolattices**
Lucas R. Meza, Alex J. Zelhofer, Arturo J. Mateos, Dennis M. Kochmann and Julia R. Greer, California Institute of Technology; Nigel A. Clarke, University of Waterloo
- 10:20 a.m.– 10:40 a.m. **The Design and Performance of a Cellular Material that Achieves Theoretical Bounds for Stiffness**
Jonathan Berger, University of California, Santa Barbara
- 10:40 a.m.–11:00 a.m. **Modeling Hierarchical Lattice Stiffness Scaling and Effect of Beam Waviness**
Alex J. Zelhofer, Dennis M. Kochmann, California Institute of Technology
- 11:00 a.m.–11:20 a.m. **Micromorphic Model Derived Based Upon Granular Micromechanics**
Anil Misra and Payam Poorolajlou, University of Kansas

M1

**MECHANICS OF SOFT MATERIALS:
MECHANICAL CHARACTERIZATION OF SOFT MATERIALS (15a)**

ROOM 2502

SESSION CHAIR: Yuhang Hu

- 9:40 a.m.– 10:20 a.m. **Cavitation and Puncture: Characterizing the Mechanics of Soft Materials-Keynote**
Alfred J. Crosby, University of Massachusetts Amherst
- 10:20 a.m.– 10:40 a.m. **Measurement of Concentration-Dependent Diffusivity of Water in Hydrogels Using Magnetic Resonance Imaging**
Howon Lee, Rutgers University; Jiaxi Lu, University of Illinois Urbana Champaign; John Georgiadis, Illinois Institute of Technology; and Nicholas X. Fang, Massachusetts Institute of Technology
- 10:40 a.m.–11:00 a.m. **Characterization of Viscoelastic Rubberlike Materials**
Shuolun Wang and Shawn A. Chester, New Jersey Institute of Technology; Leslie Lamberson, Drexel University
- 11:00 a.m.–11:20 a.m. **Characterization of Mechanical Properties for Soft Tissues and Synthesis Replacements**
Jack E. Norfleet, Yangyang Qiao, Yueqian Jia, Brian Goldiez, Alain Kassab and Yuanli Bai, University of Central Florida

**M1**
**MECHANICS OF SOFT MATERIALS:
MECHANICS AND PHYSICS OF SOFT MATERIALS (19a)**
ROOM 2503**SESSION CHAIRS: Changyong Cao and Pavel Galich**

- 9:40 a.m.– 10:00 a.m. **4D Printing of Stretchable Supercapacitors from Graphene Flakes**
Changyong Cao, Yihao Zhou, Jeffrey T. Glass and Aaron D. Franklin, Duke University
- 10:00 a.m.– 10:20 a.m. **Magnetoelectric Soft Materials for Wireless Energy Transfer**
Zeinab Alameh, University of Houston
- 10:20 a.m.– 10:40 a.m. **Characterization of Plasma Deposited Hydrocarbon Diffusion Barriers for Embolic Foam Devices**
Landon D. Nash, Kendal P. Ezell, Duncan J. Maitland, Texas A&M University
- 10:40 a.m.–11:00 a.m. **Tunable Lotus-Leaf and Rose-Petal Effects via Graphene Paper Origami**
Changyong Cao, Yaying Feng, Jianfeng Zang, Gabriel P. Lopez, Xuanhe Zhao, Duke University
- 11:00 a.m.–11:20 a.m. **Manipulating elastic wave propagation in soft media by deformation**
Pavel I. Galich, and Stephan Rudykh, Israel Institute of Technology

M1
**MECHANICS OF NANOSCALE PHENOMENA:
MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5a)**
ROOM 2504**SESSION CHAIRS: Xinghang Zhang and Dan Gianola**

- 9:40 a.m.– 10:00 a.m. **Thermomechanical Behavior of Molded Metallic Glass Nanowires**
Daniel J. Magagnosc and Daniel S. Gianola, University of Pennsylvania;
Wen Chen, Jan Schroers, Yale University; and Golden Kumar, Texas Tech University
- 10:00 a.m.– 10:20 a.m. **Brittle to Ductile transition in amorphous materials: An effective temperature approach**
Ahmed Elbanna and Xiao Ma, University of Illinois Urbana Champaign
- 10:20 a.m.– 10:40 a.m. **Structural Heterogeneity Induced Plasticity in Bulk Metallic Glasses**
Weidong Li, Yanfei Gao, University of Tennessee; Hongbin Bei, Oak Ridge National Laboratory
- 10:40 a.m.–11:00 a.m. **Mechanical Behaviors of Cu-based Metallic Multilayers with Crystalline/Amorphous Layer Interfaces**
Zhe Fan, Sichuang Xue, Kaiyuan Yu, Haiyan Wang and Xinghang Zhang, Texas A&M University
- 11:00 a.m.–11:20 a.m. **Mechanical Behavior and Deformation Mechanism of Nanostructured Metallic Glass Nanopillars**
Sara Adibi, University of Houston



M1	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS OF 2D MATERIALS (11a)
ROOM 2505	SESSION CHAIRS: Pilar Ariza

- | | |
|------------------------|--|
| 9:40 a.m.– 10:20 a.m. | Two-Dimensional Materials: Mechanical Stiffness, Strength and Reliability-Keynote
Jeffrey W. Kysar, Columbia University |
| 10:20 a.m.– 10:40 a.m. | Elastic Properties of Graphene Sheets Using MM3 Potential
Sandeep Singh and B. P. Patel-Indian Institute of Technology Delhi |
| 10:40 a.m.–11:00 a.m. | The Strength of Pristine and Polycrystalline Graphene Governed by Crystalline Orientations and GB Structures
Yujie Wei, Chinese Academy of Sciences |
| 11:00 a.m.–11:20 a.m. | Stability of Structured Grain Boundaries in Graphene
M.P. Ariza and F. Arca, Universidad de Sevilla; J.P. Mendez and Micheal Ortiz, California Institute of Technology |

M1	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21a)
ROOM 1402	SESSION CHAIR: Laurent Ponson

- | | |
|------------------------|--|
| 9:40 a.m.– 10:00 a.m. | Size Effect in Paris Law for Quasibrittle Materials: Modified Theory, Experiments, and Modeling
Kedar Kirane and Zdenek P. Bažant, Northwestern University |
| 10:00 a.m.– 10:20 a.m. | Probabilistic Modeling of Failure of Polycrystalline MEMS Structures
Jia-Liang Lea and Zhiren Zhu, University of Minnesota; Roberto Ballarini, University of Houston |
| 10:20 a.m.– 10:40 a.m. | Intermittency and Localization in Quasi-brittle Failure of Heterogeneous Materials: A Numerical and Analytical Study
E. Berthier, D. Kondo, and L. Ponson, Institut Jean le Rond d'Alembert; V. Demery, Paris Tech |
| 10:40 a.m.–11:00 a.m. | A Probabilistic Crack Band Model for Quasibrittle Fracture
Jia-Liang Le, University of Minnesota; Jan Elias, Brno University of Technology |
| 11:00 a.m.–11:20 a.m. | Distributed Damage Creates Flaw Tolerance
Roberto Ballarini, University of Houston |

**M1**
**LIGHT WEIGHT STRUCTURES:
DESIGN, MECHANICS & CONTROL – TENSEGRITY ENGINEERING (25a)**
ROOM 1403**SESSION CHAIR: Robert E. Skelton**

- | | |
|------------------------|--|
| 9:40 a.m.– 10:20 a.m. | Tensegrity as a Paradigm to Integrate Structure and Control Design-Keynote
Robert E. Skelton, University of California, San Diego |
| 10:20 a.m.– 10:40 a.m. | Shape Control of Tensegrity Structures
James Hendrickson, Texas A&M University |
| 10:40 a.m.–11:00 a.m. | Robust Resonance Entrainment of Tension-Driven Elastic Flapper
Tetsuya Iwasaki, University of California, Los Angeles |
| 11:00 a.m.–11:20 a.m. | Tensegrity Structures Exploiting High-performance Polymer Muscles
Yonas Tadesse, Monica Jung de Andrade, Lianjun Wu and Ray H. Baughman,
University of Texas at Dallas Richardson |



M2	MECHANOBIOLOGY: MECHANOBIOLOGY & CELL MECHANICS (1b)
ROOM 2401	SESSION CHAIR: Baohua Ji

11:40 a.m.–Noon	Characterizing the Strain-driven Injury Evolution of Neurons Under Compressive Loading Eyal Bar-Kochba, Mark Scimone, Jonathan B. Estrada, Jennet Toyjanova and Christian Franck, Brown University
Noon–12:20 p.m.	Mean Deformation Metrics for Auantifying 3D Cell-matrix Interactions in the Absence of Material Properties David A. Stout, Eyal Bar-Kochba, Jonathan B. Estrada, Jennet Toyjanova, Haneesh Kesari, Jonathan S. Reichner and Christian Franck, Brown University
12:20 p.m.–12:40 p.m.	Mechanical Origins of Brain Torsion in Early Chick Embryo Zi Chen, Qiaohang Guo, Eric Dai, Nickolas Forsch and Larry A. Taber, Washington University
12:40 p.m.–1:00 p.m.	The Micro-geometric Environment of Mitral Valve Interstitial Cells Under Physiological Loading Salma Ayoub, Amir H. Khalighi, Chung-Hao Lee and Michael S. Sacks, The University of Texas at Austin
1:00 p.m.– 1:20 p.m.	Micromenchanical Characterization of a 3D Collagen Matrix Mohak Patel, Jennet Toyjanova, Jonathan Estrada and Christian Franck, Brown University

M2	MECHANICS OF FRACTURE AND DAMAGE: MODELING FAILURE & DAMAGE IN SOLID MATERIALS (24b)
ROOM 2402	SESSION CHAIR: Christian Linder

11:40 a.m.–Noon	Three Dimensional Fracture Growth as a Standard Dissipative System: From General Theorems to 3D Crack Tracking Algorithms Alberto Salvadori, University of Notre Dame; F. Fantoni, Universita degli studi di Brescia; and P. Wawrzynek, Fracture Analysis Consultant, Inc.
Noon–12:20 p.m.	A Phase-field Model for Fluid Driven Crack Propagation in Poroelastic Solids Zachary Wilson, The University of Texas at Austin
12:20 p.m.–12:40 p.m.	High-temperature Fatigue Crack Growth in a Visco-plastic Strain Gradient Material Model P. Seiler, T. Siegmund, Y. Zhang, V. Tomar, Purdue University; J. Kruzic, Oregon State University
12:40 p.m.–1:00 p.m.	Verified and Validated High Performance Simulation of Multi-scale Failure in Adhesively Bonded Joints Matthew Mosby and Karel Matouš, University of Notre Dame
1:00 p.m.– 1:20 p.m.	h-Auxiliary Map Methods: Higher Order Solutions of Crack Problems and Beyond M.M. Chiaramonte and A.J. Lew, Stanford University; and Y. Shen, University of Michigan-Shanghai Jiao Tong University Joint Institute



M2	MECHANICS OF NANOSCALE PHENOMENA: NANOMATERIALS (8b)
ROOM 2403	SESSION CHAIR: Seok-Woo Lee

11:40 a.m.–Noon	Entropic Interactions Between Fluctuating Twin Boundaries Dengke Chen, Department of Mechanical Engineering, University of Houston; and Yashashree Kulkarni, Department of Mechanical Engineering, University of Houston
Noon–12:20 p.m.	Effects of Aging and Cyclic Heat Treatment on Room Temperature Superelasticity in Oligocrystalline Fe-Mn-Al-Ni Shape Memory Wires H. Ozcan, J. Ma and I. Karaman, Texas A&M University
12:20 p.m.–12:40 p.m.	Using Nanoscale Thermocapillary Flows to Create Arrays of Purely Semiconducting Single-walled Carbon Nanotubes Jizhou Song, Chaofeng Lu, Yuhang Li and Yonggang Huang, Northwestern University
12:40 p.m.–1:00 p.m.	Computational Modeling of Flexoelectric Effect in Solids Sheng Mao, University of Pennsylvania; Prashant K. Purohit, University of Pennsylvania; Nikolaos Aravas, University of Pennsylvania
1:00 p.m.– 1:20 p.m.	Morphogenesis of Calcium-Silicate-Hydrates Rouzbeh Shahsavari, Rice University

M2	MECHANICS OF NANOSCALE PHENOMENA: FIRST PRINCIPLES METHODS IN THE MECHANICS OF MATERIALS (10b)
ROOM 2404	SESSION CHAIR: Martya Banerjee

11:40 a.m.–12:20 p.m.	First Principles Study of Defects in Magnesium Alloys: Case Studies Using MacroDFT-Keynote Mauricio Ponga, Dingyi Sun, Michael Ortiz and Kaushik Bhattacharya, California Institute of Technology
12:20 p.m.–12:40 p.m.	A Systematic Framework for Predicting Twinning in Hexagonal Close-packed Materials Dingyi Sun, California Institute of Technology
12:40 p.m.–1:00 p.m.	Effects of Solute on $\langle a \rangle$ and $\langle c+a \rangle$ Type Dislocation in n Ti Ab-initio Study M.A. Bhatia and K.N. Solanki, Arizona State University
1:00 p.m.– 1:20 p.m.	Investigation of Deformation Twins Using a DFT-informed 3D Phase Field Dislocation Dynamics (Pfdd) Model Abigail Hunter and Irene J. Beyerlein, Los Alamos National Laboratory



Symposia: Monday | M2 11:40 a.m.–1:20 p.m.

M2	MECHANOBIOLOGY: ANALYTICAL AND COMPUTATIONAL MODELING IN MECHANOBIOLOGY (3b)
ROOM 2405	SESSION CHAIR: Roland Kaunas

11:40 a.m.–12:20 p.m.	On the Development of an Anatomical, Structural, and Biomechanical Integrated Model of the Mitral Valve-Keynote Michael Sacks, The University of Texas at Austin
12:20 p.m.–12:40 p.m.	The In Situ Effects of Statins on Aortic Valve Interstitial Cell Physical State Rachel M. Buchanan, Michael S. Sacks, The University of Texas at Austin
12:40 p.m.–1:00 p.m.	Stretch-induced Cell Reorganization Depends on Matrix Stiffness Candice Haase, Abhishek Tondon and Roland Kaunas, Texas A&M University
1:00 p.m.– 1:20 p.m.	Modeling Two-phase Blood Flow in Catheterized Elastic Artery with Atherosclerosis Brian Williams and Taher Saif, University of Illinois Urbana Champaign

M2	MECHANICS OF NANOSCALE PHENOMENA: PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4b)
ROOM 2406A	SESSION CHAIR: Ting Zhu

11:40 a.m.–Noon	Micromechanical Studies of the Structure-Function of Soft Collagenous Tissues Thao (Vicky) Nguyen, The Johns Hopkins University Baltimore
Noon–12:20 p.m.	Tunable Rigidity of Polymeric Core-Lipid-Shell Nanoparticles for Regulated Cellular Uptake Xinghua Shi, Chinese Academy of Sciences
12:20 p.m.–12:40 p.m.	Nanoparticle-Enabled Mechanotargeting Sulin Zhang, Pennsylvania State University
12:40 p.m.–1:00 p.m.	Mechanics of DNA and Molecular Motors Bin Chen, Zhejiang University
1:00 p.m.– 1:20 p.m.	Mechanobiochemical Modeling of Cell-Material Interactions Hongyan Yuan, University of Rhode Island



M2	MECHANICS OF SOFT MATERIALS: MUSCULOSKELETAL SOFT TISSUE BIOMECHANICS (18b)
ROOM 2406B	SESSION CHAIR: Sarah Calve

11:40 a.m.–Noon	Micromechanical Poroelastic Finite Element and Shear-lag Models of Tendon Predict Large Strain Dependent Poisson's Ratios and Fluid Expulsion Under Tensile Loading Hossein Ahmadzadeh, Benjamin R. Freedman, Brianne K. Connizzo, Louis J. Soslowsky and Vivek B. Shenoy, University of Pennsylvania
Noon–12:20 p.m.	Influence of Site-Specific Cartilage Material Properties and Focal Defect Size on Stress Redistribution in the Knee Joint after Repair with Osteochondral Autograft Transplantation Surgery (OATS) Xiuyuan Yang, Benjamin Marchi, Ellen M. Arruda and Rhima M. Coleman, University of Michigan
12:20 p.m.–12:40 p.m.	Biphasic Finite Element Analysis of Cartilage Stresses in the Patellofemoral Joint Brian K. Jones, Clark T. Hung and Gerard A. Ateshian, Columbia University
12:40 p.m.–1:00 p.m.	Experimental Characterization of Anterior Cruciate Ligament Biomechanics Kaitlyn Mallett, Ellen Arruda, University of Michigan
1:00 p.m.– 1:20 p.m.	Use of Full-field Methods for the Characterization of the Anterior Cruciate Ligament Mechanical Response Callan Luetkemeyer and Ellen Arruda, University of Michigan

M2	ARCHITECTURED MATERIALS & MANUFACTURING: MECHANICS IN ENERGY STORAGE AND CONVERSION (36b)
ROOM 2500	SESSION CHAIRS: Sulin Zhang and Kejie Zhao

11:40 a.m.–12:20 p.m.	Atomistic Insights into Li-ion Diffusion in Amorphous Silicon-Keynote Xin Yan and Pradeep Sharma, University of Houston
12:20 p.m.–12:40 p.m.	On the Multi-scale Modeling of Multi-physics Processes in Lithium Ion Battery Cells A. Salvadori, University of Notre Dame; D. Grazioli and M. Magri, Università degli studi di Brescia; M.G.D. Geers, Eindhoven University of Technology; and A.F. Bower, Brown University
12:40 p.m.–1:00 p.m.	Reactivity at the Lithium Metal Anode of Lithium-Sulfur Batteries Luis E. Camacho-Forero and Perla B. Balbuena, Texas A&M University
1:00 p.m.– 1:20 p.m.	Lithiation of SiO₂ in Li-ion Batteries: in-situ Transmission Electron Microscopy Experiments and Theoretical Studies Kejie Zhao, Purdue University



M2	ARCHITECTURED MATERIALS & MANUFACTURING: ENGINEERING SCIENCE OF ARCHITECTURED MATERIALS (37b)
ROOM 2501	SESSION CHAIR: Francois Barthelat
11:40 a.m.–Noon	The Performance of a Tailorable Coefficient of Thermal Expansion Lattice that can Achieve Theoretical Bounds for Stiffness Jonathan B. Berger, Robert M. McMeeking, University of California
Noon–12:20 p.m.	Additive Manufacturing and Architected Materials Christopher M. Spadaccini, Joshua Kuntz, Eric Duoss, Xiaoyu Zheng and Thomas Wilson, Lawrence Livermore National Laboratory
12:20 p.m.–12:40 p.m.	High-strength, Low-density Mechanical Metamaterials Based on 3D Direct Laser Writing Jens Bauer, Almut Schroer, Ruth Schwaiger, and Oliver Kraft, Karlsruhe Institute of Technology
12:40 p.m.–1:00 p.m.	Multiobjective Topology Optimization of Trabecular Bone Structure in the Spine and the Femur: Implications for Biomimicry Ahmed Elbanna and Darin Peetz, University of Illinois Urbana Champaign
1:00 p.m.– 1:20 p.m.	3D Printed Structures with Negative Thermal Expansion Qiming Wang, University of Southern California; Julie A. Jackson and Christopher M. Spadaccini, Lawrence Livermore National Laboratory; Qi Ge and Nicholas X. Fang, Massachusetts Institute of Technology; and Jonathan B. Hopkins, University of California
M2	MECHANICS OF SOFT MATERIALS: MECHANICAL CHARACTERIZATION OF SOFT MATERIALS (15b)
ROOM 2502	SESSION CHAIR: Yuhang Hu
11:40 a.m.–Noon	Stretchable Batteries with Self-similar Serpentine Interconnects and Integrated Wireless Recharging Systems Yihui Zhang, Yewang Su, Huanyu Cheng, and Yonggang Huang, Northwestern University
Noon–12:20 p.m.	Experimental Validation of Ruga-phase Diagram for Primary Bilayer Systems A. Landauer; I. Newton; C. Franck; K.S. Kim, Brown University
12:20 p.m.–12:40 p.m.	Time Dependent Mechanics of a Dual-crosslink Self-healing Gel Rong Long, Koichi Mayumi, Costantino Creton, and Tetsuharu Narita, University of Colorado Boulder; Chung-Yuen Hui, ESPCI ParisTech-CNRS-UPMC
12:40 p.m.–1:00 p.m.	High Speed Red-blue Diffraction Assisted Image Correlation Johnathan Estrada and Christian Franck, Brown University
1:00 p.m.– 1:20 p.m.	Opacification of Shape Memory Polymer Foams Using Tungsten Nanoparticles for Neurovascular Embolic Applications Sayyeda M. Hasan, Garrett Harmon, Jeffery E. Raymond, Tiffany P. Gustafson, and Duncan J. Maitland, Texas A&M University; Fang Zhou, University of Minnesota; and Thomas S. Wilson, Lawrence Livermore National Laboratory



M2	MECHANICS OF SOFT MATERIALS: MECHANICS AND PHYSICS OF SOFT MATERIALS (19b)
ROOM 2503	SESSION CHAIR: Pavel Galich

11:40 a.m.–Noon	Mechanics of HIV Interaction with T-cell Membrane Himani Agrawal and Pradeep Sharma, University of Houston; and Liping Liu, Rutgers University
Noon–12:20 p.m.	Interfacial Welding of Dynamic Covalent Network Polymers Kai Yu, John Jabour, H. Jerry Qi, Georgia Institute of Technology; Qian Shi, and Tiejun Wang, Xian Jiaotong University; Hao Li, Hefei University of Technology; Hua Yang, Beijing JiaoTong University; and Martin L. Dunn Singapore University of Technology and Design
12:20 p.m.–12:40 p.m.	Multifunctional Bondings of Hydrogels to Diverse Solids with Interfacial Toughness over 1000j/m² Hynwoo Yuk, Massachusetts Institute of Technology
12:40 p.m.–1:00 p.m.	Hydraulic fracture and toughening of a brittle layer bonded to a hydrogel Alessandro Lucantonio, Giovanni Noselli, and Antonio DeSimone, International School for Advanced Studies; Xavier Trepas, Institute for Bioengineering of Catalonia; Marino Arroyo, Universitat Politècnica de Catalunya-Barcelona Tech
1:00 p.m.– 1:20 p.m.	Interphase Induced Dynamic Self-Stiffening in Graphene-Based Polydimethylsiloxane Nanocomposites Linlin Cao, Pei Dong, Soumya Vinod, Jaime Taha Tijerina, Pulickel M. Ajayan, and Jun Lou, Rice University; Yanlei Wang and Zhiping Xu, Tsinghua University

M2	MECHANICS OF NANOSCALE PHENOMENA: MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5b)
ROOM 2504	SESSION CHAIRS: Xiaodong Li and Yash Kulkarni

11:40 a.m.–Noon	Recoverable Plasticity in Penta-twinned Metallic Nanowires Governed by Dislocation Nucleation and Retraction Qingquan Qin, Guangming Cheng, Tzu-Hsuan Chang, and Yong Zhu, North Carolina State University; Sheng Yin, Brown University; Xiaoyan Li, Tsinghua University; Gunther Richter and Huajian Gao, Max Planck Institute for Intelligent Systems
Noon–12:20 p.m.	Mechanical Behavior of Nanotwinned Metals X. Zhang, D. Bufford, Y. Liu and H. Wang, Texas A&M University
12:20 p.m.–12:40 p.m.	Tailoring Strength and Ductility in Nanostructured Ag through Structural Design Ryan Ott, Ames Laboratory
12:40 p.m.–1:00 p.m.	Intrinsic Fracture Response of Twin Boundaries in Nanotwinned Metals Tanushree Sinha, and Yashashree Kulkarni, University of Houston
1:00 p.m.– 1:20 p.m.	The Formation of Growth Twins in Polycrystalline Al with High Stacking Fault Energy S. Xue, Z. Fan, Y. Chen, J. Li, H. Wang, X. Zhang, Texas A&M University



M2	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS OF 2D MATERIALS (11b)
ROOM 2505	SESSION CHAIR: Ellad Tadmor

11:40 a.m.–Noon	Microscopic origin of non-linear damping in single layer MoS₂ Subhadeep De and Narayan R. Aluru, University of Illinois at Urbana Champaign
Noon–12:20 p.m.	Strain Engineering of Phonon Dispersion Relation and Thermal Properties of Graphene Zhen Zhang and James D. Lee, George Washington University; and Jiaoyan Li, Brown University
12:20 p.m.–12:40 p.m.	A Molecular Dynamics Study of the Thermal Transport Properties of Monolayer MoS₂ and BN Xiaonan Wang and Alireza Tabarraei, University of North Carolina at Charlotte
12:40p.m.–1:00 p.m.	Environment-controlled Dislocation Migration and Superplasticity in Monolayer MoS₂ Mingjie Liu, Xiaolong Zou and Boris I. Yakobson, Rice University

M2	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21b)
ROOM 1402	SESSION CHAIR: Michel Borden

11:40 a.m.–Noon	Understanding “Phase-field” Models of Fracture Blaise Bourdin, Louisiana State University; J.J. Marigo and E. Tanné, École Polytechnique; and C. Maurini, Université Pierre et Marie Curie
Noon–12:20 p.m.	Refinements of the Variational Approach to Fracture for Improved Constitutive Response in Ductile Materials Michael J. Borden, Eric M. Domonell, North Carolina State University
12:20 p.m.–12:40 p.m.	A Variational Model for Simulating Fracture in Solids Containing Weak Interfaces Kaushik Vijaykumar and Haneesh Kesari, Brown University; and Louis G. Hector, Jr., General Motors R&D Center
12:40p.m.–1:00 p.m.	An Augmented Finite Element Method for Dynamic Crack Growth in an Elastic Solid Jaedal Jung and Q. D. Yang, University of Miami
1:00p.m.–1:20p.m.	Computational Modeling of Micro-level Damage and Debonding in Polymer Matrix Composites Masoud Safdari, Scott Zacek, Nancy R. Sottos, and Philippe H. Geubelle, University of Illinois at Urbana Champaign



M2

**LIGHT WEIGHT STRUCTURES:
DESIGN, MECHANICS & CONTROL – TENSEGRITY ENGINEERING (25b)**

ROOM 1403

SESSION CHAIR: Landolf Rhodes-Barbarigos

11:40 a.m.–Noon	Exploring Tensegrity for the Design of a Passive and Active Footbridge System L. Rhode-Barbarigos, University of Miami; I.F.C. Smith, Swiss Federal Institute of Technology; E. Sega, Hofstra University; and S. Adriaenssens, Form Finding Lab
Noon–12:20 p.m.	An Experimental and Numerical Study Of Shape Memory Alloy-Based Tensegrity/Origami Structures John L. Rohmer, Edwin A. Peraza Hernandez, Robert E. Skelton, Daren J. Hartl, and Dimitris C. Lagoudas, Texas A&M University
12:20 p.m.–12:40 p.m.	Design of Muscular-Skeletal Tensegrity-Like Structures via a Genetic Programming Approach Darren J. Hartl, Gregory W. Reich, and Philip S. Beran, Air Force Research Laboratory
12:40p.m.–1:00 p.m.	On Compressive Structures of Minimal Mass Andrea Micheletti, University of Rome TorVergata; Robert E. Skelton, University of California San Diego
1:00p.m.–1:20p.m.	On the Post Buckling Behavior of Tensegrity Structures Julian J. Rimoli, Georgia Institute of Technology



M3	MECHANOBIOLOGY: MECHANOBIOLOGY & CELL MECHANICS (1c)
ROOM 2401	SESSION CHAIRS: Baohua Ji, Christian Franck, Taher Saif and Bin Chen

2:30 p.m.–3:10 p.m.	Brownian Nanoimaging of Single Ligand-integrin Interactions and Cytostructural Feedback at leukocyte Surfaces in 3-D-Keynote Evans Evans, Boston University and Duke University
3:10 p.m.–3:30 p.m.	An Active Contraction Model of Valvular Interstitial Cells Yusuke Sakamoto, The University of Texas at Austin
3:30 p.m.–3:50 p.m.	Detection of SK Channels in Neuronal Axons by Single Molecule AFM Krithika Abiraman, Anastasios V. Tzingounis and George Lykotrafitis, University of Connecticut

M3	MECHANICS OF NANOSCALE PHENOMENA: FIRST PRINCIPLES METHODS IN THE MECHANICS OF MATERIALS (10c)
ROOM 2402	SESSION CHAIR: John Pask

2:30 p.m.–3:10 p.m.	Towards Large and Fast Density Functional Theory Calculations-Keynote Phanish Suryanarayana, Georgia Institute of Technology
3:10 p.m.–3:30 p.m.	An Accurate and Efficient Finite-difference Formulation of Density Functional Theory Swarnava Ghosh, Phanish Suryanarayana: Georgia Institute of Technology
3:30 p.m.–3:50 p.m.	Real-space Finite-element Formulation of Orbital-free Density Functional Theory for Al-Mg Materials System Das. Sambit, Iyer. Mrinal and Gavini. Vikram: University of Michigan
3:50 p.m.–4:10 p.m.	A New Type of Maxwell Stress in Soft Materials due to Quantum Mechanical-Elasticity Coupling Xiaobao Li, Liping Liu, and Pradeep Sharma, University of Houston

**M3**
**MECHANICS OF NANOSCALE PHENOMENA:
COMPUTATIONAL MATERIALS WITH EMPHASIS ON PHASE TRANSFORMATION (9a)**
ROOM 2403**SESSION CHAIR: Raymundo Arroyave**

- 2:30 p.m.–2:50 p.m. **Effect of Two Nanoscale Size Parameters on the Macroscopic Transformation Behavior Within Phase Field Approach**
Valery I. Levitas, Departments of Aerospace Engineering, Mechanical Engineering, and Material Science and Engineering, Iowa State University
- 2:50 p.m.–3:10 p.m. **An Ab-initio Study of the Factors Affecting Phase Selection During the Martensitic Transformation in Co₂NiGa Heusler Alloy**
Anjana Talapatra and Raymundo Arroyave, Texas A&M University;
Peter Entel, University of Duisburg-Essen-Germany; Jaime I. Valencia, Cinvestav Unidad Querétaro Libramiento Norponiente; and A.H. Romero, West Virginia University
- 3:10 p.m.–3:30 p.m. **Large Deformation Model with Coupled Plasticity and Strain-induced Phase Transformation in a Diamond Anvil Cell**
Biao Feng and Valery I. Levitas, Iowa State University
- 3:30 p.m.–3:50 p.m. **A Phase-Field Model for Simulating Microstructure Development During Physical Vapor Deposition of Isotropic Multiphase Thin Films**
James A. Stewart and Douglas E. Spearot, The University of Arkansas
- 3:50 p.m.–4:10 p.m. **Coupled Phase Field, Heat Conduction, and Elastodynamic Simulation of Kinetic Superheating and Melting of Aluminum Nanolayer Irradiated by Picosecond Laser**
Yong Seok Hwang and Valery I. Levitas, Iowa State University

M3
**MECHANICS OF FRACTURE AND DAMAGE:
MODELING FAILURE & DAMAGE IN SOLID MATERIALS (24c)**
ROOM 2404**SESSION CHAIR: N. Sukumar**

- 2:30 p.m.–2:50 p.m. **Earthquake Nucleation and Propagation on Rate and State Faults: Single vs Two State Variables Formulation and Evolution by Composite Aging-slip Law**
Xiao Ma and Ahmed Elbanna, University of Illinois Urbana Champaign
- 2:50 p.m.–3:10 p.m. **Simulating Dynamic Fracture in Very Large Shell Structures: A Discontinuous Galerkin/Cohesive Zone Model Approach**
Brandon Talamini, Raul Radovitzky, Massachusetts Institute of Technology
- 3:10 p.m.–3:30 p.m. **Modelling of Cohesive Crack Growth in Solids with Thermo-mechanical Augmented Finite Element Method Structures: A Discontinuous Galerkin/Cohesive Zone Model Approach**
Jaedal Jung, B.C. Do, Q. D. Yang, University of Miami
- 3:30 p.m.–3:50 p.m. **Failure Initiation and Progression in [0/90] CFRP Composite Beams Subject to Out-of-plane Low-velocity Impact**
Demirkan Coker, Omer Tanay Topac, and Ercan Gurses, Middle East Technical University
- 3:50 p.m.–4:10 p.m. **Simulating Hydrogen Embrittlement and Fast Pathways for Diffusion**
James W. Foulk III, Jakob T. Ostien, and Alejandro Mota, Sandia National Laboratories



M3

**MECHANOBIOLOGY:
ANALYTICAL AND COMPUTATIONAL MODELING IN MECHANOBIOLOGY (3c)**

ROOM 2405

SESSION CHAIR: Amina A. Qutub

- 2:30 p.m.–3:10 p.m. **Modeling Two-phase Blood Flow in Catheterized Elastic Artery with Atherosclerosis-Keynote**
Daniel N. Riahi, The University of Texas-Pan American and University Illinois Urbana Champaign
- 3:10 p.m.–3:30 p.m. **Multiscale Modeling of Cardiovascular Diseases**
Heather N. Hayenga, S. Kubecka, M. Keshavarzian, A. Morris, R. Bhui, J. Bailon, W. Anderson, S. Leonardi, and C.A. Meyer, University of Texas at Dallas
- 3:30 p.m.–3:50 p.m. **Abiochemical and Mechanical Model of Injury-Induced Intimal Thickening**
Pak-Wing Fok, University of Delaware and Rebecca Sanft, University of North Carolina at Chapel Hill
- 3:50 p.m.–4:10 p.m. **Modeling Regenerative States of Neurovascular Cells**
Arun Mahadevan, Byron Long, Jacob T. Robinson, and Amina A. Qutub, Rice University

M3

**MECHANICS OF NANOSCALE PHENOMENA:
PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4c)**

ROOM 2406A

SESSION CHAIR: David Henann

- 2:30 p.m.–3:10 p.m. **A Cahn-Hilliard-Type Theory for Species Diffusion Coupled with Large Elastic-Plastic Deformations – Application to Li-ion Electrode Materials-Keynote**
Lallit Anand, Massachusetts Institute of Technology
- 3:10 p.m.–3:30 p.m. **Mechanics Learned from Black Carp Teeth: A Bio-inspired Study**
Haimin Yao, The Hong Kong Polytechnic University
- 3:30 p.m.–3:50 p.m. **Bio-inspired Study of Motion Driven by Strain Gradient**
Shaohua Chen, Chinese Academy of Sciences
- 3:50 p.m.–4:10 p.m. **Chemomechanics of Electrodes in Li-ion Batteries**
Kejie Zhao, Purdue University



M3

MECHANICS OF SOFT MATERIALS: SOFT TISSUES MECHANICS: THEORETICAL CONSIDERATIONS, EXPERIMENTAL RESULTS AND APPLICATION (14a)

ROOM 2406B

SESSION CHAIR: Michael Sacks

- 2:30 p.m.–3:10 p.m. **Mechanistic Origins of Soft Tissues Structure and Mechanics-Keynote**
Yoram Lanir, Technion-Israel Institute of Technology
- 3:10 p.m.–3:30 p.m. **Inverse Models for Characterization of the In-vivo Valvular Mechanical Behaviors**
Chung-Hao Lee, Kristen Feaver, Will Zhang, and Michael S. Sacks,
The University of Texas at Austin; Robert C. Gorman and Joseph H. Gorman, University of Pennsylvania
- 3:30 p.m.–3:50 p.m. **A Poroelastic Mixture Model for Simulating Interstitial Fluid Flow in Brain: Formulation and Numerical Solutions**
Scott T. Miller, Sandia National Laboratories; Francesco Costanzo, Penn State
- 3:50 p.m.–4:10 p.m. **A Porous Fiber Composite Material Model to Capture Cervical Tissue Remodeling in Mouse Pregnancy**
Kyoko Yoshida and K. Myers Columbia University;
M. Mahendroo, University of Texas Southwestern Medical Center; and
J. Vink, R. Wapner, Columbia University Medical Center

M3

ARCHITECTURED MATERIALS & MANUFACTURING MECHANICS IN ENERGY STORAGE AND CONVERSION (36c)

ROOM 2500

SESSION CHAIRS: Siva Nadimpalli and Claudio V. Di Leo

- 2:30 p.m.–3:10 p.m. **Mechanical Degradation Stochastics in Lithium-Ion Battery Electrodes-Keynote**
Partha P. Mukherjee, Pallab Barai, and Aashutosh Mistry, Texas A&M University
- 3:10 p.m.–3:30 p.m. **Mechanical Failure of Metal Anodes in Lithium-Ion Batteries**
Author: Ali Ghahremaninezhad, University of Miami
- 3:30 p.m.–3:50 p.m. **Strain Rate Sensitivity of Mechanical and Electrical Behavior of 18650 LiFePO₄ Battery Cells**
Waterloo Tsutsui, Hangjie Liao, Ethan McMillan, Jaspreet Kukreja, Kiran Balakrishnan,
Niranjan Parab, John Bartos, Trung Nguyen, Edwin Garcia, Thomas Siegmund, and Wayne Chen,
Purdue University
- 3:50 p.m.–4:10 p.m. **Optimal Design of Actively-Cooled Microvascular Composite Panels for Li-ion Battery Applications**
Authors: Masoud Safdari, Marcus H.Y. Tan, Ahmad R. Najafi, Stephan J. Petty, Scott R. White, and
Philippe H. Geubelle, University of Illinois Urbana Champaign



M3

**ARCHITECTURED MATERIALS & MANUFACTURING:
ENGINEERING SCIENCE OF ARCHITECTURED MATERIALS (37c)**

ROOM 2501

SESSION CHAIR: Thomas Siegmund

- 2:30 p.m.–2:50 p.m. **Design and Fabrication of Scalable Micro-architected Materials with Superior Strength and Ductility**
Xiaoyu Zheng, William Smith, Todd, H Weisgraber, Nick Todd, Julie Jackson, and Christopher M. Spadaccini, Virginia Tech; John Mcree, Bryan Moran, Jianchao Ye, Mark Mensor, Patrick Campbell, Morris Wang, and Nicholas X. Fang, Lawrence Livermore National Laboratory
- 2:50 p.m.–3:10 p.m. **Bio-inspired Flexible Armors with Tailored Architectures**
Roberto Martini, David Van Zyl and Francois Barthelat, McGill University
- 3:10 p.m.–3:30 p.m. **Nature's Wisdom in Multilevel Architected Biological Armors**
Xiaodong Li, University of Virginia
- 3:30 p.m.–3:50 p.m. **Energy Dissipation and Wave Propagation in Cellular Materials that Exhibit Phase Transformations**
David Restrepo and Pablo D. Zavattieri Purdue University;
Sara Rodriguez and Juan D. Gómez, Universidad EAFIT;
Nilesh D. Mankame, General Motors Global Research & Development
- 3:50 p.m.–4:10 p.m. **Multifunctional Architected Battery-Structure Material System with High Energy Storage and Crash Resistance Capabilities**
Trung N. Nguyen, Thomas Siegmund, Jaspreet Kukreja, Kiran Balakrishnan, Waterloo Tsutsui, Hangjie Liao, and Wayne Chen, Purdue University

M3

**MECHANICS OF SOFT MATERIALS:
MECHANICAL CHARACTERIZATION OF SOFT MATERIALS (15c)**

ROOM 2502

SESSION CHAIR: Shengqiang Cai

- 2:30 p.m.–3:10 p.m. **Liquid Crystal Elastomers with Tailorable Properties-Keynote**
T.D. Nguyen and A. Azoug, Johns Hopkins University;
M. Saed and C. M. Yakacki, University of Colorado Denver
- 3:10 p.m.–3:30 p.m. **In-situ Micro-CT and X-ray Diffraction of a Polypropylene Nonwoven Under Tension**
Meredith Silberstein, Naigeng Chen, Margaret Koker, Cornell University
- 3:30 p.m.–3:50 p.m. **Inverse Notch Sensitivity in Glassfiber Non-woven Network**
Yinglong Chen, Thomas Siegmund, Purdue University;
Alvaro Ridruejo, Carlos Gonzalez, Javier Llorca, Polytechnic University of Madrid
- 3:50 p.m.–4:10 p.m. **Structural Testing at the Micro and Nano Scales: Breaking Invisible Specimens with Zero Force**
Roberto Ballarini, University of Houston

**M3**
**MECHANICS OF SOFT MATERIALS:
MECHANICS AND PHYSICS OF SOFT MATERIALS (19c)**
ROOM 2503**SESSION CHAIRS: Yuhang Hu and Sina Youssefian**

- 2:30 p.m.–2:50 p.m. **Indentation: A Simple and Robust Method to Characterize Poroelasticity of Gels**
Yuhang Hu, University of Illinois Urbana Champaign
- 2:50 p.m.–3:10 p.m. **Elastic Response of Soft Spherical Shells under Cylindrical Indenters**
Sina Youssefian, Worcester Polytechnic Institute
- 3:10 p.m.–3:30 p.m. **Mechanical Characterization of Strain-rate Dependent Polyurethane Foams**
M. Petersen, J. Cardona, A. Landauer, D. Henann, C. Franck, Brown University
- 3:30 p.m.–3:50 p.m. **Mechanical Regulation of Interfacial Wrinkling Pattern**
Chao Gao and Yaning Li, University of New Hampshire

M3
**MECHANICS OF NANOSCALE PHENOMENA:
MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5c)**
ROOM 2504**SESSION CHAIR: Haiyan Wang**

- 2:30 p.m.–2:50 p.m. **Coupled Temperature and Layer Thickness Effect on Strengthening Mechanisms of Ti/Ni Multilayer Thin Films**
Zhou Yang and Junlan Wang, University of Washington
- 2:50 p.m.–3:10 p.m. **Predicting The Structure of Semi-Coherent Interface Using Anisotropic Elasticity Theory**
Niaz Abdolrahim, A. J. Vattré, K. Kolluri, and M. J. Demkowicz,
Massachusetts Institute of Technology
- 3:10 p.m.–3:30 p.m. **Multiscale Perspective of Exploring Interface Roles in Metal-Ceramics Composites**
Jian Wang, University of Nebraska; Shuai Shao and Nan Li, Los Alamos National Laboratory;
Caizhi Zhou, Missouri University of Science and Technology; Amit Misra, University of Michigan
- 3:30 p.m.–3:50 p.m. **Exploring Deformation and Failure in Nano-Solids: Flaw-Driven Fracture in Nanocrystalline Pt and Grain boundary Sliding in Bi-crystalline Al**
J. R. Greer, D. Z. Chen, and R. Lontas, California Institute of Technology;
M. J. Zadeh, Y.-W. Zhang, Institute of High Performance Computing; and
S.-W. Lee, University of Connecticut



M3

**MECHANICS OF NANOSCALE PHENOMENA:
MECHANICS OF 2D MATERIALS (11c)**

ROOM 2505

SESSION CHAIR: Johnathan Felts

- 2:30 p.m.–3:10 p.m. **Thermomechanical Bond Scission Dynamics Measured on Functionalized Graphene Using Scanning Probes-Keynote**
Jonathan R. Felts, Andrew J. Oyer, Sandra C. Hernández, Keith E. Whitener, Jr.,
Jeremy T. Robinson, Scott G. Walton, and Paul E. Sheehan, Texas A&M University
- 3:10 p.m.–3:30 p.m. **Designing Graphene Structures with Controlled Distributions of Topological Defects: A Case Study of Toughness Enhancement in Graphene Ruga**
Teng Zhang, Huajian Gao, Brown University; Xiaoyan Li Tsinghua University,
- 3:30 p.m.–3:50 p.m. **Plasma-Surface Interaction Simulations: Controlled Patterning of Holes in Graphene**
Abhilash Harpale, Marco Panesi, and Huck Beng Chew, University of Illinois Urbana Champaign
- 3:50 p.m.–4:10 p.m. **Crack Path Selection for the Dry Transfer of Graphene**
Shruti Jain, S. R. Na, K. M. Liechti and R. T. Bonnecaze, The University of Texas at Austin

M3

**MECHANICS OF FRACTURE AND DAMAGE:
FRACTURE MECHANICS (21c)**

ROOM 1402

SESSION CHAIR: Vikas Tomar

- 2:30 p.m.–2:50 p.m. **Unique Extraction of Rate Dependent Traction Separation Relations for Interfaces**
S. Palvadi N. Lu and K.M. Liechti, The University of Texas at Austin
- 2:50 p.m.–3:10 p.m. **In-situ Mechanical Characterization of Fracture Behaviors of Monolayer and Multilayer MoS₂**
Emily Hacopian, Yingchao Yang, Yongji Gong, Weibing Chen, Pulickel Ajayan and Jun Lou,
Rice University
- 3:10 p.m.–3:30 p.m. **Fracture Mechanics of Suture Interfaces in Nature**
Lei Liu, Yaning Li, University of New Hampshire
- 3:30 p.m.–3:50 p.m. **Utilization of Nano-indentation to Examine Bond Line Integrity in Adhesively Bonded Composite Structures**
Denizhan Yavas, Xu Shang, Wei Hong, and Ashraf F. Bastawros, Iowa State University
- 3:50 p.m.–4:10 p.m. **Influence of Interface on the Fracture of Bio-inspired Laminated Composites**
Tao Qu, Chandra Prakash, Vikas Tomar, Purdue University



M3

**MECHANICS OF NANOSCALE PHENOMENA:
MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5j)**

ROOM 1403

SESSION CHAIRS: Brian Sheldon and Reinhold Dauskardt

2:30 p.m.–2:50 p.m.	Hyper-Confined Low-Density Multifunctional Hybrids: Molecular Design and Mechanical Behavior Reinhold H. Dauskardt, Stanford University
2:50 p.m.–3:10 p.m.	Multi-Level Stiffness Analysis in Tetraikaidecahedron Nanolattices Carlos M. Portela, Alessandro Maggi, and Julia R. Greer, California Institute of Technology
3:10 p.m.–3:30 p.m.	Mechanical Properties of Magnesium Composites Reinforced by Multiwalled Carbon Nanotubes Q.Z. Li, Washington State University and the University of Nevada; and B. Tian, University of Nevada, Harbin Engineering University
3:30 p.m.–3:50 p.m.	Nanostructural Characteristics and Interfacial Properties of Polymer Fibers in Cement Matrix Faezeh Shalchy and Nima Rahbar, Worcester Polytechnic Institute
3:50 p.m.–4:10 p.m.	Defects in Flexoelectric Solids Sheng Mao and Prashant K. Purohit, University of Pennsylvania



M4	MECHANOBIOLOGY: MECHANOBIOLOGY & CELL MECHANICS (1d)
ROOM 2401	SESSION CHAIR: Christian Franck

4:30 p.m.–4:50 p.m.	Mechanics of Biological Interfaces Under Stretch Across Scales: Lipid Bilayer Membranes and Epithelia Marino Arroyo, Universitat Politècnica de Catalunya-Barcelona Tech
4:50 p.m.–5:10 p.m.	Kinetics of Receptor-mediated Endocytosis of Elastic Nanoparticles Xin Yi and Huajian Gao, Brown University
5:10 p.m.–5:30 p.m.	Modeling of Vesiculation and Band-3 Diffusion in the Normal and Defective Red Blood Cell Membrane He Li, Brown University; and Vi Ha, and Yihao Zhang, University of Connecticut and George Lykotrafitis, University of Connecticut
5:30 p.m.– 5:50 p.m.	Stability of Lipid Membranes Nikhil Walkani, University of Houston
5:50 p.m.–6:10 p.m.	Quantifying Post-concussive Hypothermia Effects on the Brain Using a Novel 4D Traumatic Brain Injury Cell Assay Mark Scimone, Alana Levine, Jon Estrada, Eyal Bar-Kochba, and Christian Franck, Brown University

M4	MECHANICS OF FRACTURE AND DAMAGE: MODELING FAILURE & DAMAGE IN SOLID MATERIALS (24d)
ROOM 2402	SESSION CHAIR: N. Sukumar

4:30 p.m.–4:50 p.m.	Simulation-based High Cycle Fatigue Life Prediction Based on Extended Space-Time Finite Element Method R. Zhang; Northwestern Polytechnical University; S. R. Mannava and V. K. Vasudevan; University of Cincinnati; and D. Qian, University of Texas at Dallas
4:50 p.m.–5:10 p.m.	Stress Analysis of Adhesively Bonded Composite Joints Xiang-Fa Wu, Xiao Wang, Youhao Zhao, and Robert Jensen, North Dakota State University
5:10 p.m.–5:30 p.m.	Microstructural Damage Modeling of Heterogeneous Quasi-brittle Solids Subjected to Rate-Dependent Fracture and Viscoelastic-Viscoplastic Deformation Yong-Rak Kim, Taesun You, and Keyvan Z. Rami, University of Nebraska; and David, H. Allen; Texas A&M Transportation Institute
5:30 p.m.– 5:50 p.m.	Elastic Homogenization via Single Inclusion and Full Field Approaches, and Modeling of Progressive Failure in Porous RTM6 Epoxy Anton Trofimov and Borys Drach, New Mexico State University; and Igor Tsukrov; University of New Hampshire
5:50 p.m.–6:10 p.m.	Investigation of Fracture in Magnesium We43 Alloy Babak Kondori, Texas A&M University



M4	MECHANICS OF NANOSCALE PHENOMENA: COMPUTATIONAL MATERIALS WITH EMPHASIS ON PHASE TRANSFORMATION (9b)
ROOM 2403	SESSION CHAIRS: Theocharis Baxevanis and Anjana Talapatra

4:30 p.m.–4:50 p.m.	Alloying, Configurational, Thermal and Magnetic Effects On The Phase Stability of Ferromagnetic Shape Memory Alloys: Perspectives From Ab Initio Calculations Raymundo Arroyave and Ajana Talapatra, Texas A&M University; Navdeep Singh, University of Houston; and Peter Entel, University of Duisburg-Essen
4:50 p.m.–5:10 p.m.	Generalized Multiphase Phase Field Theory for Temperature- and Stress-induced PT: Multivariant Martensitic PT and Virtual Melting Arunabha M. Roy and Valery I. Levitas, Iowa State University
5:10 p.m.–5:30 p.m.	Linking Microstructural Evolution in Ferroelectrics to their Dynamic Electromechanical Response Charles S. Wojnar, Missouri University of Science and Technology; Dennis M. Kochmann, California Institute of Technology
5:30 p.m.– 5:50 p.m.	Shock-induced Current Generation and Electro-thermo-mechanical Coupling of Ferroelectric Ceramics Vinamra Agrawal and Kaushik Bhattacharya, California Institute of Technology
5:50 p.m.–6:10 p.m.	Phase-Field Approach to Nonequilibrium Phase Transformation with Moving Interfacial Phases and Interfacial Tension Kasra Momeni and Valery I. Levitas, Iowa State University

M4	MECHANICS OF NANOSCALE PHENOMENA: FIRST PRINCIPLES METHODS IN THE MECHANICS OF MATERIALS (10d)
ROOM 2404	SESSION CHAIR: Phani Motamarri

4:30 p.m.–4:50 p.m.	An Analog of the Plane-Wave Method for Isolated Systems Amartya S. Banerjee, Lawrence Berkeley National Laboratory; and Ryan S. Elliott and Richard D. James, University of Minnesota
4:50 p.m.–5:10 p.m.	An Analog of the Plane-Wave Method for Isolated Systems Amartya S. Banerjee, Lawrence Berkeley National Laboratory; and Ryan S. Elliott and Richard D. James, University of Minnesota
5:10 p.m.–5:30 p.m.	An All-electron DFT Calculation Using Spectral Gauss Quadrature Xin Cindy Wang, U.S. Army Research Laboratory
5:30 p.m.– 5:50 p.m.	A Thermodynamically Motivated Sintering Model of Ceramics Nisha Mohan, The University of Texas at Arlington
5:50 p.m.–6:10 p.m.	Violations of Second Law of Thermodynamics vis-à-vis Continuum Mechanics Martin Ostoja-Starzewski: University of Illinois Urbana Champaign



M4	MECHANOBIOLOGY: ANALYTICAL AND COMPUTATIONAL MODELING IN MECHANOBIOLOGY (3d)
ROOM 2405	SESSION CHAIR: Taeyoon Kim

4:30 p.m.–5:10 p.m.	Is EnvZ a Bacterial Mechanosensor?-Keynote Linda J. Kenney, National University of Singapore; and Jesse Brown Veterans Affairs Medical Center and University of Illinois-Chicago
5:10 p.m.–5:30 p.m.	Cellular Mechano-Sensing via Actomyosin Contractility Taeyoon Kim, Purdue University
5:30 p.m.– 5:50 p.m.	Forces, Morphology, and Mechanical Phase Transition of Active Cytoskeletal Networks Michael Mak, Muhammad H. Zaman, and Roger D. Kamm, Boston University; and Taeyoon Kim, Purdue University
5:50 p.m.–6:10 p.m.	Coarse-Grained Modeling of Vesicle Responses to Active Rotational Nanotube and Its Application in Cell Communications Xianqiao Wang and Liuyang Zhang, University of Georgia

M4	MECHANICS OF NANOSCALE PHENOMENA: PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4d)
ROOM 2406A	SESSION CHAIR: Teng Li

4:30 p.m.–4:50 p.m.	Mechanical Behavior of Novel Materials at the Nanoscale Julia Greer, California Institute of Technology
4:50 p.m.–5:30 p.m.	Pseudo-First-Order Phase Transition and Ultrahigh Electrocaloric Effect in Barium Titanate Nanoparticles-Keynote Honghui Wu, Hong Kong University of Science and Technology; and Tong-Yi Zhang, Shanghai University
5:30 p.m.– 5:50 p.m.	Co-deformation Mechanisms in Crystalline-amorphous Nanolaminates Xiaoling Zhou, Xiaoyan Li and Changqing Chen, Tsinghua University
5:50 p.m.–6:10 p.m.	In Situ Nanomechanics Ting Zhu, Georgia Institute of Technology



M4	MECHANICS OF SOFT MATERIALS: SOFT TISSUES MECHANICS: THEORETICAL CONSIDERATIONS, EXPERIMENTAL RESULTS AND APPLICATION (14b)
ROOM 2406 B	SESSION CHAIR: John Criscione
4:30 p.m.–5:10 p.m.	Diverse Roles of Glycosaminoglycans in Large Artery Mechanics-Keynote Jay D. Humphrey, Yale University; Sara Roccabianca, Michigan State University
5:10 p.m.–5:30 p.m.	A 3D Constitutive Model for the Aortic Valve Leaflet Bruno V. Rego and Michael S. Sacks, The University of Texas at Austin
5:30 p.m.– 5:50 p.m.	Intra- and Inter-animal Variations in the Biomechanical Properties of Tracheal Cartilage Rings Karkhanis Teja and Marepalli Rao, University of Cincinnati; Farhan Zafar, David Morales, and Luis Simon, Cincinnati Children's Hospital Medical Center; and Balakrishna Haridas, Texas A&M University
5:50 p.m.–6:10 p.m.	A Mesoscale Model on the Mechanical Role of Collagen and Elastin within the Mitral Valve Layer Will Zhang, Salma Ayoub, and Michael Sacks, University of Texas at Austin; and Jun Liao Mississippi State University
M4	ARCHITECTURED MATERIALS & MANUFACTURING: MECHANICS IN ENERGY STORAGE AND CONVERSION (36d)
ROOM 2500	SESSION CHAIRS: Siva Nadimpalli and Claudio V. Di Leo
4:30 p.m.–5:10 p.m.	Mechanistic Understanding of Li Transport in Battery Electrode Materials-Keynote Reza Shahbazian-Yassar, University of Illinois at Chicago
5:10 p.m.–5:30 p.m.	Experimental and Modeling Characterization of Mechanics and Phase Kinetics of Sn Anode in Lithium-ion Battery Chun Hao Chen, Srivatsan Hulikal, Eric Chason, Allan Bower, and Pradeep Guduru, Brown University
5:30 p.m.– 5:50 p.m.	Phase Field Simulation of Crack Propagation in Li-ion Battery Electrode Particles During (dis-)charging Ying Zhao and Peter Stein, and Bai-Xiang Xu, Universität Darmstadt Dolivostraße
5:50 p.m.–6:10 p.m.	Reactivity at Carbon-Sulfur Composite Cathodes of Lithium-Sulfur Batteries Juan C. Burgos, Kie Hankins, Perla B. Balbuena, Texas A&M University



M4	ARCHITECTURED MATERIALS & MANUFACTURING: ENGINEERING SCIENCE OF ARCHITECTURED MATERIALS (37d)
ROOM 2501	SESSION CHAIR: Francois Barthelat

4:30 p.m.–4:50 p.m.	Dynamic Stability of Functionally Graded Cylindrical Shells under Axial Follower Loads M. E. Torki and J. N. Reddy, Texas A&M University; H. Haddadpour, Sharif University of Technology
4:50 p.m.–5:10 p.m.	Tension-Induced Tunable Corrugation in Two-phase Soft Composite Materials: Mechanisms and Implications Qianli Chen and Ahmed Elbanna, University of Illinois-Urbana Champaign
5:10 p.m.–5:30 p.m.	Mechanics and Design of Materials with a Mutistable Micro-architecture Kaikai Che, Julien Meaud, Jiangtao Wu, Michael Isakov, and Jerry Qi, George W. Woodruff School of Mechanical Engineering at Georgia Tech
5:30 p.m.– 5:50 p.m.	Effectiveness of Approximate Cloaks Valentin Serey and Ankit Srivastava, Illinois Institute of Technology

M4	MECHANICS OF SOFT MATERIALS: MECHANICAL CHARACTERIZATION OF SOFT MATERIALS (15d)
ROOM 2502	SESSION CHAIR: Shengqiang Cai

4:30 p.m.–4:50 p.m.	A New Sample Surface Detection Approach in Nanoindentation of Soft Materials for Accurate Determination of Elastic And Poroviscoelastic Properties A. Wagoner Johnson and J. Wei, University of Illinois Urbana Champaign
4:50 p.m.–5:10 p.m.	Dynamic Indentation to Characterize the Poroelasticity of Gels Yang Lai, Yuhang Hu, University of Illinois Urbana Champaign
5:10 p.m.–5:30 p.m.	Estimating the Non-Homogeneous Elastic Modulus Distribution from Surface Deformations Sevan Goenezen, Texas A&M University
5:30 p.m.– 5:50 p.m.	Characterizing non-homogeneous Elastic Properties Non-destructively: A Boundary Sensitivity Investigation Yue Mei, Texas A&M University



M4	
MECHANICS OF SOFT MATERIALS: MECHANICS AND PHYSICS OF SOFT MATERIALS (19d)	
ROOM 2503	SESSION CHAIRS: Lihua Jin and Stephan Rudykh
4:30 p.m.–4:50 p.m.	Initiation, growth and smoothening of creases in soft materials Zhigang Suo, Harvard University; Lihua Jin, Stanford University; Dayong Chen, Anesia Auguste, and Ryan C. Hayward, University of Massachusetts
4:50 p.m.–5:10 p.m.	Shape Bifurcation of a Spherical Dielectric Elastomer Balloon under the Actions of Internal Pressure and Electric Voltage Xudong Liang, University of California
5:10 p.m.–5:30 p.m.	Influence of Material Properties and Internal Geometry on Wrinkled Interfaces in Hyperelastic Layered Composites Viacheslav Slesarenko, and Stephan Rudykh, Israel Institute of Technology
5:30 p.m.–5:50 p.m.	Extracting a Kinetic Relation from the Dynamics of a Bistable Chain Qingze Zhao and Prashant K. Purohit, University of Pennsylvania
5:50 p.m.–6:10 p.m.	Macroscopic and Microscopic Instabilities in Hyperelastic Fiber Composites Stephan Rudykh, Israel Institute of Technology
M4	
MECHANICS OF NANOSCALE PHENOMENA: MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5d)	
ROOM 2504	SESSION CHAIRS: Peter Liaw and Qizhen Li
4:30 p.m.–4:50 p.m.	Ferritic Alloys with Extreme Creep Resistance via Coherent Hierarchical Nano-precipitates Peter K. Liaw, Gian Song, Zhiqian Sun, Lin Li, Shenyang Huang, Zhenke Teng, and Yanfei Gao, The University of Tennessee; Xiandong Xu and Mingwei Chen, Tohoku University; Michael Rawlings, David C. Dunand, Morris E. Fine, and Gautam Ghosh, Northwestern University; Christian H. Liebscher and Mark D. Asta, University of California; Bjørn Clausen, Los Alamos National Laboratory; Jonathan Poplawsky and Donovan N. Leonard, Oak Ridge National Laboratory; Chain T. Liu, University of Hong Kong
4:50 p.m.–5:10 p.m.	Unveiling Surface, Mechanical and Thermal Deformations in Nanostructures and Devices Xiaodong Li, University of Virginia and University of South Carolina; Yingchao Yang, Yong Sun, Siming Guo, Michael Sutton, Ning Li, Jie Liu, Goutam Koley, Douglas Blom, University of South Carolina; and Zhiyao Duan, Guofeng Wang, University of Pittsburgh
5:10 p.m.–5:30 p.m.	Direct Quantitative Observation of Plasticity and Fracture of Alumina Nanoparticles Daniel C. Bufford, William M. Mook, Michael E. Chandross, Jay D. Carroll, Brad L. Boyce, Paul G. Kotula, Khalid Hattar, and Pylin Sarobol, Sandia National Laboratories
5:30 p.m.–5:50 p.m.	Dynamic behavior and Microstructural Evolution of a Nanocrystalline Cu-Ta Alloy S. Turnage, K. Darling, M. Rajagopalan, and K. Solanki, Arizona State University
5:50 p.m.–6:10 p.m.	Beam Induced Artifacts during in situ Transmission Electron Microscopy Deformation of Nanocrystalline and Ultrafine-grained Aluminum Films Beam Induced Artifacts during in situ Transmission Electron Microscopy Deformation of Nanocrystalline and Ultrafine-grained Aluminum Films Rohit Sarkar and Jagannathan Rajagopalan, Arizona State University; and Christian Rentenberger, University of Vienna



M4	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS OF 2D MATERIALS (11d)
ROOM 2505	SESSION CHAIR: Rouzbeh Shahsavari

4:30 p.m.–4:50 p.m.	Interface Adhesion Between 2D materials and Elastomers Measured by Buckle Delamination Nanshu Lu, Chris Brennan, Edward Yu, University of Texas at Austin
4:50 p.m.–5:10 p.m.	Tunable Friction of Monolayer MoS₂ by Control of Interfacial Chemistry Weibing Chen, Anthony George, Pulickel Ajayan and Jun Lou, Rice University
5:10 p.m.–5:30 p.m.	Junction Configuration-Induced Mechanisms Govern Elastic and Inelastic Deformations in Hybrid Carbon Nanomaterials Rouzbeh Shahsavari, Rice University
5:30 p.m.– 5:50 p.m.	Tunable Schottky Contacts in Two-dimensional Graphene and Phosphorene van der Waals heterojunction Tian Wang and Wei Hu, University of Science and Technology of China
5:50 p.m.–6:10 p.m.	The Importance of type of Mechanical Constraints on Structural Semiconducting-to-Metallic Phase Transition in Monolayer Transition Metal Dichalcogenides Yao Li, Karel-Alexander N. Duerloo, and Evan J. Reed, Stanford University

M4	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21d)
ROOM 1402	SESSION CHAIR: Antonios Kontsos

4:30 p.m.–4:50 p.m.	Interaction Between Crack Fronts and Dynamical Instabilities in Brittle Fracture Itamar Kolvin, Gil Cohen and Jay Fineberg, The Hebrew University of Jerusalem
4:50 p.m.–5:10 p.m.	The Role of Elastic Waves During Dynamic Rupture of Heterogenous Interfaces Fabian Barras, Jean-François Molinari, Ecole Polytechnique Fédérale de Lausanne; and Philippe H. Geubelle, University of Illinois Urbana Champaign
5:10 p.m.–5:30 p.m.	Dynamic Penetration and Bifurcation of a Crack at an Interface in a Transparent Bi-Layer: Visualization and Quantification Balamurugan M. Sundram and Hareesh V. Tippur, Auburn University
5:30 p.m.– 5:50 p.m.	Integrated Approach to Forward Modeling of Acoustic Emission in Ductile Fracture K.P. Baxevanakis, J. Cuadra, M. Mazzotti, I. Bartoli and A. Kontsos, Drexel University



M4	ENGINEERING EDUCATION: ENGINEERING EDUCATION (29b)
ROOM 1403	SESSION CHAIR: Dale McDonald
4:30 p.m.–4:50 p.m.	Utilization of Professors of Practice in Engineering Education: A Win-Win for Students Academia and Industry Tanya Dugat Wickliff, Texas A&M University
4:50 p.m.–5:10 p.m.	Petroleum Engineering Certificate Program at Midwestern State University Mahmoud Elsharafi, Midwestern State University
5:10 p.m.–5:30 p.m.	Describing Effective Teamwork for Engineering Students and Faculty Members Jeffrey Froyd, Texas A&M University
5:30 p.m.– 5:50 p.m.	Ups and Downs of a Senior Capstone Project Mohamed Salim Azzouz, Midwestern State University



T1

**MECHANICS OF FRACTURE AND DAMAGE:
STRENGTHENING AND TOUGHENING POLYMERS (22)**

ROOM 2401

SESSION CHAIR: Krishnaswamy Ravi-Chandar

- 9:10 a.m.– 9:50 a.m. **On Multiscale Modeling of Toughening in Polymer Rubber Blends-Keynote**
Thomas Seelig, Karlsruhe Institute of Technology
- 9:50 a.m.– 10:10 a.m. **Distributed Damage and Fracture in Elastomeric Polymer**
S. Heyden and M. Ortiz, California Institute of Technology; B. Li, Case Western Reserve University; and K. Weinberg, Universität Siegen
- 10:10 a.m.–10:30 a.m. **Identification of a Cohesive Model from the Analysis of the Crack Tip Displacement Fields From Digital Image Correlation at the Micron Scale**
R. Estevez, Université Grenoble Alpes; and J. Réthoré, Université de Lyon
- 10:30 a.m.–10:50 a.m. **Modeling of Morphology Evolution in Polymer Blends Based on Mixed Variational Potentials**
Andreas Krischok, Stanford University

T1

**MECHANOBIOLOGY:
MECHANOBIOLOGY & CELL MECHANICS (1e)**

ROOM 2402

SESSION CHAIR: Bin Chen

- 9:10 a.m.– 9:30 a.m. **Magnetoelectric Effect in Biological Cells**
Sana Krichen, University of Houston
- 9:30 a.m.– 9:50 a.m. **Nonuniform Breaking of Molecular Bonds, Peripheral Morphology, and Releasable Adhesion by Elastic Anisotropy in Bio-adhesive Contacts**
Yan Liu, Yanfei Gao, University of Tennessee
- 9:50 a.m.– 10:10 a.m. **Biophysical Insights into the Architecture of the Nuclear Envelope**
Mehdi Torbati, University of Houston; Tanmay Lele University of Florida; and Ashutosh Agrawal, University of Houston
- 10:10 a.m.–10:30 a.m. **Mathematical Modeling of Mitochondria Fission**
Ehsan Irajizad, University of Houston



T1

LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL–DYNAMICS, ESTIMATION & CONTROL OF AEROSPACE SYSTEMS (27a)

ROOM 2403

SESSION CHAIR: Srinivas R. Vadali

- 9:10 a.m.– 9:50 a.m. **Satellite Formations: Dynamics, Control and Navigation-Keynote**
K. Terry Alfriend, Texas A&M University
- 9:50 a.m.– 10:10 a.m. **Satellite Economic Preliminary Design of Navigation and Control Systems for Spacecraft Formations**
K. Fujimoto and K. Terry Alfriend, Texas A&M University
- 10:10 a.m.–10:30 a.m. **Impulsive Formation Keeping and Reconfiguration for Spacecraft Formation-Flying and Rendezvous**
S. D'Amico and L. Riggi, Stanford University
- 10:30 a.m.–10:50 a.m. **Simulating Relative Satellite Motion with a Second Order Hoots Theory**
K.W. Johnson, S.R. Vadali and K. Terry Alfriend, Texas A&M University

T1

MECHANICS OF SOFT MATERIALS–SOFT TISSUES MECHANICS: THEORETICAL CONSIDERATIONS, EXPERIMENTAL RESULTS AND APPLICATION (14c)

ROOM 2404

SESSION CHAIR: Michael Sacks

- 9:10 a.m.– 9:50 a.m. **Modeling the Enhancement of Extracellular Matrix Quantity and Quality in Large-Deformation Mechanically-Conditioned Tissue Engineering-Keynote**
J.S. Soares and M.S. Sacks, University of Texas at Austin
- 9:50 a.m.– 10:10 a.m. **Interrupted Suture Force Estimation for Skin Wound Closure: A Computational Approach**
Arnab Chanda, and Vinu Unnikrishnan, University of Alabama
- 10:10 a.m.–10:30 a.m. **A Non-logarithmic Set of invariants for Isotropic Elasticity that have Convenient "Orthogonal Properties"**
Arun R. Srinivasa, Texas A&M University



T1

**MECHANOBIOLOGY:
ANALYTICAL AND COMPUTATIONAL MODELING IN MECHANOBIOLOGY (3e)**

ROOM 2405

SESSION CHAIR: Ching-Hwa Kiang

- 9:10 a.m.– 9:30 a.m. **Single Molecule and Single Cell Approaches to the Mechanical Properties of Biomolecules and Live Cells (KEYNOTE SPEAKER)**
Ching-Hwa Kiang, Rice University
- 9:30 a.m.– 9:50 a.m. **Single Molecule and Single Cell Approaches to the Mechanical Properties of Biomolecules and Live Cells (KEYNOTE SPEAKER)**
Ching-Hwa Kiang, Rice University
- 9:50 a.m.– 10:10 a.m. **Lung Airway Tissue Strain Estimation Under Ventilation Breathing**
Israr B.M. Ibrahim, Parya Aghasafari, and Ramana Pidaparti, University of Georgia
- 10:10 a.m.–10:30 a.m. **Micromechanical Models on the Effect of Interface Properties in Nacre**
Sina Askarinejad, Nima Rahbar, Worcester Polytechnic Institute
- 10:30 a.m.–10:50 a.m. **On the Effective Properties of Porous Piezoelectric Medium with Matrix Material of Crystal Class 6**
Uziel Paulo da Silva, Adair Roberto Aguiar, Departamento de Engenharia de Estruturas – SET – EESC – USP and Julián Bravo Castellero, Universidad de La Habana San Lázaro y L

T1

**MECHANICS OF NANOSCALE PHENOMENA:
MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5i)**

ROOM 2406A

SESSION CHAIRS: Daniel Bufford and Yong Zhu

- 9:10 a.m.– 9:30 a.m. **A Molecular Dynamics Study of Dislocation Mobility in Heterogeneous Materials**
Rigelesaiyin Ji and Liming Xiong, Iowa State University
- 9:30 a.m.– 9:50 a.m. **Effect of Plastic Anisotropy on the Deformation Behavior of Bicrystalline, Ultrafinegrained Aluminum Films**
Ehsan Izadi, Jagannathan Rajagopalan, Arizona State University
- 9:50 a.m.– 10:10 a.m. **Determination of the Piezo-Spectroscopic Coefficients of Vibronic Bands of $\text{Al}_2\text{O}_3\text{Cr}^{3+}$ Obtained with Photo-Stimulated Luminescence Spectroscopy**
Hugo E. Peláez Pérez and P.K. Imbrie, Texas A&M University
- 10:10 a.m.–10:30 a.m. **Image Based Numerical Modeling of High-energy Ball Milled Intermetallic Systems**
S. Lee, A. Salvadori, and K. Matouš, University of Notre Dame
- 10:30 a.m.–10:50 a.m. **Effect of Water Molecules on the Nanostructure of Lignin-Carbohydrate Complex**
Sina Youssefian and Nima Rahbar, Worcester Polytechnic Institute



T1

**ARCHITECTURED MATERIALS & MANUFACTURING:
PROFESSOR MARY BOYCE/ENGINEERING SCIENCE MEDAL SYMPOSIUM (32a)**

ROOM 2406B

SESSION CHAIR: Ellen Arruda

- 9:10 a.m.– 9:30 a.m. **Sub-Tg Bonding of Amorphous Polymers: Means, Magnitudes and Mechanisms**
David M. Parks, Massachusetts Institute of Technology
- 9:30 a.m.– 9:50 a.m. **Characterization and Modeling of Nanoparticle Reinforced Polymeric Nanofiber Composites**
Zhouzhou Zhao, Ellen Arruda, University of Michigan; Keqin Cao, Intel Corporation
- 9:50 a.m.– 10:10 a.m. **Micromechanical Modeling of Layered Fibrous Networks with Applications to Biomaterials for Tissue Engineering**
James B. Carleton, Gregory Rodin, and Michael Sacks, University of Texas at Austin
- 10:10 a.m.–10:30 a.m. **Challenges and Process Development in Double-Sided Incremental Forming – A Brief Review**
Jian Cao, Kornel F. Ehmann, Zixuan Zhang, Newell Moser, Huaqing Ren, Ebot Ndip-Agbor, Jacob Smith, Qiang Zeng, Taekyung Lee, Huan Zhang, Northwestern University
- 10:30 a.m.–10:50 a.m. **On the Design of Flightworthy Gas Turbine Structures Using High Temperature Metal Alloys and Ceramic Matrix Composite Materials**
Apostolos Karafillis, General Electric Aircraft Engines

T1

**ARCHITECTURED MATERIALS & MANUFACTURING:
MECHANICS IN ENERGY STORAGE AND CONVERSION (36e)**

ROOM 2500

SESSION CHAIR: Hanqing Jiang

- 9:10 a.m.– 9:50 a.m. **Stress Evolution and Degradation Mechanisms in Li-ion Battery Materials-Keynote**
Brian W. Sheldon, Brown University
- 9:50 a.m.– 10:10 a.m. **Polysulfide Decompositions at the Anode Surface of Li/S Batteries**
Samuel Bertolini and Perla B. Balbuena; Texas A&M University
- 10:10 a.m.–10:30 a.m. **In-situ Measurement of Solid Electrolyte Interphase Evolution**
Insun Yoon, Allan F. Bower, Pradeep R. Guduru, Brown University
- 10:30 a.m.–10:50 a.m. **Nucleation and Growth of Fragments from Electrolyte Decomposition at the Surfaces of Silicon Anodes of Li-ion Batteries**
Fernando A. Soto, Edgar A. Prada and Perla B. Balbuena, Texas A&M University



T1

**ARCHITECTURED MATERIALS & MANUFACTURING:
ENGINEERING SCIENCE OF ARCHITECTURED MATERIALS (37e)**

ROOM 2501

SESSION CHAIR: Francois Barthelat

- 9:10 a.m.– 9:50 a.m. **Materials by Design: 3-Dimensional Architected Nanostructured Meta-Materials-Keynote**
Julia Greer, California Institute of Technology
- 9:50 a.m.– 10:10 a.m. **Wave Manipulation in Architected Materials: An Experimental Demonstration Bench Enabled by LEGO® Bricks**
Paolo Celli, Stefano Gonella, University of Minnesota
- 10:10 a.m.–10:30 a.m. **Topological Interlocked Hybrid Materials–Towards New Hierarchical Composite Materials**
Lee Djumas, Andrey Molotnikov, George P. Simon, Turi Estrin, Monash University
- 10:30 a.m.–10:50 a.m. **RVE Size Definition for Knitted Textile Architectures**
D. Liu, D. Christe, K. Mazur, S. Esola, C. Knittel, G. Dion, D. Breen and A. Kotsos, Drexel University

T1

MECHANICS OF SOFT MATERIALS: SOFT MECHANICAL STRUCTURES (16a)

ROOM 2502

SESSION CHAIR: Nanshu Lu

- 9:10 a.m.– 9:30 a.m. **Stretchability of Polymer Bonded and Polymer Embedded Serpentes**
Nanshu Lu, University of Texas at Austin
- 9:30 a.m.– 9:50 a.m. **Buckling Modes of Stiff Thin Films Tuned by the Micro-Patterns on Soft Substrate**
Xue Feng, Tsinghua University
- 9:50 a.m.– 10:10 a.m. **Crease Instability in the Eversion of the Incompressible Elastic Cylinder Tube**
Xudong Liang, University of California-San Diego
- 10:10 a.m.–10:30 a.m. **Shape Reconfigurable Soft Structures**
Babak Haghpanah, Jonathan Hopkins, and Lorenzo Valdevit, University of California-Irvine
- 10:30 a.m.–10:50 a.m. **Mechanics and Optics of Stretchable Elastomeric Microlens Array for Artificial Compound Eye Camera**
Zhengwei Li and Jianliang Xiao, University of Colorado Boulder



T1

**MECHANICS OF SOFT MATERIALS:
MECHANICS AND PHYSICS OF SOFT MATERIALS (19e)**

ROOM 2503

SESSION CHAIRS: Christian Linder and Teng Zhang

- 9:10 a.m.– 9:30 a.m. **Microcavitation as a Neuronal Damage Mechanism in Blast Traumatic Brain Injury**
Jon Estrada, Christian Franck, Brown University
- 9:30 a.m.– 9:50 a.m. **Predicting Fracture Energies and Crack-Tip Strain Fields in Soft Tough Materials**
Teng Zhang, Shaoting Lin, Hyunwoo Yuk and Xuanhe Zhao, Massachusetts Institute of Technology
- 9:50 a.m.– 10:10 a.m. **Degradation of Thermoset Shape Memory Polyurethanes and Foams**
Duncan J Maitland, Texas A&M University
- 10:10 a.m.–10:30 a.m. **Computational Modeling of Strain-induced Crystallization in Rubber Materials**
Reza Rastak and Christian Linder, Stanford University
- 10:30 a.m.–10:50 a.m. **Molecular Simulation Guided Constitutive Modeling on Finite Strain Viscoelasticity of Elastomers**
Ying Li, University of Connecticut; Shan Tang, Chongqing University; Martin Kröger, ETH Zürich; and Wing Kam Liu, Northwestern University

T1

**MECHANICS OF NANOSCALE PHENOMENA:
MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5e)**

ROOM 2504

SESSION CHAIRS: Nik Chawla and Pradeep Sharma

- 9:10 a.m.– 9:30 a.m. **Experimental Molecular Dynamics on Deformation of Metallic Nanowires**
Scott X. Mao, University of Pittsburgh
- 9:30 a.m.– 9:50 a.m. **Direct Observation of Plastic Deformation in Nanocrystalline TiN thin films at Ultra-low Stress: An In situ Nanoindentation Study**
Jie Jian, Joon Hwan Lee, Yue Liu, Fauzia Khatkhatay, Kaiyuan Yu, Qing Su, Xinghang Zhang, Liang Jiao, and Haiyan Wang, Texas A&M University
- 9:50 a.m.– 10:10 a.m. **Quantification of Dislocation Nucleation Stress in TiN through High-resolution In situ Indentation Experiments and First Principles Calculations**
N. Li, S.K. Yadav, X.Y. Liu, J. Wang, R.G. Hoagland, A. Misra, University of Michigan
- 10:10 a.m.–10:30 a.m. **In situ Fracture Investigations in Ceramic Nanocomposites**
Brian W. Sheldon, Sugeetha Vasudevan, Xin Liang, Brown University; Phillip E. Loya, Yingchao Yang, and Jun Lou, Rice University
- 10:30 a.m.–10:50 a.m. **Mechanical Characterization of Al-SiC Nanolaminate Composites using Micromechanical Testing Methods**
C. Mayer, S.S Singh, N. Chawla, Arizona State University; Y. Lingwei and J. Molina-Aldareguia, IMDEA Materials Institute; Y.L. Shen and N. Li, University of New Mexico; and N. Mara, Los Alamos National Laboratory



T1	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS OF 2D MATERIALS (11e)
ROOM 2505	SESSION CHAIR: Rui Huang

- 9:10 a.m.– 9:50 a.m. **Mechanics of Supported Graphene: Understanding and Controlling Wrinkles and Bubbles**
-Keynote
Kuan Zhang and Marino Arroyo, Universitat Politècnica de Catalunya-Barcelona Tech
- 9:50 a.m.– 10:10 a.m. **Rippllocations in Van der Waals Layers**
Sulin Zhang and Peng Zhao, Pennsylvania State University;
Akihiro Kushima and Ju Li, Massachusetts Institute of Technology
- 10:10 a.m.–10:30 a.m. **Characterizing the Selective Delamination of Graphene for Wafer Scale Fabrication**
Seung Ryul Na, S. Rahimi, Li Tao, Harry Chou, D. Akinwande, and K.M. Liechti,
The University of Texas at Austin
- 10:30 a.m.–10:50 a.m. **Statistical Effects of Thermal Rippling on van der Waals Interactions between Monolayer Graphene and its Substrate**
Peng Wang, Wei Gao, and Rui Huang, University of Texas at Austin

T1	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21e)
ROOM 1402	SESSION CHAIR: Leslie Lamberson

- 9:10 a.m.– 9:30 a.m. **Anisotropic Damage in Boron Carbide: Experiments and Constitutive Modeling**
L. Farbaniec, R.S. Ayyagari, J. Hogan, M. Shaeffer, N. Daphalapurkar,
and K.T. Ramesh, Johns Hopkins University
- 9:30 a.m.– 9:50 a.m. **Mixed-Mode Anisotropic Dynamic Fracture Characterization of Ti3SiC2**
Logan Shannahan, Leslie Lamberson, and Michel Barsoum, Drexel University
- 9:50 a.m.– 10:10 a.m. **Effect of Solvent Diffusion on Crack-tip Fields and Driving Force for Fracture of Hydrogels**
Nikolaos Bouklas, Chad M. Landis and Rui Huang, University of Texas at Austin
- 10:10 a.m.–10:30 a.m. **Elastic Fields Around Finite Faults with Shear- and Openingmode Cracks in Anisotropic Halfspace**
Ali Sangghaleh, Amirhossein Molavi Tabrizi, and Ernian Pan, University of Akron;
and W. Ashley Griffith, University of Texas at Arlington
- 10:30 a.m.–10:50 a.m. **Fast Assessment of the Endurance Limit on Aerospace Materials Using a Thermographic NDE Methodology**
D.A. Exarchos, E. Z. Kordatos, T.E. Matikas, University of Ioannina

**T1**
**ENGINEERING EDUCATION:
ENGINEERING EDUCATION AND INNOVATION (31a)**
ROOM 1403**SESSION CHAIR: Teri Reed**

9:10 a.m.– 9:30 a.m.	AggiE-Challenge: Multidisciplinary and Vertically Integrated Undergraduate Teams Working on Grand Challenges Magdalini Lagoudas, Texas A&M University
9:30 a.m.– 9:50 a.m.	Fundamentals of Mechanics Essential for Modeling Based Engineering Sheldon Wang, Midwestern State University
9:50 a.m.– 10:10 a.m.	Aggies Invent – An Intensive Design Experience Challenging Students to Solve Problems in 48 Hours Rodney Boehm, Texas A&M University
10:10 a.m.–10:30 a.m.	SpaceX Hyperloop Pod Competition Greg Chamitoff, Magdalini Lagoudas and Rodney Boehm, Texas A&M University
10:30 a.m.–10:50 a.m.	General Discussion



T2	MECHANICS OF NANOSCALE PHENOMENA: BEHAVIOR & MECHANICS OF ACTIVE MATERIALS & STRUCTURES (12a)
ROOM 2401	SESSION CHAIRS: Dimitris Lagoudas and Theocharis Baxevanis

11:10 a.m.– 11:50 a.m.	Effects of Localization in Pseudoelastic NiTi-Keynote Stelios Kyriakides, Nathan Bechle, University of Texas at Austin
11:50 a.m.– 12:10 p.m.	Thermomechanically-Induced Fracture in Shape Memory Alloys Theocharis Baxevanis, Sameer Jape, and Dimitris C. Lagoudas, Texas A&M University
12:10 p.m.–12:30 p.m.	Dynamic behavior of Martensitic NiTi Shape Memory Alloys Ying Qiu, Marcus L. Young, University of North Texas; Xu Nie, Southern Methodist University
12:30 p.m.–12:50 p.m.	Reversible Axial Buckling of Pseudoelastic NiTi Shell Dongjie Jiang, Nathan Bechle, Chad M. Landis, Stelios Kyriakides, University of Texas at Austin

T2	ARCHITECTURED MATERIALS & MANUFACTURING: MECHANICS IN ENERGY STORAGE & COVERSION (36f)
ROOM 2402	SESSION CHAIRS: Alberto Salvadori and Hanqing Jiang

11:10 a.m.– 11:50 a.m.	Direct Measurements of Li-Si Composition, Volume Expansion and Modulus Variation of Amorphous Si after Electrochemical Lithiation-Keynote Xu Wang, Sudhanshu S. Singh, Teng Ma, Nikhilesh Chawla, and Hanqing Jiang, Arizona State University
11:50 a.m.– 12:10 p.m.	Measurement of Fracture Energy of Lithiated Silicon as a Function of Lithium Concentration Michael J. Chon, Allan F. Bower, Pradeep R. Guduru; Brown University
12:10 p.m.–12:30 p.m.	Fracture Toughness Measurement of Lithiated Silicon Electrodes from Atomic Simulation Haoran Wang, Huck Beng Chew; University of Illinois Urbana Champaign
12:30 p.m.–12:50 p.m.	A Study of Stress and Damage Evolution during Electrochemical Cycling of Lithium Ion Battery Cathodes Jay Sheth, Naba K. Karan, Brian Sheldon and Pradeep R. Guduru; Brown University



T2	LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL–DYNAMICS, ESTIMATION & CONTROL OF AEROSPACE SYSTEMS (27b)
ROOM 2403	SESSION CHAIR: Robert E. Skelton

11:10 a.m.– 11:50 a.m.	The Interdisciplinary Task of Modeling Dynamics for Simulation or Control-Keynote Robert E. Skelton, Texas A&M University
11:50 a.m.– 12:10 p.m.	Time Varying Covariance Equivalent Realizations Manoranjan M. Majji, The University at Buffalo
12:10 p.m.–12:30 p.m.	Approximate Component Cost Analysis for Large Scale Systems Karolos Grigoriadis, University of Houston
12:30 p.m.–12:50 p.m.	Retro-Directive Array Power Transmission for the Power Star™ Satellite David Hyland, Texas A&M University

T2	MECHANICS OF SOFT MATERIALS–SOFT TISSUES MECHANICS: THEORETICAL CONSIDERATIONS, EXPERIMENTAL RESULTS AND APPLICATION (14d)
ROOM 2404	SESSION CHAIR: Alan Freed

11:10 a.m.– 11:50 a.m.	A New formulation of Slight Compressibility for Arterial Tissue and Its Finite Element Implementation-Keynote Jeremiah Murphy, Dublin City University
11:50 a.m.– 12:10 p.m.	Micro-structural and Biaxial Creep Properties of the Swine Uterosacralcardinal Ligament Complex Ting Tan, Nathan M. Cholewa, Scott W. Case, and Raffaella De Vita, Virginia Polytechnic Institute and State University
12:10 p.m.–12:30 p.m.	A Novel Fiber-level Structural Constitutive Model for Viable Right Ventricular Myocardium Reza Avazmohammadi, Will Zhang, and Michael Sacks, University of Texas at Austin Michael Hill, University of Nottingham; and Marc Simon, University of Pittsburgh
12:30 p.m.–12:50 p.m.	A Promising Approach for Modeling Biological Fibers Alan Freed and Kumbakonam Rajagopal, Texas A&M University



T2	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS AND CHARACTERIZATION OF MICRO/NANOPOROUS MATERIALS AND APPLICATIONS IN ENERGY AND ENVIRONMENTS (7a)
-----------	--

ROOM 2405	SESSION CHAIR: Baoxing Xu
------------------	----------------------------------

- | | |
|------------------------|---|
| 11:10 a.m.– 11:50 a.m. | Nano-Architected Meta-Materials for Energy Storage-Keynote
Julia Greer, X. Xia, D. Tozier, C. Xu., and B.M. Gallant, California Institute of Technology |
| 11:50 a.m.– 12:10 p.m. | Metallic Glue in Ambient Environment
Hanchen Huang, Northeastern University |
| 12:10 p.m.–12:30 p.m. | Size- and Shape-Controlled Fabrication of Novel Calcium-Silicate Membranes for Gas Storage and Separation
Rouzbeh Shahvari, Rice University |
| 12:30 p.m.–12:50 p.m. | Study of Corrosivity of Molten Salt Nanofluids
Harsh Tamakuwala, Binjian Ma, Debjyoti Banerjee, Texas A&M University |

T2	MECHANICS OF NANOSCALE PHENOMENA: PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4e)
-----------	--

ROOM 2406A	SESSION CHAIR: Xuanhe Zhao
-------------------	-----------------------------------

- | | |
|------------------------|---|
| 11:10 a.m.– 11:30 a.m. | Study on Deformation-Crinkle Properties of Multilayer Graphene
Kyung-Suk Kim, Brown University |
| 11:30 a.m.– 11:50 a.m. | Soft Network Composite Materials with Deterministic and Bio-Inspired Designs-Keynote
Haiwen Luan, Huanyu Cheng, Fuxing Miao, Yihui Zhang, and Yonggang Huang, Northwestern University |
| 12:10 p.m.–12:30 p.m. | In situ Mechanics at Atomic Scale-Experimental Molecular Dynamics
Scott X. Mao, University of Pittsburg |
| 12:30 p.m.–12:50 p.m. | Wrinkling Crystallography on Curved Surfaces
Pedro M. Reis, Massachusetts Institute of Technology |



T2	ARCHITECTURED MATERIALS & MANUFACTURING: PROFESSOR MARY BOYCE/ENGINEERING SCIENCE MEDAL SYMPOSIUM (32b)
ROOM 2406B	SESSION CHAIR: Jian Cao
11:10 a.m.– 11:30 a.m.	Assembly of Micro/nanomaterials into Complex, Three Dimensional Architectures by Compressive Buckling Yihui Zhang, Haoran Fu, Guoyan Zhou, Huanyu Cheng, and Yonggang Huang, Northwestern University
11:30 a.m.– 11:50 a.m.	Actuated 3D Origami-like Structures with Tunable Volume and Stiffness Katia Bertoldi, Harvard University
11:50 a.m.– 12:10 p.m.	Design of Bio-inspired Armor: Flexibility and Protection Stephan Rudykh, Technion-Israel Institute of Technology; Christine Ortiz, Massachusetts Institute of Technology; Mary C. Boyce, Columbia University
12:10 p.m.–12:30 p.m.	Bio-inspired Structural Composites for Vibration Mitigation and Impact Resistance Lifeng Wang, Stony Brook University
12:30 p.m.–12:50 p.m.	Design of Hierarchically Cut Hinges for Highly Stretchable and Reconfigurable Metamaterials with Enhanced Strength Yichao Tang, Gaojian Lin, Songgang Qiu, and Jie Yin, Temple University; Lin Han, Drexel University; Shu Yang, University of Pennsylvania
T2	FLUID MECHANICS: HYPERSONIC AEROTHERMOCHEMISTRY (39a)
ROOM 2500	SESSION CHAIR: Ivett Leyva
11:10 a.m.– 11:30 a.m.	High Enthalpy Hypersonic Experiments: Bridging the Scales Joanna M. Austin, California Institute of Technology
11:30 a.m.– 11:50 a.m.	Development of Novel Laser-Based Diagnostics for Complex Hypersonic Flows Simon W. North, Texas A&M University
11:50 a.m.– 12:10 p.m.	Experimental Measurements and Computations in High-enthalpy Leading-edge Separation Tremayne Kaseman, Ram Prakash, Amna Khraibut, Sudhir Gai, and Sean O'Byrne, University of New South Wales
12:10 p.m.–12:30 p.m.	Expansion Tube Studies of Non-equilibrium Nitrogen Flows Richard Morgan, Tim McNytre, and Anand Veeraragavan, Centre for Hypersonics, The University of Queensland, Brisbane Australia
12:30 p.m.–12:50 p.m.	Implementation of a Higher-Order Flow Solver for Investigation of Turbulent, High Strain Flows Raymond L. Fontenot and Paul G. A. Cizmas, Texas A&M University



T2	ARCHITECTURED MATERIALS & MANUFACTURING: ENGINEERING SCIENCE OF ARCHITECTURED MATERIALS (37f)
ROOM 2501	SESSION CHAIR: Thomas Siegmund

11:10 a.m.– 11:30 a.m.	An Investigation of the Role of Microstructure in Affecting the Strength and Toughness Properties in Marine Glass Fibers Michael A Monn, Jarod Ferreira, and Haneesh Kesari, Brown University
11:30 a.m.– 11:50 a.m.	Analysis of Naturally-occurring and Biomimetic Rod Like Microstructures E. Escobar de Obaldia, P. Zavattieri, C. Jeong, Purdue University; S. Herrera, L. Grunenfelder, and D. Kisailus, University of California
11:50 a.m.– 12:50 p.m.	General Discussion

T2	MECHANICS OF SOFT MATERIALS: SOFT MECHANICAL STRUCTURES (16b)
ROOM 2502	SESSION CHAIR: James Hanna

11:10 a.m.– 11:30 a.m.	A Conserved Quantity in Thin Body Dynamics J.A. Hanna and H. Pendar, Virginia Polytechnic Institute and State University
11:30 a.m.– 11:50 a.m.	Buckling of a Prismatic Solid with Large Pre-stress: Competition of Microscopic and Macroscopic Instabilities Claire Lestringant and B. Audoly, Sorbonne Universités
11:50 a.m.– 12:10 p.m.	Isometric Immersions, Energy Minimization and Self Similar Buckling in Non-Euclidean Elastic Sheets John Gemmer, Brown University
12:10 p.m.–12:30 p.m.	Reconfiguring Origami Tubes with Polygonal Cross-sections Evgueni T. Filipov, University of Illinois Urbana Champaign; Glaucio H. Paulino, Georgia Institute of Technology; and Tomohiro Tachi, University of Tokyo



T2	MECHANICS OF SOFT MATERIALS: MECHANICS AND PHYSICS OF SOFT MATERIALS (19f)
ROOM 2503	SESSION CHAIR: Gal deBotton and Shawn A. Chester
11:10 a.m.– 11:30 a.m.	Microstructural Motivated Analysis of the Electromechanical Coupling in Dielectric Elastomers Gal deBotton and Noy Cohen, Ben-Gurion University
11:30 a.m.– 11:50 a.m.	Modeling Light Active Shape Memory Polymers Craig Hamel and Shawn A. Chester, New Jersey Institute of Technology
11:50 a.m.– 12:10 p.m.	Modeling the Mechanical Behaviour of Temperature Memory Polymers Swapnil Moon, Northeastern University; I. Joga Rao and Shawn A. Chester, New Jersey Institute of Technology Boston
12:10 p.m.–12:30 p.m.	Development of a Finite Element Method for Light Activated Polymers Craig Hamel and Shawn A. Chester, New Jersey Institute of Technology
12:30 p.m.–12:50 p.m.	A Mutiscale Approach for Modeling Actuation Response of Polymeric Artificial Muscles Soodabeh Sharafi, Guoqiang Li, Louisiana State University
T2	MECHANICS OF NANOSCALE PHENOMENA: MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5f)
ROOM 2504	SESSION CHAIRS: Douglas E. Spearot and Niaz Abdolrahim
11:10 a.m.– 11:30 a.m.	Understanding Gradient Nanograins by Crystal Plasticity and Molecular Dynamics Simulations Ting Zhu, Georgia Institute of Technology
11:30 a.m.– 11:50 a.m.	A New Model for Anisotropic Grain Boundaries: A Geometric and Variational Approach for Predicting Energy and Morphology Brandon Runnels, Michael Ortiz, California Institute of Technology; and Irene J. Beyerlein, Los Alamos National Laboratory
11:50 a.m.– 12:10 p.m.	Bridging Time-scales: Slow Strain Rate Mechanical Behavior Using Atomistic Simulations Xin Yan, Pradeep Sharma, University of Houston
12:10 p.m.–12:30 p.m.	Understanding the Effects of Dislocation Emissions and Crystallographic Textures on Grain-size Dependent Behavior of Nanocrystalline Metals Caizhi Zhou, Rui Yuan, Missouri University of Science and Technology; and Irene J. Beyerlein, Los Alamos National Laboratory
12:30 p.m.–12:50 p.m.	A Molecular Dynamics Study of the Role of Grain Size and Orientation on Compression of Nanocrystalline Cu during Shock Mehrdad M. Sichani, Douglas E. Spearot, University of Arkansas



T2	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS OF 2D MATERIALS (11f)
ROOM 2505	SESSION CHAIR: Eduard Karpov

- | | |
|------------------------|--|
| 11:10 a.m.– 11:30 a.m. | Elastic Deformations in 2D van der Waals Heterostructures and Their Impact on Optoelectronic Properties: Predictions From a Multiscale Computational Approach
Hemant Kumar, Dequan Er, Liang Dong, Junwen Li and Vivek B. Shenoy, University of Pennsylvania |
| 11:30 a.m.– 11:50 a.m. | Mechanics of Weakly-Bonded Incommensurate Atomic Bilayers
Ilia Nikiforov and Ellad B. Tadmor, University of Minnesota |
| 11:50 a.m.– 12:10 p.m. | Cauchy-Born rule for Incommensurate Systems of Coupled Atomic Chains
Paul Cazeaux, M. Luskin, I. Nikiforov, E. Tadmor School of Mathematics, University of Minnesota |
| 12:10 p.m.–12:30 p.m. | Domain Reduction Boundary Conditions in Molecular Mechanics of Graphene and Other Nanocrystalline Material
Eduard G. Karpov, University of Illinois at Chicago |
| 12:30 p.m.–12:50 p.m. | Pattern Formation in the Three-dimensional Deformations of Fibered Sheets
Francesco dell'Isola, Ivan Giorgio, David Steigmann, University of Rome La Sapienza |

T2	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21f)
ROOM 1402	SESSION CHAIR: Krishnaswamy Ravi-Chandar

- | | |
|------------------------|---|
| 11:10 a.m.– 11:50 a.m. | Dynamic Crack Propagation in Thermo-Visco-Elastic-Plastic Solid-Keynote
Jiaoyan Li, Leyu Wang and James D. Lee, The George Washington University |
| 11:50 a.m.– 12:10 p.m. | Initiation and Growth of Cracks Under Combined Mixedmode I+III
K.H. Pham and K. Ravi-Chandar, The University of Texas at Austin |
| 12:10 p.m.–12:30 p.m. | A Fracture Mechanics Study of Shape Memory Alloys Under Actuation
Sameer Jape, Theodoros Baxevanis, and Dimitrios C. Lagoudas, Texas A&M University |



T2 ROOM 1403	ENGINEERING EDUCATION: ENGINEERING EDUCATION AND INNOVATION (31b) SESSION CHAIR: Sheldon Wang
11:10 a.m.– 11:30 a.m.	Linear Control Systems Courses and Undergraduate Research: A New Perspective Dale B. McDonald, Midwestern State University
11:30 a.m.– 11:50 a.m.	New Environment for Learning and Teaching Experimental Mechanics K. Ramesh, IIT Madras
11:50 a.m.– 12:10 p.m.	Lessons Learned From a Successful NSF S-STEM Grant Michael Shipley, Midwestern State University
12:10 p.m.–12:30 p.m.	Enhancing Engineering Student Experiences with Augmented Reality (AR) Prasad Enjeti, Texas A&M University



T3	MECHANICS OF NANOSCALE PHENOMENA: BEHAVIOR & MECHANICS OF ACTIVE MATERIALS & STRUCTURES (12b)
ROOM 2401	SESSION CHAIRS: Marcus Young and Majid Tabesh

2:00 p.m.– 2:20 p.m.	Modeling Shape Memory Alloys Crystalline Transformation Responses Using an Anisotropic Yield Surface Darren J. Hartl, Texas A&M University; Björn Kiefer and Robin Schulte, Technical University of Dortmund; and Andreas Menzel, Lund University
2:20 p.m.– 2:40 p.m.	Predictive Modeling of the Constitutive Response of Precipitation Hardened Ni-rich NiTi SMAs Dimitris C. Lagoudas, Austin Cox, and Theodoros Baxevanis, Texas A&M University
2:40 p.m.– 3:00 p.m.	Modeling NiTi Superelasticity in Presence of Nanoprecipitates Piyas Chowdhury, Luca Patriarca, and Huseyin Sehitoglu, University of Illinois Urbana Champaign; and Guowu Ren, Chinese Academy of Engineering Physics
3:00 p.m.–3:20 p.m.	Precipitate Growth for Short Aging Times of a NiTiHf High Temperature Shape Memory Alloy Matthew Carl, Brian Van Doren, Scott Schlegel, and Marcus L. Young, University of North Texas
3:20 p.m.–3:40 p.m.	Slip Resistance of Ti based Shape Memory Alloys A. Ojha and Huseyin Sehitoglu, University of Illinois Urbana Champaign

T3	MECHANICS OF SOFT MATERIALS: MULTI-SCALE MECHANICS OF PARTICULATE MEDIA (17a)
ROOM 2402	SESSION CHAIR: Rich Regueiro

2:00 p.m.– 2:40 p.m.	Modeling of Gravity-Driven, Dense Granular Flow-Keynote Daren Liu and David L. Henann, Brown University; Ken Kamrin, Massachusetts Institute of Technology
2:40 p.m.– 3:00 p.m.	Modeling Density Segregation in Bidisperse Granular Flow Paul B. Umbanhowar, Hongyi Xiao, Julio M. Ottino, Richard M. Lueptow, Northwestern University
3:00 p.m.–3:20 p.m.	Rheological Behavior of Partially-wet Granular Matter Ramin Ghelichi and K. Kamrin, Massachusetts Institute of Technology
3:20 p.m.–3:40 p.m.	Non-Equilibrium Thermodynamics of Fault Gouge: Effect of Grain Contact Processes Ahmed Elbanna, University of Illinois Urbana Champaign; and Charles Lieou, Jean Carlson, University of California, Santa Barbara



T3

**LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL-DYNAMICS,
ESTIMATION & CONTROL OF AEROSPACE SYSTEMS (27c)**

ROOM 2403

SESSION CHAIR: K. Terry Alfrend

- 2:00 p.m.– 2:40 p.m. **Changing Course with the Magnetospheric MultiScale Mission-Keynote**
R.C. Carpenter, NASA Goddard Space Flight Center
- 2:40 p.m.– 3:00 p.m. **Guidance, Navigation, and Control for the CubeSat Proximity Operations Demonstration (CPOD) Mission**
C.W.T. Roscoe, J.J. Westphal, and J.A. Bowen, Applied Defense Solutions
- 3:00 p.m.–3:20 p.m. **Spacecraft Formation Dynamics Using Variational Equations for First-order Relative Motion Invariants**
T. Bennett and H. Schaub, University of Colorado
- 3:20 p.m.–3:40 p.m. **Guidance and Control for Spacecraft Planar Relative Maneuvering via Input Shaping and Differential Drag**
R. Bevilacqua, University of Florida

T3

**ARCHITECTURED MATERIALS & MANUFACTURING:
MECHANICS IN ENERGY STORAGE & CONVERSION (36g)**

ROOM 2404

SESSION CHAIR: Ali Ghahremaninezhad

- 2:00 p.m.– 2:40 p.m. **Polarized Infrared Characterization of Dislocations and Grain Boundaries in Photovoltaic Silicon-Keynote**
T.-W. Lin, H. T. Johnson, University of Illinois Urbana Champaign; and
H. Tummala, M. Fivel, Université Grenoble-Alpes
- 2:40 p.m.– 3:00 p.m. **Tailorable Thermal Expansion of Alloy**
D. Gehring, R. Arroyave, and I. Karaman, Texas A&M University;
and J.A. Monroe, Texas A&M Engineering Experiment Station
- 3:00 p.m.–3:20 p.m. **Role of Electrolytes on the Anode Reduction Reactions of Li/S Batteries**
Taylor Smith and Perla B. Balbuena, Texas A&M University
- 3:20 p.m.–3:40 p.m. **Solubility and Dissociation of Polysulfides on Cathode-Composite Materials of Li/S Batteries**
Ethan Kamphaus, Fernando A. Soto, and Perla B. Balbuena, Texas A&M University



T3	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS AND CHARACTERIZATION OF MICRO/NANOPOROUS MATERIALS AND APPLICATIONS IN ENERGY AND ENVIRONMENTS (7b)
-----------	--

ROOM 2405	SESSION CHAIR: Weiyi Lu
------------------	--------------------------------

- | | |
|----------------------|--|
| 2:00 p.m.– 2:40 p.m. | Mechanical Characterization of Nanoporous Thin films for Electronics, Energy and Anti-wear Applications-Keynote
Junlan Wang, University of Washington |
| 2:40 p.m.– 3:20 p.m. | Biological Micro/Nanoporous Materials for Energy Storage-Keynote
Xiaodong Li, University of Virginia |
| 3:20 p.m.–3:40 p.m. | Nanomechanical Properties of Density Modulated Nanoporous Tungsten Thin Films
Tanil Ozkan and Andreas A. Polycarpou, Texas A&M University;
Taha Demirkan, Tansel Karabacak, University of Arkansas; and Kathy Walsh, University of Illinois |

T3	MECHANICS OF NANOSCALE PHENOMENA: PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4f)
-----------	--

ROOM 2406A	SESSION CHAIR: Pedro Reis
-------------------	----------------------------------

- | | |
|----------------------|---|
| 2:00 p.m.– 2:20 p.m. | Rupture Behaviors of Receptor—Ligand Bond at Ultralow Loading Rate
Dechang Li and Baohua Ji, Beijing Institute of Technology |
| 2:20 p.m.– 2:40 p.m. | Concurrent Barrier-crossing of Molecular Bonds in Series: Implications in Dynamics Force Spectroscopy
Jin Qian, Zhejiang University |
| 2:40 p.m.– 3:00 p.m. | Deformation and Relaxation of a Visco-elastic Vesicle in a Viscous Fluid
Liping Liu, Rutgers University |
| 3:00 p.m.–3:20 p.m. | The Effect of Elastic Strain on Catalytic Activity: A Case Study on Hydrogen Evolution Reaction
Pradeep R. Guduru, Brown University |
| 3:20 p.m.–3:40 p.m. | Electrets in Soft Materials
Pradeep Sharma, University of Houston |



T3	ARCHITECTURED MATERIALS & MANUFACTURING: PROFESSOR MARY BOYCE/ENGINEERING SCIENCE MEDAL SYMPOSIUM (32c)
ROOM 2406B	SESSION CHAIR: Katia Bertoldi

2:00 p.m.– 2:20 p.m.	Mechanoresponsive Glassy Polymers: Time, Temperature, and Loading Mode Dependence Meredith Silberstein and Jaewoo Kim, Cornell; University Zhao, Massachusetts Institute of Technology; Gregory R. Gossweiler and Stephen L. Craig, Duke University
2:20 p.m.– 2:40 p.m.	Mechanics of a Family of Auxetic Chiral Structures Yunhao Jiang and Yaning Li, University of New Hampshire
2:40 p.m.– 3:00 p.m.	Energy Storage and Structural Evolution During Inelastic Deformation of Glassy Polymers Thao (Vicky) Nguyen, Johns Hopkins University
3:00 p.m.–3:20 p.m.	A Glass-transition Constitutive Model for Polymethyl Methacrylate and its Ability to Predict Microchannel Hot Embossing using Multi-scale Finite Element Simulations Rebecca B. Dupaix and Danielle Mathiesen, Ohio State University
3:20 p.m.–3:40 p.m.	Evolution of Interface Properties during Surface Welding in Covalent Adaptable Network Polymers Kai Yu, and H. Jerry Qi, Georgia Institute of Technology

T3	FLUID MECHANICS: HYPERSONIC AEROTHERMOCHEMISTRY (39b)
ROOM 2500	SESSION CHAIR: John Schmisser

2:00 p.m.– 2:20 p.m.	State Resolved Analyses of High Temperature Energy Transfer Processes in Oxygen Iain D. Boyd, Daniil Andrienko, and Kevin Neitzel, University of Michigan
2:20 p.m.– 2:40 p.m.	Construction of Non-equilibrium Hydro Dynamic Models for Atmospheric Entry Plasmas Marco Panesi, University of Illinois at Urbana-Champaign
2:40 p.m.– 3:00 p.m.	Fundamental Aspects of Turbulent Flows in Thermal Non-equilibrium: Theory and Direct Numerical Simulations D.A. Donzis, Texas A&M University
3:00 p.m.–3:20 p.m.	Multi-scale Interaction of Vibrational Energy Transfer and Turbulent Combustion Romain Fievet, Timothy Haller, Heath Reising, Stephen Voelkel, Noel Clemens, Venkat Raman, and Philip Varghese, The University of Texas at Austin & University of Michigan
3:20 p.m.–3:40 p.m.	Dynamics of Internal Energy Relaxation and Dissociation in Hypersonic Flows Graham V. Candler, Thomas E. Schwartzenruber, Paolo Valentini and Jason D. Bender, Aerospace Engineering & Mechanics University of Minnesota



T3	MECHANICS OF NANOSCALE PHENOMENA: ADVANCES IN CONTINUUM MECHANICS AND COMPUTATIONAL ENGINEERING SCIENCE–J.N. REDDY (28a)
ROOM 2501	SESSION CHAIR: Roy Samit
2:00 p.m.– 2:40 p.m.	Multiscale Modeling for Structural Integrity of Composite Materials-Keynote Ramesh Talreja, Texas A&M University
2:40 p.m.– 3:00 p.m.	Mesoscale Material Properties Fields; Partitioning Strategies and Probabilistic Descriptions Sarah Baxter and Katherine Acton, University of St. Thomas
3:00 p.m.–3:20 p.m.	Analyses of Flexible and Foldable Electro-Active Composite Plates Vahid Tajeddini and Anastasia Muliana, Texas A&M University
3:20 p.m.–3:40 p.m.	Investigation of the Effect of Inaccurate Geometric Mapping in a Circularly Curved Solid Element Samit Roy and Abhishek Kumar, University of Alabama
T3	MECHANICS OF FRACTURE AND DAMAGE: DUCTILE FRACTURE (20a)
ROOM 2502	SESSION CHAIR: Amine Benzerga
2:00 p.m.– 2:20 p.m.	Critical Hardening Rate Model To Predict Ductile Fracture After Non-Proportional Loading J.M. Stephane, Massachusetts Institute of Technology; and Dirk Mohr, Swiss Federal Institute of Technology
2:20 p.m.– 3:00 p.m.	Simulation of Ductile Failure Using a Regularized GTN Model: Application to a Low Carbon Construction Steel-Keynote J. Besson and Y. Zhang, Mines ParisTech; and E. Lorentz, Departement Analyses Mécaniques et Acoustique
3:00 p.m.–3:20 p.m.	Temperature and Strain Rate Effects on the Damage and Fracture of AZ31B Magnesium Alloy A.K. Rodriguez and A.A. Benzerga, Texas A&M University; and G. Ayoub, Texas A&M University at Qatar
3:20 p.m.–3:40 p.m.	Porosity Evolution in a Creeping Single Crystal: Effect of the Lode Parameter Ankit Srivastava and Alan Needleman, Texas A&M Univeristy



T3	MECHANICS OF SOFT MATERIALS: MECHANICS AND PHYSICS OF SOFT MATERIALS (19g)
ROOM 2503	SESSION CHAIR: David Clarke
2:00 p.m.– 2:20 p.m.	Mechanics of Mechanochemically Responsive Elastomers Qiming Wang, University of Southern California; Xuanhe Zhao, Massachusetts Institute of Technology; Gregory R. Gossweiler, Stephen L. Craig, Duke University
2:20 p.m.– 2:40 p.m.	Flexoelectricity in Molecular Dipole Electrets Zeinab Alameh, University of Houston
2:40 p.m.– 3:00 p.m.	Electric Field Induced Nanowire Electrode/Dielectric Elastomer Interactions Samuel Shian, Ehsan Hajiesmaili and David R. Clarke, Harvard University
3:00 p.m.–3:20 p.m.	Electro-mechanical Instability in Dielectric Elastomer Rajeev Kumar, Sumit Basu, Indian Institute of Technology Kanpur
3:20 p.m.–3:40 p.m.	Designing Morphologies in Thin Nematic Glass Sheets Paul Plucinsky, Marius Lemm, and Kaushik Bhattacharya, California Institute of Technology
T3	MECHANICS OF NANOSCALE PHENOMENA: MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5g)
ROOM 2504	SESSION CHAIRS: Brad Boyce and Jens Bauer
2:00 p.m.– 2:20 p.m.	Large Anelasticity and Associated Energy Dissipation in Single-Crystalline Nanowires Guangming Cheng, Yong Zhu, North Carolina State University; Chunyang Miao, and Huajian Gao, Brown University
2:20 p.m.– 2:40 p.m.	Characterization of High Temperature Crack Tip Plasticity and Size Effect in Alloy 617 Using Nanomechanical Raman Spectroscopy and High Temperature Indentation Yang Zhang, Vikas Tomar, Purdue University
2:40 p.m.– 3:00 p.m.	Study on How to Remove Substrate Effects of Nano-indentation on Sub-10-nm Thin Films Youfeng Zhang, Andreas A. Polycarpou, Texas A&M University
3:00 p.m.–3:20 p.m.	Tensile Characterization of Ultra-Strong alumina Thin Films Applying Additively Manufactured Micro-push-to-pull Mechanisms Jens Bauer, Almut Schroer, Ruth Schwaiger, Lorenzo Valdevit, and Oliver Kraft, Karlsruhe Institute of Technology and University of California
3:20 p.m.–3:40 p.m.	Detecting Abnormal Grain Growth During Fatigue of Nanocrystalline Ni-Fe Brad L. Boyce, Timothy A. Furnish, Sandia National Laboratories



T3	MECHANICS OF NANOSCALE PHENOMENA: SMALL SCALE PLASTICITY (6a)
ROOM 2505	SESSION CHAIR: John L. Bassani

- | | |
|---------------------|---|
| 2:00 p.m.–2:20 p.m. | On the Relationship Among Lattice Misorientation Field, Strain Gradient Effects, and Indentation Size Effects
Yanfei Gao, University of Tennessee and Oak Ridge National Laboratory;
Lucia Nicola, Delft University of Technology; Bennett C. Larson, Oak Ridge National Laboratory; and
George M. Pharr, University of Tennessee |
| 2:20 p.m.–2:40 p.m. | Thermally Activated Deformation Mechanism in Glasses
Yue Fan, Takuya Iwashita, and Takeshi Egami, Oak Ridge National Laboratory |
| 2:40 p.m.–3:00 p.m. | On Size Effects in Single Crystal Wedge Indentation
Christian F. Niordson, Technical University of Denmark |
| 3:00 p.m.–3:20 p.m. | Non-localized Deformation in Metallic Glasses with Pre-existing Shear Bands
Shaoxing Qu, Zhejiang University |
| 3:20 p.m.–3:40 p.m. | Deformation-Induced Microstructural Evolution at Grain Scale
Grethe Winther, Technical University of Denmark |

T3	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21g)
ROOM 1402	SESSION CHAIR: Ahmed Elbana

- | | |
|---------------------|--|
| 2:00 p.m.–2:20 p.m. | Cracking the crack: What do we Learn from the Statistical Properties of Fracture Surfaces?
Laurent Ponson, Institut Jean le Rond d'Alembert; Stéphane Vernède, Tortoise Analytic;
and Jean-Philippe Bouchaud, Capital Fund Management |
| 2:20 p.m.–2:40 p.m. | Micromechanics of Ductile Fracture in Multiphase Advanced High Strength Steels
Daniel Gerbig, Ankit Srivastava, Allan F. Bower, Brown University |
| 2:40 p.m.–3:00 p.m. | Micromechanics of Ultra-low Cycle Fatigue
Ravi Kiran Yellavajjala, Brown University; and Kapil Khandelwal, Notre Dame |
| 3:00 p.m.–3:20 p.m. | Influence of Grain Breakage on Plasticity and Fracture in Amorphous Materials
Ahmed Elbanna and Xiao Ma, University of Illinois Urbana Champaign;
Jean M. Carlson and Charles Lieou, University of California Santa Barbara |



T3	MECHANICS OF SOFT MATERIALS: SOFT MECHANICAL STRUCTURES (16c)
ROOM 1403	SESSION CHAIR: Xiaoming Mao
2:00 p.m.– 2:20 p.m.	Use of Architected Fiber Structures to Create Novel Dielectric Elastomer Based “Grippers” for Soft Robotics Samuel Shian, Lydia Abune, Katia Bertoldi and David R. Clarke, Harvard University
2:20 p.m.– 2:40 p.m.	Phase boundaries with discontinuous stretch and twist in DNA Qingze Zhao, University of Pennsylvania
2:40 p.m.– 3:00 p.m.	Domain Wall Solitons as Robust Mechanisms at the Microscale: Topological Chains David Zeb Rocklin, Xiaoming Mao, University of Michigan; and Vincenzo Vitelli, Leiden University
3:00 p.m.–3:20 p.m.	Programmable Modal Mixing in Nonlinear Lattice Structures Stefano Gonella, University of Minnesota
3:20 p.m.–3:40 p.m.	Reconfigurable Soft Metamaterial with Topological Phonons Xiaoming Mao, University of Michigan



T4	MECHANICS OF NANOSCALE PHENOMENA: BEHAVIOR & MECHANICS OF ACTIVE MATERIALS & STRUCTURES (12c)
ROOM 2401	SESSION CHAIRS: James Boyd and Nikos Micailidis

4:00 p.m.–4:20 p.m.	Porosity-affected Pseudoelasticity in Niti Shape Memory Foams A. Tsouknidas, N. Michailidis, Aristotle University of Thessaloniki; B. Lester, T. Baxevanis, and Dimitris C. Lagoudas, Texas A&M University; G. Maliaris, Democritus University of Thrace
4:20 p.m.–4:40 p.m.	Engineering Transformation Hysteresis in Ni-rich NiTi and NiTiHf Shape Memory Alloys Brian Franco and Ibrahim Karaman, Texas A&M University
4:40 p.m.–5:00 p.m.	Design and Fabrication of an SMA-Based Solar Array Deployment Mechanism Cullen Eckert, Robert W. Wheeler, James G. Boyd, and Dimitris C. Lagoudas, Texas A&M University
5:00 p.m.–5:20 p.m.	Kinematics of Uncreased Origami Structures Edwin Peraza Hernandez, Darren Hartl, and Dimitris C. Lagoudas, Texas A&M University
5:20 p.m.–5:40 p.m.	Analytical Solution for the Elastic-plastic and Pseudoelastic Response of a Shape Memory Alloy Thickwalled Cylinder Under Internal Pressure James G. Boyd, Laurent Dubousquet, Majid Tabesh, Texas A&M University

T4	MECHANICS OF NANOSCALE PHENOMENA: PROFESSOR HUAIJIAN GAO/PRAGER MEDAL SYMPOSIUM (4g)
ROOM 2402	SESSION CHAIR: Markus Buehler

4:00 p.m.–4:20 p.m.	Mechanochemically Responsive Polymers: When Deformation and Fracture Control Chemistry Xuanhe Zhao, Massachusetts Institute of Technology
4:20 p.m.–5:00 p.m.	Getting Stuck and Breaking Free: Free Boundaries and Free Discontinuities in Heterogeneous Media-Keynote Kaushik Bhattacharya, California Institute of Technology
5:00 p.m.–5:20 p.m.	On the Elastic Wave Attenuation of Load Bearing Biological Materials Yung-Wei Zhang, Institute of High Performance Computing
5:20 p.m.–5:40 p.m.	Anomalous Scaling Law of Mechanical Properties of Cellulose Nano Paper: Defeating the Conflict Between Strength and Toughness Teng Li, University of Maryland



T4	LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL-DYNAMICS, ESTIMATION & CONTROL OF AEROSPACE SYSTEMS (27d)
ROOM 2403	SESSION CHAIR: John L. Junkins

4:00 p.m.–4:20 p.m.	Attitude Estimation Using Rate-Integrating Gyroscopes F.L. Markley, NASA GSFC; and J.L. Crassidis, University at Buffalo
4:20 p.m.–4:40 p.m.	Heliogyro Dynamics and Control Considerations Pimienta-Peñalver J.L. Crassidis, University at Buffalo
4:40 p.m.–5:00 p.m.	Adaptive Control Boosted Through Dynamically Adjusted Feedback Gains: Applications to Controlling Euler-Lagrange Systems S. Yabg, M.R. Akella, The University of Texas at Austin
5:00 p.m.– 5:20 p.m.	Calibrated and Decalibrated Approximations of Nonlinear Dynamics Systems A.J. Sinclair, Auburn University
5:20 p.m.–5:40 p.m.	Ten Years of Flower Constellations D. Mortari and M.E. Gonzales, Texas A&M University

T4	MECHANICS OF FRACTURE AND DAMAGE: DUCTILE FRACTURE (20b)
ROOM 2404	SESSION CHAIRS: Schmulik Osovski

4:30 p.m.–4:20 p.m.	A Coherent Shear Localizing Solution that Appears in a Model for Shear Band Formation Min-Gi Lee and Athanasios Tzavaras, King Abdullah University of Science & Technology
4:20 p.m.–4:40 p.m.	On Modeling Ductile Fracture at Low Stress Triaxiality Amine Benzerga, Texas A&M University
4:40 p.m.–5:00 p.m.	A Method for Uniquely Extracting Traction Separation Relations for Cracks/Interfaces in Viscoelastic Media S. Palvadi, N. Lu and K.M. Liechti, The University of Texas-Austin
5:00 p.m.– 5:20 p.m.	A Rate-dependent, Non-associative Theory of Ductile Failure Mediated by Dislocation Emission Justin Wilkerson and Thao Nguyen, University of Texas at San Antonio
5:20 p.m.–5:40 p.m.	On the Path-dependence of the Fracture Locus in Ductile Materials: Experiments Shamik Basua, G. Ayoub and A.A. Benzerga, Texas A&M University



T4	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS AND CHARACTERIZATION OF MICRO/NANOPOROUS MATERIALS AND APPLICATIONS IN ENERGY AND ENVIRONMENTS (7c)
ROOM 2405	SESSION CHAIR: Weiyi Lu

4:00 p.m.–4:40 p.m.	In Situ Indentation of Nanoporous Copper-Keynote Antonia Antoniou, Georgia Institute of Technology
4:40 p.m.–5:30 p.m.	Strengthening Mechanisms of Core-Shell Nanoporous Metallic Materials Niaz Abdolrahim, University of Rochester; D.F. Bahr, B. Revard, C. Reilly, and H.M. Zbib, Washington State University; J. Ye and T.J. Balk, University of Kentucky
5:00 p.m.– 5:20 p.m.	Effects of Temperature and Humidity on Atomic Force Microscopy Dimensional Measurement: An Experimental Investigation Tian Wang, Chengfu Ma, Yuhang Chen, Jiaru Chu and Wenhao Huang, University of Science and Technology of China
5:20 p.m.–5:40 p.m.	Large-deformation and High-strength Amorphous Porous Carbon Nanospheres Weizhu Yang and Baoxing Xu, University of Virginia; Hangxun Xu, University of Science and Technology of China

T4	ARCHITECTURED MATERIALS & MANUFACTURING: ADVANCES IN MODELING OF MANUFACTURING PROCESS MECHANISMS (33a)
ROOM 2406A	SESSION CHAIR: Satish Bukkapatnam

4:00 p.m.–4:40 p.m.	Data-Driven Modeling for Diagnosis and Prognosis in Manufacturing-Keynote Robert X. Gao, Case Western Reserve University
4:40 p.m.–5:00 p.m.	Design of a Heated Micro-Cantilever Optimized for Thermo-Capillary Driven Printing of Molten Polymer Nanostructures Mohammadreza Soleymaniha, and Jonathan R. Felts, Texas A&M University
5:00 p.m.– 5:20 p.m.	Simulation and Measurement of Period-n Milling Bifurcations Andrew Honeycutt and Tony Schmitz, University of North Carolina at Charlotte
5:20 p.m.–5:40 p.m.	Constitutive Modeling, Numerical Simulations and Experiments of Bulk Metallic Glasses at High Homologous Temperatures Prakash Thamburaja, National University of Malaysia



T4	
ARCHITECTURED MATERIALS & MANUFACTURING: PROFESSOR MARY BOYCE/ENGINEERING SCIENCE MEDAL SYMPOSIUM (32d)	
ROOM 2406B	SESSION CHAIR: Rebecca Dupaix
4:00 p.m.–4:20 p.m.	Mechanical Design of DNA Nanostructures for Physical Measurements Carlos Castro, The Ohio State University
4:20 p.m.–4:40 p.m.	Towards Constitutive Equation for Non-linear Mechanics of PDMSnanosilica D. Colombo & Sabine Cantournet, F. Lequeux & H. Montes, MINES Paristech
4:40 p.m.–5:00 p.m.	On Accurate Anatomical, Physiological, and Constitutive Models of Whole Knee Biomechanics Benjamin C. Marchi and Ellen M. Arruda, University of Michigan
5:00 p.m.– 5:20 p.m.	Characterization of Soft Tissue Through Uniaxial Tests and Computational Studies Marco Giovannini, Newell Moser, Kornel Ehmann, Jian Cao, Northwestern University
5:20 p.m.–5:40 p.m.	Digital Manufacturing Enabled Soft Active Composites H. Jerry Qi, Georgia Institute of Technology
T4	
FLUID MECHANICS: HYPERSONIC AEROTHERMOCHEMISTRY (39c)	
ROOM 2500	SESSION CHAIR: Rodney Bowersox
4:00 p.m.–4:20 p.m.	Alexandre Martin: Current and Future Challenges in Aerothermodynamic Ablation Alexandre Martin, University of Kentucky
4:20 p.m.–4:40 p.m.	Hypersonic Stability Analyses Helen L. Reed, Travis S. Kocian, Alexander J. Moyes, Daniel Mullen Texas A&M University
4:40 p.m.–5:00 p.m.	Role of Transient Growth on Roughness Induced Hypersonic Blunt Body Transition Eli Reshotko, Case Western Reserve University, Andrew Leidy and Rodney Bowersox, Texas A&M University
5:00 p.m.– 5:20 p.m.	Control of Hypersonic BL Corner Separation by Transient Energy Addition Alec Houpt and Sergey B. Leonov, University of Notre Dame
5:20 p.m.–5:40 p.m.	Investigation of Hypersonic Panel Flutter with a Time-Domain Solver Robert L. Brown, Keith Ballard, John D. Whitcomb, and Paul G. A. Cizmas; Texas A&M University



T4	MECHANICS OF NANOSCALE PHENOMENA: ADVANCES IN CONTINUUM MECHANICS AND COMPUTATIONAL ENGINEERING SCIENCE—J.N. REDDY (28b)
ROOM 2501	SESSION CHAIR: Vinu Unnikrishnan

4:00 p.m.–4:20 p.m.	A Novel Mixed-mode Cohesive Law for Continuum Fracture Analysis Anthony M. Waas and Nhung Nguyen, University of Washington
4:20 p.m.–4:40 p.m.	Subject-Specific Computational Study of Blast Induced Traumatic Injuries Arnab Chanda, and Vinu Unnikrishnan, University of Alabama
4:40 p.m.–5:00 p.m.	Exploring the “nanoFin Effect” for Nanocomposites Debjyoti Banerjee, Texas A&M University
5:00 p.m.– 5:20 p.m.	Configurational Derivative: Sensitivity of Arbitrary Functions to Translation, Rotation and Scaling of Finite-Sized Heterogeneities T. Song, H-Y Lin, and Ganesh Subbarayan, Purdue University
5:20 p.m.–5:40 p.m.	Flexible Origami Sheets Assembled into Stiff Reconfigurable Structures Evgueni T. Filipov, University of Illinois Urbana Champaign; Glaucio H. Paulino, Georgia Institute of Technology; and Tomohiro Tachi, University of Tokyo

T4	MECHANICS OF SOFT MATERIALS: SOFT MECHANICAL STRUCTURES (16d)
ROOM 2502	SESSION CHAIR: Julien Meaud

4:00 p.m.–4:20 p.m.	Diffusion-induced Deformations in Polymer Composites as a Means for Self-Assembly Sudharsan Srinivasa Parthasarathy, Anastasia Muliana, Kumbakonam Rajagopal, Texas A&M University
4:20 p.m.–4:40 p.m.	Self-Assembly of Butterfly Proboscis Kostya Kornev, Golnaz Tomaraei, Peter Adler, Charles Beard, and Suellen Pometto, Clemson University
4:40 p.m.–5:00 p.m.	Structural Effects of Biomimetic Scales Ranajay Ghosh, Hamid Ebrahimi & Ashkan Vaziri, Northeastern University
5:00 p.m.– 5:20 p.m.	3D Printing Soft Architected Materials Jordan R. Raney, Katia Bertoldi, and Jennifer A. Lewis, Harvard University
5:20 p.m.–5:40 p.m.	Exploiting Instabilities to Obtain Tunable Modes of Deformation in Microarchitected Materials with a Negative Poisson’s Ratio Julien Meaud, Thomas Bowling, Kaikai Che, Jiangto Wu, Michael Isakov, and Jerry Qi, Georgia Institute of Technology



T4	MECHANICS OF SOFT MATERIALS: MECHANICS AND PHYSICS OF SOFT MATERIALS (19h)
ROOM 2503	SESSION CHAIRS: Fatemeh Ahmadpoor and Pei Dong

4:00 p.m.–4:20 p.m.	Design of Layered, Soft Polymer Composites for High Damping Applications Muhammed R. Imam and Trisha Sain, North Carolina A&T State University
4:20 p.m.–4:40 p.m.	A Solid-liquid Self-adaptive Composite Pei Dong, Rice University
4:40 p.m.–5:00 p.m.	A Mesoscopic Discrete Particle Model for the Arterial Wall and its Dissection Alireza Yazdani, George Em Karniadakis, Brown University; Chiara Bellini, Jay D. Humphrey, Yale University
5:00 p.m.– 5:20 p.m.	Effective Properties of Fibrous Networks with Non-Identical Elements Ehsan Ban and Catalin R. Picu, Rensselaer Polytechnic Institute
5:20 p.m.–5:40 p.m.	Thermal Fluctuations in Nonlinear Curvature Elasticity-Implications for Renormalized Bending Rigidity and Vesicles Size Distributions Fatemeh Ahmadpoor and Pradeep Sharma, University of Houston

T4	MECHANICS OF NANOSCALE PHENOMENA: MECHANICAL BEHAVIOR OF NANOSTRUCTURED MATERIALS (5h)
ROOM 2504	SESSION CHAIRS: Ken Liechti and Xinghang Zhang

4:00 p.m.–4:20 p.m.	Probing the Adhesion Interactions of Graphene on Silicon Oxide by Nanoindentation Ji Won Suk, Jinkee Lee, Sungkyunkwan University, Seung Ryul Na, Kenneth M. Liechti Ryan J. Stromberg, Douglas Stauffer, Rodney S. Ruoff, The University of Texas at Austin
4:20 p.m.–4:40 p.m.	Nonlinear Geometric Effects in Strained Helical Nanoribbons Zi Chen, Dartmouth College
4:40 p.m.–5:00 p.m.	Stretchable Nanotube Networks With Strain and Cycle Dependent Conductivity Lihua Jin, Alex Chortos, Christian Linder, Zhenan Bao, and Wei Cai, Stanford University
5:00 p.m.– 5:20 p.m.	Mechanical Properties of Carbyne From First-principles: A Nanorod or a Nanorope? Mingjie Liu, Vasilii I. Artyukhov and Boris I. Yakobson, Rice University
5:20 p.m.–5:40 p.m.	High-Performance Coils and Yarns of Polymeric Piezoelectric Nanofibers Majid Minary University of Texas at Dallas



T4	MECHANICS OF NANOSCALE PHENOMENA: SMALL SCALE PLASTICITY (6b)
ROOM 2505	SESSION CHAIR: Jeffrey W. Kysar

4:00 p.m.–4:20 p.m.	Size Effects in Nanoscale Metallic Systems Dennis M. Kochmann, Jeffrey S. Amelang, and Ishan Tembhekar, California Institute of Technology
4:20 p.m.–4:40 p.m.	Dislocation multiplication from the Frank-Read source in coarse-grained atomistic models Shuozhi Xu, David L. McDowell, Georgia Institute of Technology; Liming Xiong, Iowa State University; Youping Chen, University of Florida
4:40 p.m.–5:00 p.m.	Numerical Study of the effects of Boundary Conditions and Lattice Rotations on the Indentation of Single Crystals Eduardo Bittencourt, Universidade Federal do Rio Grande do Sul
5:00 p.m.–5:20 p.m.	Correlation of the Mechanical Properties of Metallic Glasses with Shear Banding Characteristics Yujie Wei, Chinese Academy of Sciences

T4	MECHANICS OF FRACTURE AND DAMAGE: FRACTURE MECHANICS (21h)
ROOM 1402	SESSION CHAIR: Yanfei Gao

4:00 p.m.–4:20 p.m.	A Methodology for High Resolution Digital Image Correlation in High Temperature Experiments Antonia Antoniou, Georgia Institute of Technology
4:20 p.m.–4:40 p.m.	Evaluation of Interaction Effect in Multiple Cracks under Bi-axial Loads using Photoelasticity K. Ramesh, Ramesh Bojja, and Vivekanandan, India Institute of Technology Madras
4:40 p.m.–5:00 p.m.	A New Specimen for Dynamic Mode I Crack Propagation Under Stress Waves Loading S. Chen, S. Osovski, Technion-Israel Institute of Technology
5:00 p.m.– 5:20 p.m.	Neutron Diffraction and Micromechanical Analyses of Fatigue Crack Growth Yanfei Gao, Peter K. Liaw, University of Tennessee; Rozaliya I. Barabash, Oak Ridge National Laboratory
5:20 p.m.–5:40 p.m.	Multi-scale Toughness via Scratch Testing: From QuasiBrittle to Ductile Materials Ange-Therese Akono, University of Illinois Urbana Champaign



T4	MECHANICS OF SOFT MATERIALS: MULTI-SCALE MECHANICS OF PARTICULATE MEDIA (17b)
ROOM 1403	SESSION CHAIR: David Henann
4:00 p.m.–4:20 p.m.	Discrete-continuum Coupling Method for Fluid-saturated Porous Media Part 1: Theoretical Framework and Numerical Implementation Kun Wang and WaiChing Sun, Columbia University
4:20 p.m.–4:40 p.m.	Discrete-continuum Coupling Method for Fluid-saturated Porous Media Part 2: Extension to Higher-order Continua Kun Wang and WaiChing Sun, Columbia University
4:40 p.m.–5:00 p.m.	Micromorphic Continuum Stress and Strain Measures Calculated from 3D DEM Simulations on Granular Media Richard A. Regueiro, Boning Zhang, Farhad Shahabi, University of Colorado Boulder
5:00 p.m.– 5:20 p.m.	SPH Modeling of Granular Flows with Viscoplastic Constitutive Laws Ryan Hurley and José E. Andrade, California Institute of Technology
5:20 p.m.–5:40 p.m.	Granular Micromechanics Model Predicts the Effect of Intermediate Principal Stress and Loading Path on Failure of Cementitious Materials Payam Poorsolhjouy and Anil Misra, University of Kansas



W1

**ENGINEERING EDUCATION PANEL:
WOMEN IN ENGINEERING SCIENCE (29a)**

ROOM 2401

SESSION CHAIRS: P.K. Imbrie and Valerie Taylor

9:10 a.m.–10:50 a.m.

Panel—Women in Engineering Science

W1

**ARCHITECTURED MATERIALS & MANUFACTURING: THERMAL & MECHANICAL
STABILITY OF IRRADIATED METALS & METAL ALLOYS (34a)**

ROOM 2402

SESSION CHAIR: Daniel Bifford

9:10 a.m.– 9:50 a.m.

Development of advanced radiation-tolerant alloys using principles of self-organization-Keynote
X. Zhang, J. Beach, S. Shu, P. Bellon, R.S. Averback; University of Illinois Urban Champaign

9:50 a.m.–10:10 a.m.

Non-random Walk Diffusion Enhances the Sink Strength of Semicohherent Interfaces
A.J. Vattre, CEA, DAM, DIF; H. Ding, M. J. Demkowicz, Massachusetts Institute of Technology;
T. Jourdan and C. Marinica, Service de Recherches de Métallurgie Physique

10:10 a.m.–10:30 a.m.

Radiation Response of Nanolayered, Nanoporous and Nanotwinned Metals
Xinghang Zhang, J. Li, KY Yu, Y. Chen, H. Wang, and C. Sun, Texas A&M University; and
M.A. Kirk and M. Li, Argonne National Laboratory

10:30 a.m.–10:50 a.m.

Defect Accumulation in Ion and Neutron Irradiated Molybdenum
Donghu Xu and Brian D. Wirth, University of Tennessee;
Meimei Li and Marquis A. Kirk, Argonne National Laboratory; and
Gerrit VanCoevering and Gary Was, University of Michigan

**W1****LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL-DYNAMICS, ESTIMATION & CONTROL OF AEROSPACE SYSTEMS (27e)****ROOM 2403****SESSION CHAIR: John Valasek**

- 9:10 a.m.– 9:50 a.m. **Advances in Intensity Correlation Imaging: Reducing Phase Retrieval Time-Keynote**
D.C. Hyland, Texas A&M University
- 9:50 a.m.–10:10 a.m. **Tracking Control of Non-Standard Multiple Time Scale Systems with Slow and Fast Actuators**
J. Valasek, Texas A&M University; and A. Narang-Siddarth, University of Washington
- 10:10 a.m.–10:30 a.m. **Validation of Autonomous Systems — A Dynamical Systems Approach**
A. Narang-Siddarth, University of Washington; J. Valasek, Texas A&M University
- 10:30 a.m.–10:50 a.m. **Output Feedback on a Nonlinear Hypersonic Vehicle Model Using Adaptive Control**
D. Famularo, D and J. Valasek, Texas A&M University

W1**MECHANICS OF FRACTURE AND DAMAGE: DUCTILE FRACTURE (20c)****ROOM 2404****SESSION CHAIR: Jacques Besson**

- 9:10 a.m.– 9:30 a.m. **A Triaxiality and Lode Parameter Dependent Continuum Damage Model**
Ravi Kiran and Kapil Khandelwal, Brown University
- 9:30 a.m.– 9:50 a.m. **Damage and Fracture in AZ31 Alloy: Experiments and Modeling**
Babak Kondori, Texas A&M University
- 9:50 a.m.–10:10 a.m. **Application of All-strain-based Modified Mohr-Coulomb Criterion (eMMC) to Ductile Fracture of Metal Sheets**
Yueqian Jia and Yuanli Bai, University of Central Florida
- 10:10 a.m.–10:30 a.m. **Rate Effects on Ductile Crack Growth Mechanism – From Void-by-void Crack Growth to Diffused Damage**
S. Osovski, Technion-Israel Institute of Technology; A. Srivastava and A. Needleman, Texas A&M University
- 10:30 a.m.–10:50 a.m. **On Void Coalescence Under Combined Tension and Shear**
M.E. Torki and A.A. Benzerga, Texas A&M University; J.B. Leblond, Sorbonne Universities; and C. Teko lu, TOBB University of Economics and Technology



W1	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS AND CHARACTERIZATION OF MICRO/NANOPOROUS MATERIALS AND APPLICATIONS IN ENERGY AND ENVIRONMENTS (7d)
ROOM 2405	SESSION CHAIR: Baoxing Xu

9:10 a.m.– 9:50 a.m.	Processing and Microstructure/Mechanical Characterization of Porous Magnesium Composites-Keynote Qizhen Li and H. Xu, Washington State University; H. Cay, University of Nevada
9:50 a.m.–10:10 a.m.	Image-based Multi-scale Modeling of High-Energy Ball Milled Composites Alberto Salvadori, S. Lee and Karel Matous, University of Notre Dame
10:10 a.m.–10:30 a.m.	Probabilistic Multiscale Modeling of Organic-Rich Shales Mohammad Mashhadian, Sara Abedi, and Arash Noshadravan, Texas A&M University
10:30 a.m.–10:50 a.m.	Stochastic Homogenization of Heterogeneous Media with Random Inclusions: Application in Micro-poromechanics of Organic-rich Rocks Vasav Dubey and Arash Noshadravan, Texas A&M University

W1	ARCHITECTURED MATERIALS & MANUFACTURING: ADVANCES IN MODELING OF MANUFACTURING PROCESS MECHANISMS (33b)
ROOM 2406A	SESSION CHAIR: Jyhwen Wang

9:10 a.m.– 9:50 a.m.	Advancements in Modeling Double-Sided Incremental Forming using Finite Element Methods-Keynote Newell Moser, Huaqing Ren, Jacob Smith, Zixuan Zhang, Ebot Ndip-Agbor, and Jian Cao, Northwestern University
9:50 a.m.–10:10 a.m.	A Multiscale Taylor Model-based Constitutive Theory Describing Grain Growth in Polycrystalline Cubic Metals Prakash Thamburaja, The National University of Malaysia
10:10 a.m.–10:30 a.m.	Experimental Analysis and Modeling of Damage Evolution in CBN Grinding Wheel Tianyu Yu, Ashraf F. Bastawros, and Abhijit Chandra, Iowa State University
10:30 a.m.–10:50 a.m.	Modeling of Bone Drilling and Debris Interactions Using a Mesh-free Method Mahsa Tajdari and Bruce L.Tai, Texas A&M University

**W1****MECHANICS OF FRACTURE AND DAMAGE:
FRICTION, FRACTURE AND DAMAGE (23a)****ROOM 2406B****SESSION CHAIR: Ahmed Elbanna**

- 9:10 a.m.– 9:50 a.m. **Fracture Mechanics of Hydrofracture-Keynote**
Michael Marder, The University of Texas at Austin
- 9:50 a.m.–10:10 a.m. **Static and Sliding Contact Of Rough Surfaces: Effect of Surface Roughness, Material Properties, and Long-Range Elastic Interactions**
Srivatsan Hulikal, Kaushik Bhattacharya, Nadia Lapusta, Brown University
- 10:10 a.m.–10:30 a.m. **Fracture-mechanics-based Approach to Frictional Slip Arrest**
David S. Kammer, Elsa Bayart, Ilya Svetlizky and Jay Fineberg,
The Hebrew University of Jerusalem, Israel
- 10:30 a.m.–10:50 a.m. **Effect of Off-fault Low-velocity Elastic Inclusions on Supershear Rupture Dynamics**
Xiao Ma and Ahmed Elbanna, University of Illinois Urbana Champaign

W1**FLUID MECHANICS: MULTI-SCALE MODELING OF FLUID DYNAMICS (38a)****ROOM 2505****SESSION CHAIR: Sharath Girimaji**

- 9:10 a.m.– 9:30 a.m. **Fluid Dynamics Modeling of the Effect of Heliox Gas Flow on Lung Airways**
Jong Won Kim and Ramana M. Pidaparti, University of Georgia;
Rebecca L. Heise and Angela M. Reynolds, Virginia Commonwealth University
- 9:30 a.m.– 9:50 a.m. **Hybrid Multi-scale Coupling Algorithms for Simulation of Transport Processes in Porous Media**
S. Karimi and K. B. Nakshatrala, University of Houston
- 9:50 a.m.–10:10 a.m. **Lorentz Force Formulation for MHD: From Microscale Physics to Macroscale Equations**
Steven E. Anderson, Eduardo De Carli da Silva, and Sharath S. Girimaji, Texas A&M University
- 10:10 a.m.–10:30 a.m. **Implications of Second Law of Thermodynamics in Mesoscopic Fluid Flow Simulations**
V. Venugopal and S. S. Girimaji, Texas A&M University
- 10:30–10:50 a.m. **Fractal Structures for Enhancing Thermal-fluid Transport for Energy Applications**
Surupa Shaw and Debjyoti Banerjee, Texas A&M University



W1	ARCHITECTURED MATERIALS & MANUFACTURING: MECHANICS OF INSTABILITY & INTERFACIAL ADHESION IN BIO-COMPATIBLE ELECTRONICS (35a)
-----------	---

ROOM 2501	SESSION CHAIR: Shuodao Wang
------------------	------------------------------------

- | | |
|-----------------------|--|
| 9:10 a.m.– 9:50 a.m. | Soft Microfluidic Assemblies of Sensors, Circuits, and Radios for the Skin-Keynote
Yihui Zhang, Haoran Fu, and Yonggang Huang, Northwestern University |
| 9:50 a.m.–10:10 a.m. | Breathable and Stretchable Temperature Sensors Inspired by Skin
Xue Feng, Tsinghua University |
| 10:10 a.m.–10:30 a.m. | “Cut-and-Paste” Manufacture of Multiparametric Epidermal Sensor Systems (ESS)
Nanshu Lu, University of Texas at Austin |
| 10:30 a.m.–10:50 a.m. | Mechanically Robust Design for Wearable Tattoo Electronics
Huanyu Cheng, Pennsylvania State University |

W1	MECHANICS OF NANOSCALE PHENOMENA: BEHAVIOR & MECHANICS OF ACTIVE MATERIALS & STRUCTURES (12d)
-----------	--

ROOM 2502	SESSION CHAIRS: Ibrahim Karaman and George Chatzigeorgiou
------------------	--

- | | |
|-----------------------|--|
| 9:10 a.m.– 9:30 a.m. | The Effect of Microstructure on the Magnetocaloric Performance of Metamagnetic SMAs
I. Karaman, N.M. Bruno, Texas A&M University |
| 9:30 a.m.– 9:50 a.m. | Characterization and Modeling of Thermal Properties of Active BaTiO₃/Ag Composites
Junwei Xing, Miladin Radovic, and Anastasia Muliana, Texas A&M University |
| 9:50 a.m.–10:10 a.m. | Electro-thermo-mechanical Hysteretic Responses of Piezoelectric Materials
Kamran A. Khan Khalifa, University of Science; Anastasia H. Muliana, Texas A&M University; and Hassene Ben Atitallah and Zoubeida Ounaies, Pennsylvania State University |
| 10:10 a.m.–10:30 a.m. | Effective Magnetomechanical Properties of Magneto-Sensitive Polymeric Materials During Curing
George Chatzigeorgiou and Fodil Meraghni, Arts et Métiers ParisTech Metz-Lorraine; and Mokarram Hossain and Paul Steinmann, University of Erlangen-Nuremberg Egerlandstr |
| 10:30 a.m.–10:50 a.m. | A Scale Dependent Homogenization Approach for Identification of Characteristic Volume Element in a Random Magnetoactive Composite
Alireza Bayat and Faramarz Gordaninejad, University of Nevada Reno |

**W1**
**MECHANOBIOLOGY:
MULTI-SCALE MECHANICS OF MICROTUBULE/MOTOR-PROTEIN ASSEMBLIES (2a)**
ROOM 2503**SESSION CHAIR: Michael Shelley**

- 9:10 a.m.– 9:50 a.m. **Autonomous Motility in Soft Active Matter-Keynote**
Zvonimir Dogic, Brandeis University
- 9:50 a.m.–10:10 a.m. **Microscopic Origins of Extensile versus Contractile Active Stress in Cytoskeletal Motor-filament Systems**
Robert Blackwell, Oliver Sweezy-Schindler, Christopher Baldwin, Matthew A. Glaser, and M. D. Betterton, University of Colorado
- 10:10 a.m.–10:30 a.m. **Mechanical Effects of Dynamic Binding Between Tau Proteins on Axonal Microtubules During Traumatic Brain Injury: Predictions from a Computational Model**
Hossein Ahmadzadeh, Douglas H. Smith and Vivek B. Shenoy, University of Pennsylvania
- 10:30 a.m.–10:50 a.m. **Experiments and Theory of Spindle Assembly, Morphology and Dynamics**
Daniel J. Needleman, Harvard University

W1
**MECHANICS OF NANOSCALE PHENOMENA:
PROFESSOR HUAJIAN GAO/PRAGER MEDAL SYMPOSIUM (4h)**
ROOM 2504**SESSION CHAIR: Yujie Wei**

- 9:10 a.m.– 9:50 a.m. **Biomaterials by Design: Modeling, Synthesis, Testing-Keynote**
Markus Buehler, Massachusetts Institute of Technology
- 9:50 a.m.– 10:10 a.m. **A Tale of Two mechanisms: Strain-softening versus Strain-hardening in Single Crystals Under Small Stressed Volumes**
Yanfei Gao, Hongbin Bei, University of Tennessee
- 10:10 a.m.–10:50 a.m. **Flow Streaks in Gravity-driven Creep of a (relatively) Thin Film on a Warmer Substrate-Keynote**
James R. Rice, Harvard University



W1	MECHANICS OF NANOSCALE PHENOMENA: SMALL SCALE PLASTICITY (6c)
ROOM 2505	SESSION CHAIR: Grethe Winther

- | | |
|----------------------|---|
| 9:10 a.m.– 9:30 a.m. | Mechanical Contact Between Rough Elastic-plastic solids: Scale Effect in Deformation of Asperities
Vladislav A. Yastrebov, Samuel Forest, MINES ParisTech |
| 9:30 a.m.– 9:50 a.m. | Grain Boundary Plasticity Model Incorporating Grain Boundary Structure, Energy and Defect Redistribution
Varvara Kouznetsova, Paul van Beers, Marc Geers, Eindhoven University of Technology |
| 9:50 a.m.–10:10 a.m. | Investigating Dynamic Behavior of Metals Through Long-Term and Large-Scale Multiscale Simulation-Keynote
Pilar Ariza, Universidad de Sevilla; M. Ponga and M. Ortiz, California Institute of Technology |

W1	MECHANICS OF NANOSCALE PHENOMENA: MICROMECHANICS & MULTIFUNCTIONAL NANO COMPOSITES (13a)
ROOM 1402	SESSION CHAIR: Gary Seidel

- | | |
|-----------------------|---|
| 9:10 a.m.– 9:30 a.m. | Micromechanics of a Hybrid ZnO Nanowires-Carbon Fiber Polymer Composite
Marwan Al-Haik, N. Masghouni, and Ayoub Yari Boroujeni, Virginia Tech |
| 9:30 a.m.– 9:50 a.m. | Effective Dielectric Constant Of Composites with Interface-enhanced Independent Properties
George Chatzigeorgiou and A. Javili, P. Steinmann, Arts et Métiers ParisTech |
| 9:50 a.m.–10:10 a.m. | A Modeling Approach to Piezoresistive Properties of Hybrid Nanostructures with Embedded Non-penetrating Conductive Particles
Mohammad Naraghi and J. Cai, Texas A&M University |
| 10:10 a.m.–10:30 a.m. | Computational Micromechanics Based Exploration of Strain and Damage Sensing Capabilities in CNT-Polymer Nanocomposites
Adarsh K. Chaurasia, Xiang Ren & Gary D. Seidel, Virginia Polytechnic Institute and State University |



W1

**MECHANICS OF SOFT MATERIALS:
MULTI-SCALE MECHANICS OF PARTICULATE MEDIA (17c)**

ROOM 1403

SESSION CHAIR: Rich Regueiro

-
- | | |
|-----------------------|--|
| 9:10 a.m.– 9:50 a.m. | Scaling to RVE in viscoelasticity of random composites-Keynote
Jun Zhang and Martin Ostoj-Starzewski, University of Illinois Urbana Champaign |
| 9:50 a.m.–10:10 a.m. | Discrete Element Modeling of Heat Transfer in Granular Systems with Experimental Insight
Jason Marshall, Jose Andrade, California Institute of Technology |
| 10:10 a.m.–10:30 a.m. | Investigating the Micro-structure of Granular Materials Under Shear Loading
Marteau Eloise, California Institute of Technology |
| 10:30 a.m.–10:50 a.m. | Computing Effective Thermo-mechanical Properties for Particulate Composites Using Micromechanics with Higher Order Statistical Description of Morphology
Andrew Gillman and Karel Matous, University of Notre Dame |



W2

ARCHITECTURED MATERIALS & MANUFACTURING: THERMAL & MECHANICAL STABILITY OF IRRADIATED METALS & METAL ALLOYS (34b)

ROOM 2402

SESSION CHAIR: Khalid Hattar

- 11:10 a.m.–11:50 a.m. **Microstructure Evolution in Irradiated Alloys-Keynote**
Emmanuelle Marquis, Mukesh Bachhav, Lan Yao, and Elaina Anderson, University of Michigan
- 11:50 a.m.–12:10 p.m. **Grain Boundaries, Sink Efficiency, and Radiation Damage Evolution**
Blas Uberuaga, Los Alamos National Laboratory
- 12:10 p.m.–12:30 p.m. **Characterization of Irradiation Damage in a CrFeCoNi High-Entropy Alloy**
Mo-Rigen He, Shuai Wang, Ian M. Robertson; University of Wisconsin-Madison
- 12:30–12:50 p.m. **In situ Study of Defect Migration Kinetics and Self-Healing of Twin Boundaries in Heavy Ion Irradiated Nanotwinned Metals**
Jin Li, Youxing Chen, Miao Song, Xinghang Zhang, Haiyan Wang, and Meimei Li, Texas A&M University; Kaiyuan Yu, China University; and Mark A. Kirk, Argonne National Laboratory



W2	LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL; DYNAMICS, ESTIMATION & CONTROL OF AEROSPACE SYSTEMS (27f)
ROOM 2403	SESSION CHAIR: Manoranjan Majji

11:10 a.m.–11:30 a.m.	Experimental Studies of Space Proximity Operations for Capture and Deorbit of Spent Rocket Boosters A. Probe, Texas A&M University
11:30 a.m.–11:50 a.m.	Multiscale Modeling of Dynamic Response of Shape Memory Polymer Fibers S. Sharafi, Louisiana State University
11:50 a.m.–12:10 p.m.	Geometry of the Relative Pose Estimation Problem M. Majji, The University at Buffalo
12:10 p.m.–12:30 p.m.	Convergence Enhancement of Picard Iteration via Regularizing Transformations J.L. Read, R.M. Woollands, A.B. Probe, J.L. and Junkins, Texas A&M University
12:30–12:50 p.m.	Demonstration Experiments in LASR Laboratory A. Probe, A. Masher, Texas A&M University

W2	MECHANICS OF SOFT MATERIALS: MULTI-SCALE MECHANICS OF PARTICULATE MEDIA (17d)
ROOM 2404	SESSION CHAIR: David Henann

11:10 a.m.–11:30 a.m.	Thermally Activated Deformation Mechanism in Glasses Yue Fan, Oak Ridge National Laboratory; Takuya Iwashita, Joint Institute for Neutron Sciences; and Takeshi Egami, University of Tennessee
11:30 a.m.–11:50 a.m.	Discrete Element Modeling of the Gravel and Settlement Analysis of the High-speed Railway Subgrade Yiyue Ma, Xilin Lü, Tongji University; Zhihong Nie, Central South University; Hui Dong, Xiangtan University
11:50 a.m.–12:10 p.m.	A Manifold-based Reduced Order Model for Nonlinear Hyperelastic Materials Satyaki Bhattacharjee and Karel Matous, University of Notre Dame



W2	MECHANICS OF NANOSCALE PHENOMENA: MECHANICS AND CHARACTERIZATION OF MICRO/NANOPOROUS MATERIALS AND APPLICATIONS IN ENERGY AND ENVIRONMENTS (7e)
-----------	--

ROOM 2405	SESSION CHAIR: Weiyi Lu
------------------	--------------------------------

- | | |
|-----------------------|--|
| 11:10 a.m.–11:50 a.m. | Nano-Scale X-Ray Computed Tomography Applied to Fuel Cell and Battery Electrode Characterization And Optimization-Keynote
Shawn Litster, Carnegie Mellon University |
| 11:50 a.m.–12:10 p.m. | Novel Processing Material in Phase Change Heat Transport
Yi Wang, Texas A&M University |
| 12:10 p.m.–12:30 p.m. | Exploration of Molten Salt Nanomaterials for Enhanced Thermal Energy Storage (TES) and Heat Transfer Fluid (HTF) Applications
Binjian Ma and Deb Banerjee, Texas A&M University |
| 12:30–12:50 p.m. | Thermal to Electric Energy Conversion by Nanoporous Carbon
Weiyi Lu, Michigan State University; Yu Qiao, University of California San Diego; Aijie Han, University of Texas Pan-American; and Hyuck Lim, Applied Materials |

W2	ARCHITECTURED MATERIALS & MANUFACTURING: ADVANCES IN MODELING OF MANUFACTURING PROCESS MECHANISMS (33c)
-----------	--

ROOM 2406A	SESSION CHAIR: Arun R. Srinivasa
-------------------	---

- | | |
|-----------------------|--|
| 11:10 a.m.–11:30 a.m. | Energy Based Approach to Predict Residual Stresses in Machining Process
Omar Fergani, Torgeir Welo, Norwegian University of Science and Technology |
| 11:30 a.m.–11:50 a.m. | Prediction of Porosity in Parts Produced by Additive Manufacturing Processes Using Spatial Gaussian Process Models
Gustavo Tapia, Alaa Elwany, Texas A&M University |
| 11:50 a.m.–12:10 p.m. | A Novel Implicit Model for MagnetoViscoElastic Slurries for Localized Magnetic Polishing
Arun R. Srinivasa, K.R. Rajagopal and Satish Bukkapatnam Texas A&M University |
| 12:10 p.m.–12:50 p.m. | General Discussion |



W2		MECHANICS OF FRACTURE AND DAMAGE: FRICTION, FRACTURE AND DAMAGE (23b)
ROOM 2406B		SESSION CHAIR: Waiching Sun
11:10 a.m.–11:50 a.m.	Determination of Shear Strength of Rocks from Scratch Tests: Theoretical Justification-Keynote Emmanuel Detournay, University of Minnesota	
11:50 a.m.–12:10 p.m.	Arlequin Multiscale Poromechanics WaiChing Sun, Zhijun Cai, Columbia University	
12:10 p.m.–12:30 p.m.	Developing a New High-Speed Biaxial Material-Testing Apparatus, and Experimental Analysis of Friction and Dynamic Weakening in Rock Omid Saber, F. M. Chester, and J. L. Alvarado, Texas A&M University	
12:30–12:50 p.m.	Quantification and Promotion of Interfacial Interactions between Carbon Nanotubes and Polymer Derived Ceramics Yingchao Yang, Jun Lou, Weibing Chen, and Linlin Cao, Rice University; Xin Liang and Brian W Sheldon, Brown University; Minglin Li, Fuzhou University	
W2		FLUID MECHANICS: MULTI-SCALE MODELING OF FLUID DYNAMICS (38b)
ROOM 2500		SESSION CHAIR: Diego A. Donzis
11:10 a.m.–11:30 a.m.	Numerical Simulations of Turbulent Planar Jets—A Hybrid Continuum and Kinetic Approach Divya Sri Praturi, Sharath S. Girimaji, Texas A&M University	
11:30 a.m.–11:50 a.m.	Effects of High Frequency Droplet Train Impingement on Liquid Film Hydrodynamics and Heat Transfer Taolue Zhang, Jorge Alvarado, J. P. Muthusamy, Anoop Kanjirakat, and Reza Sadr, Texas A&M University	
11:50 a.m.–12:10 p.m.	Asynchronous Computing of Fluid Flow Phenomena at Extreme Scales Konduri Aditya and Diego A. Donzis, Texas A&M University	
12:10 p.m.–12:30 p.m.	Turbulence Generation Through Intense Localized Sources of Energy A.F. Maqui and D.A. Donzis, Texas A&M University	



W2	ARCHITECTURED MATERIALS & MANUFACTURING: MECHANICS OF INSTABILITY & INTERFACIAL ADHESION IN BIO-COMPATIBLE ELECTRONICS (35b)
ROOM 2501	SESSION CHAIR: Shuodao Wang

11:10 a.m.–11:50 a.m.	Kirigami-based stretchable lithium-ion batteries-Keynote Zeming Song, Xu Wang, Cheng Lv, Teng Ma, Hanqing Jiang, Arizona State University
11:30 a.m.–11:50 a.m.	Effects of High Frequency Droplet Train Impingement on Liquid Film Hydrodynamics and Heat Transfer Taolue Zhang, Jorge Alvarado, J. P. Muthusamy, Anoop Kanjirakat, Reza Sadr, Texas A&M University
11:50 a.m.–12:10 p.m.	Ultra-flexible, stretchable and Biocompatible Sensors Integrated with the Skin under Nose for Noninvasive Respiration Monitoring Xue Feng, Tsinghua University
12:10 p.m.–12:30 p.m.	Non-Buckling Designs with High Elastic Stretchability and High Electronic Performance for Stretchable Electronics Shuodao Wang, Oklahoma State University
12:30–12:50 p.m.	Geometric Instability Behavior of a Tri-Layer Bio-Interface System Emma Lejeune, A. Javili, Christian Linder, Stanford University

W2	ENGINEERING EDUCATION: TECHNOLOGY-ENABLED ENGINEERING EDUCATION (30)
ROOM 2502	SESSION CHAIR: Yakut Gazi

9:10 a.m.– 9:50 a.m.	Building and Blending: Approaches to Understanding and Supporting Engineering Students Online, In-Class, and In-Between-Keynote Jennifer DeBoer, Purdue University
9:50 a.m.–10:10 a.m.	Course Insights to Improve Student Success in Engineering Linda Baer, Civitas Learning, Inc.
10:10 a.m.–10:30 a.m.	Potentials of Augmented Reality (AR) and Virtual Reality (VR) for Mechanical Engineering Education at the Age of Personal 3D Printers Tanil Ozkan, Texas A&M University
10:30 a.m.–10:50 a.m.	Success Metrics for Professional and Continuing Engineering Education Programs Soma Chakrabarti, University of Delaware



W2	MECHANOBIOLOGY: MULTI-SCALE MECHANICS OF MICROTUBULE/MOTOR; PROTEIN ASSEMBLIES (2b)
ROOM 2503	SESSION CHAIR: Dan Needleman
11:10 a.m.–11:50 a.m.	Microtubule and Motor-Protein Assemblies in Biology and Physics-Keynote Michael Shelley, New York University
11:50 a.m.–12:10 p.m.	Self-Assembly Modeling of Microtubules using Tublins as Building Blocks Somenath Das, Ramana Pidaparti, and Preetam Ghosh College of Engineering, University of Georgia and Virginia Commonwealth University
12:10 p.m.–12:30 p.m.	A platform for the Large-scale Simulation of Microtubule Assemblies Ehssan Nazockdast, Abtin Rahimian, Michael Shelley, New York University
12:30–12:50 p.m.	On the Distribution and Swim Pressure of Run-and-tumble Active Particles in Confinement Barath Ezhilan, Roberto Alonso-Matilla, David Saintillan, UCSD
W2	LIGHT WEIGHT STRUCTURES: DESIGN, MECHANICS & CONTROL; TOPOLOGY OPTIMIZATION IN MATERIALS AND STRUCTURES DESIGN (26)
ROOM 2504	SESSION CHAIRS: Ahmed Elbanna and James Kai
11:10 a.m.–11:30 a.m.	Doing Topology Optimization Explicitly and Geometrically – A New Moving Morphable Components Based Framework Xu Guo, Weisheng Zhang, Jian Zhang, Dalian University of Technology
11:30 a.m.–11:50 a.m.	Topology Optimization of a Bi-Stable Cardiovascular Stent Kai James, University of Illinois; Haim Waisman, Columbia University
11:50 a.m.–12:10 p.m.	Auxetic Metamaterials with Self-similar Hierarchy Davood Mousanezhad, Hamid Ebrahimi, Ranajay Ghosh, Ashkan Vaziri, Northeastern University; Sahab Babaei, Katia Bertoldi, Harvard University
12:10 p.m.–12:30 p.m.	Topology optimization of 3-D Phononic Bandstructures Yan Lu, Yang Yang, James Guest, Ankit Srivastava, Illinois Institute of Technology
12:30–12:50 p.m.	Exploiting Length-dependent Effects for the Design of Single-material Systems with Enhanced Thermal Transport Properties Jean-Baptiste Bouquet and Julian J. Rimoli, Georgia Institute of Technology



W2	MECHANICS OF NANOSCALE PHENOMENA: SMALL SCALE PLASTICITY (6d)
ROOM 2505	SESSION CHAIR: Varvara Kouznestsova

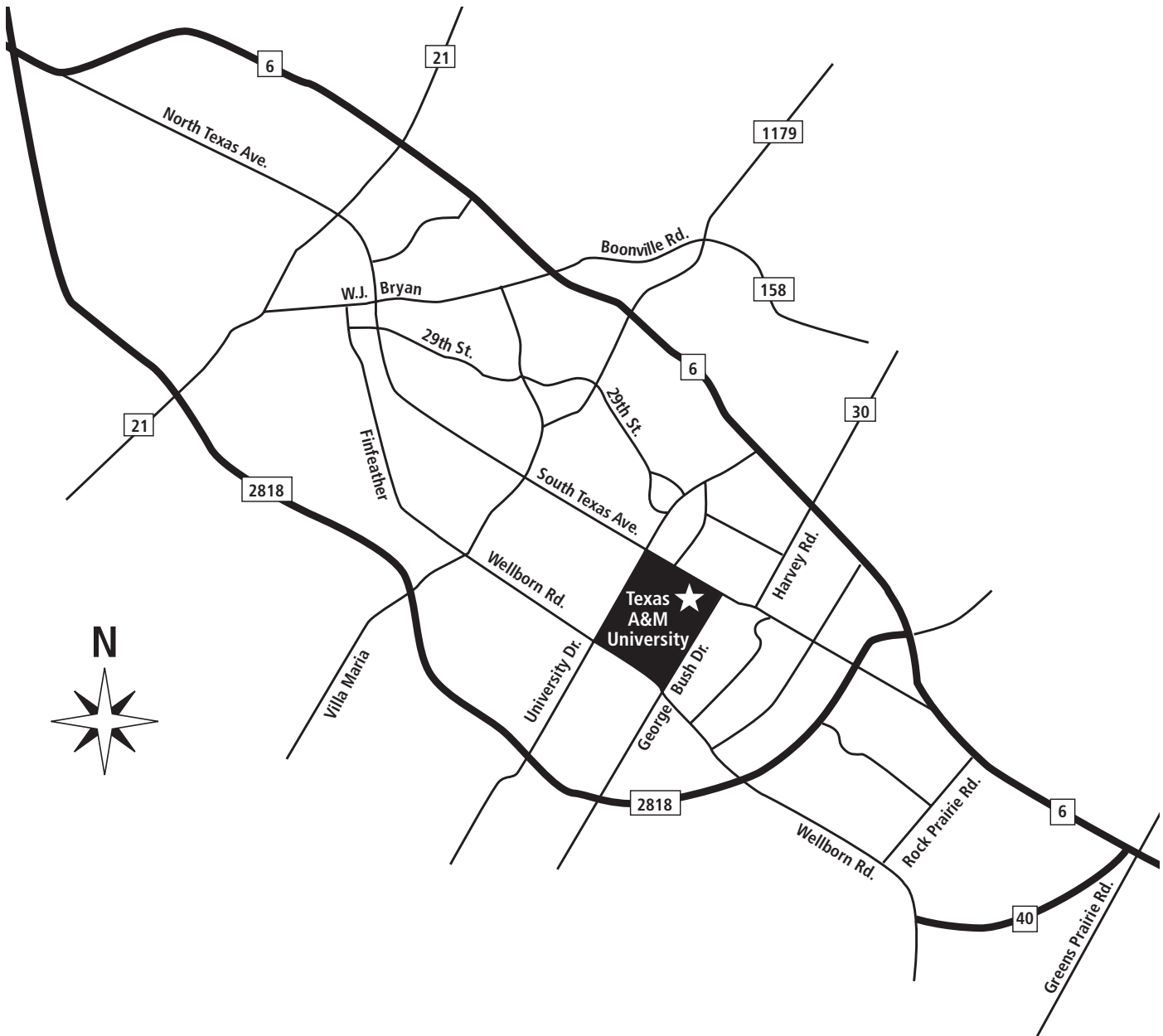
- | | |
|-----------------------|--|
| 11:10 a.m.–11:30 a.m. | Elastic Interactions of Dislocations as Gleaned from Nano-Mechanical Experiments
Xiaoyue Ni, Julia Greer, Gabriele Vajente, Rana Adhikari, California Institute of Technology;
Stefanos Papanikolaou, Johns Hopkins University; Christopher Weinberger, Drexel University |
| 11:30 a.m.–11:50 a.m. | Contact Between Plastically Deformable Bodies
Kelvin Ng Wei Siang and Lucia Nicola, Delft University of Technology |
| 11:50 a.m.–12:10 p.m. | Plasticity Length Scale Development and Evolution in Metal Single Crystals
Jeffrey W. Kysar, Columbia University |
| 12:10 p.m.–12:30 p.m. | Bifurcations in a Plastic Solid Governed by Two-Temperature Thermodynamics
John L. Bassani, University of Pennsylvania |
| 12:30–12:50 p.m. | Finite Deformation Strain-Gradient Plasticity in Amorphous Metals
Prakash Thamburaja, National University of Malaysia |

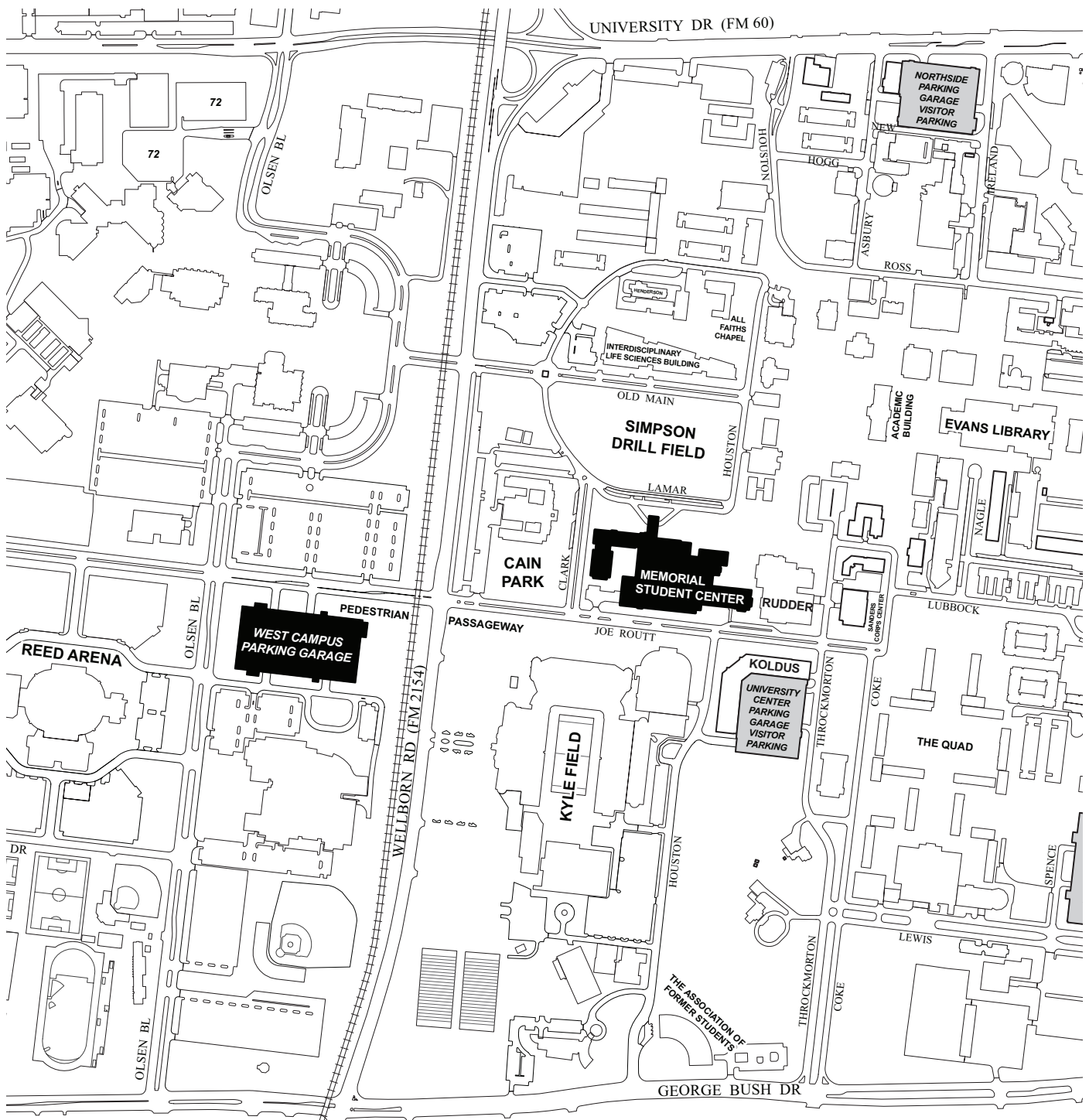
W2	MECHANICS OF NANOSCALE PHENOMENA: MICROMECHANICS & MULTIFUNCTIONAL NANO COMPOSITES (13b)
ROOM 1402	SESSION CHAIR: Gary Seidel

- | | |
|-----------------------|--|
| 11:10 a.m.–11:30 a.m. | Straub Rate Dependent Failure of Interfaces in Glass/Epoxy and Energetic Materials at Nano-Microscale via Dynamic Indentation
Devendra Verma, Vikas Tomar, Purdue University |
| 11:30 a.m.–11:50 a.m. | Bioinspired Ceramic-Polymer Campsite: Transparency, Piezoelectricity, and Stretchability Multifunctionality
Majid Minary, University of Texas at Dallas |
| 11:50 a.m.–12:10 p.m. | Implantable Magnetic Nanocomposites for Cancer Treatment
Nima Rahbar, Worcester Polytechnic Institute |
| 12:10 p.m.–12:30 p.m. | Effects of Grain Morphology on Critical State: A Computational Analysis
Alex X. Jerves, Reid Y. Kawamoto, and José E. Andrade, California Institute of Technology |



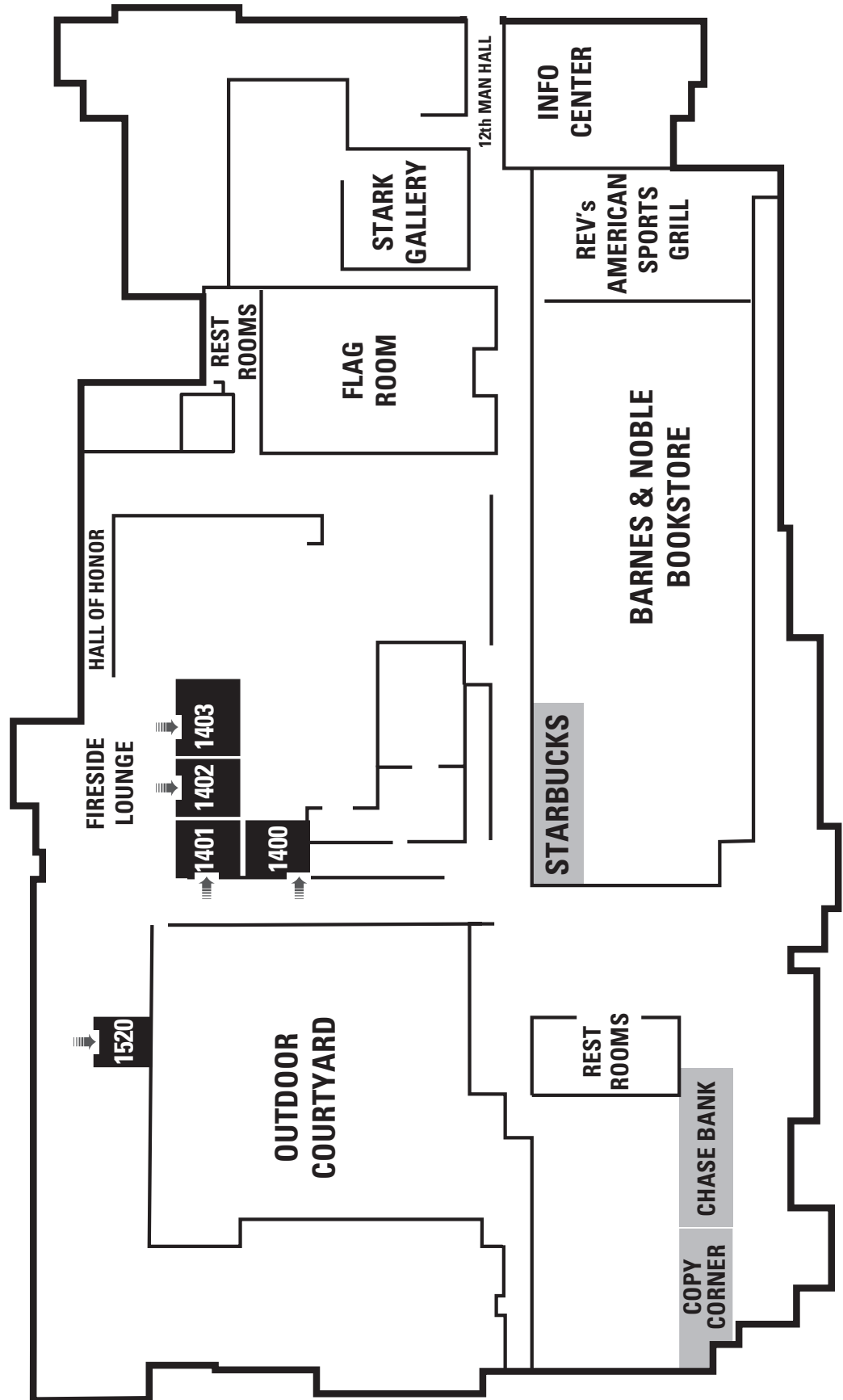
W2 ROOM 1403	MECHANICS OF FRACTURE AND DAMAGE: DUCTILE FRACTURE (20d) SESSION CHAIR: Babak Kondori
11:10 a.m.–11:30 a.m.	Modeling Void-by-void Growth vs. Void Interaction in Thin Sheet Metal Christian Lotz Felter and Kim Lau Nielsen, Technical University of Denmark
11:30 a.m.–11:50 a.m.	Origin of the Anisotropic Damage of X100 Line Pipe Steel Using 3D In situ Synchrotron-radiation Tomography Investigation Y. Madi, Mines ParisTech & EPF-Ecole d'Ingénieurs; J. Garci, T. Morgeneyer, H. Proudhon, and J. Besson, Mines ParisTech; Y. Shinohara, Nippon Steel & Sumitomo Metal Corporation
11:50 a.m.–12:10 p.m.	Ductile Fracture Mechanism, Voids Coalescence and Internal Necking in Semi-crystalline Calcium Silicate Hydrate Rouzbeh Shahsavari, Rice University
12:10 p.m.–12:30 p.m.	Experimental Study of the Effect of Plastic Anisotropy on the Ductile Fracture of a Magnesium Alloy Shamik Basua, E. Dogana, I. Karaman and A.A. Benzerga, Texas A&M University





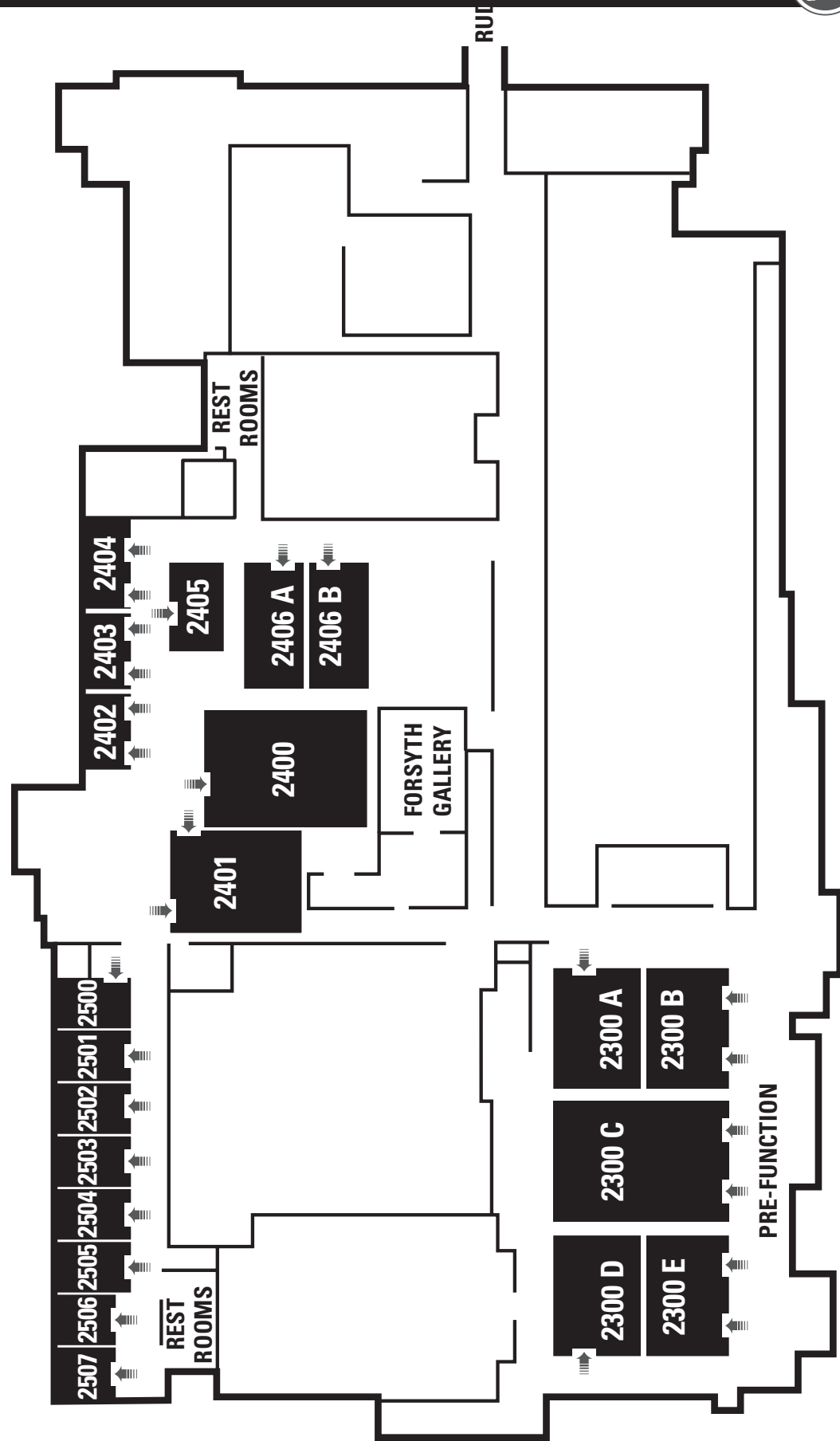


MSC: FIRST FLOOR





MSC: SECOND FLOOR





Restaurants with Private Space

Abuelo's Mexican Restaurant

840 University Dr E,
College Station
(979) 260-3400

Applebee's Neighborhood Grill & Bar

200 Texas Ave S, College Station
(979) 260-3003

Atami Steak & Sushi

800 University Dr, College Station
(979) 268-8883

BJ's Restraunt & Brewhouse

1520 Harvey Rd, College Station
(979) 696-5700

Brauhaus Bavarian Restaurant

109 N Main St, Bryan
(979) 775-4014

Briarcrest Country Club

1929 Country Club Dr, Bryan
(979) 776-0133

Buppy's BBQ

506 Sulphur Springs Rd, Bryan
(979) 779-6417

C&J Bar-B-Que

1010 S Texas Ave, Bryan
(979) 822-6033

Caffe Capri

222 N Main St, Bryan
(979) 822-2675

Café Eccell

4401 S. Texas, Ave, Bryan
(979) 599-7929

Johnny Carino's Italian Grill

620 Harvey Rd, College Station
(979) 764-7374

Casa Ole'

3201 Freedom Blvd, Bryan
(979) 776-0994

Cenare Italian Cuisine

404 University Dr E,
College Station
(979) 696-7311

Chef Cao's

404 University Dr E Ste Z,
College Station
(979) 696-8383

China King Buffet

2402 Texas Ave, College Station
(979) 694-7959

Christopher's World Grille

5001 Boonville Rd, Bryan
(979) 776-2181

Chuy's

1512 Harvey Rd., College Station
(979) 329-6022

Denny's

607 Texas Ave S, College Station
(979) 694-2544

Fuddruckers

1704 George Bush Dr E,
College Station
(979) 696-7142

Golden Corral

700 University Dr E,
College Station
(979) 846-8667

Koppe Bridge Bar & Grill

3940 Harvey Rd, College Station
(979) 776-2833

La Riviera Restaurant & Bakery

3700 S Texas Ave Ste 300., Bryan
(979) 846-5913

Longhorn Tavern Steakhouse

1900 E State Hwy 21
(979) 778-3900

Madden's Casual Gourmet

202 S Bryan Ave, Bryan
(979) 779.2558

Mr. G's Pizzeria

201 W 26th St, Bryan
(979) 822-6747

Ninfa's Mexican Restaurant

1700 Earl Rudder Fwy,
College Station
(979) 693-0506

Outback Steakhouse

2102 Texas Ave S,
College Station
(979) 764-4329

Ozona Grill and Bar

520 Harvey Rd, College Station
(979) 694-4618

Papa Perez Mexican Cuisine

201 S Main St, Bryan
(979) 775-7272

The Corner

401 University Dr, College Station
(979) 268-1406

The Feed Barn

2017 Fountain Ave, Bryan
(979) 822-9488

The Lakeside Ice House at Lake Bryan

8200 Sandy Point Rd, Bryan
(979) 361-0861

The Republic Steakhouse

701 University Dr E,
College Station
(979) 260-4120

Veritas Wine & Bistro

830 University Dr, College Station
(979) 268-3251

The Vintage House Restaurant at Messina Hof

4545 Old Reliance Rd, Bryan
(979) 778-9463

Wings 'N More

3230 Texas Ave S, College Station
(979) 694-8966



George Bush Presidential Library & Museum

*Open: Monday thru Saturday 9:30 a.m.–5:00 p.m., Sunday Noon–5:00 p.m.
(979) 691-4000*

The Museum at the George Bush Presidential Library reveals the unique influences and challenges which shaped George Herbert Walker Bush's life and presidency through artifacts, films, photographs, documents, music and interactive video that create a museum experience that is both educational and entertaining.

Messina Hof Winery & Resort

*Open: Monday thru Wednesday 10:00 a.m.–9:00 p.m.; Thursday thru Saturday 10:00 a.m.–1:00 p.m.;
and Sunday 11:00 a.m.–6:00 p.m.
(979) 778-9463*

Messina Hof is the most awarded and renowned Texas wine in national and international competitions. With tours, festivals, wine seminars, Vintner Dinners and other specialty events, Messina Hof strives to unite the excellence in wine production with excellence in education and entertainment. Unparalleled wine and food pairing efforts have helped to make choices easy for the casual wine drinker. Messina Hof can also serve as a unique and beautiful location for a private event. Whether the occasion is a wedding, luncheon, meeting, corporate gathering, the amenities abound at Messina Hof. The winery offers wine tours and tastings daily, vineyard cuisine at the award-winning Vintage House Restaurant and luxurious overnight accommodations at The Villa, voted the most romantic Bed & Breakfast in the U.S.



Bonfire Memorial

*Polo Fields Open: From Dawn until Dusk;
Admission is FREE.*

The Bonfire Memorial is dedicated to the 12 Aggies who lost their lives in the tragic collapse of the 1999 Bonfire. It celebrates the tradition and history of Texas A&M and is comprised of the Tradition Plaza, Spirit Wall and History Walk.



UNIVERSITY OF
MARYLAND

Society of Engineering Science

53rd Annual Technical Meeting Fall 2016

October 4-7, 2016 | www.SES2016.org

The University of Maryland hosts the 53rd Annual Technical Meeting of the Society of Engineering Science (SES), Fall 2016

The SES Technical Meeting is held annually to foster and promote the exchange of ideas and information among the various disciplines of engineering and the fields of physics, chemistry, mathematics, bioengineering, and related scientific and engineering fields.

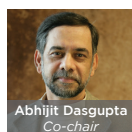
The 53rd SES Technical Meeting will be hosted by the University of Maryland (UMD) October 4-7, 2016 at the College Park Marriott Hotel & Conference Center.

UMD is located in College Park, Maryland, right on the doorstep of Washington, D.C., and is readily accessible from three major airports (IAD, DCA, and BWI). In addition, nearby Metrorail provides easy access to Washington D.C. and area attractions.

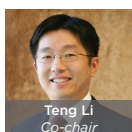
UMD is the state's flagship university, and is one of the premier research institutions in the United States and in the world. UMD has longstanding research strengths across a broad array of disciplines, and supports research addressing the most serious global challenges we currently face.

Focus areas for SES 2016 include:

- Mechanics of materials in extreme environments
- Mechanics of integrated structures: MEMS/NEMS, ICs, and electronic packaging
- Mechanics and materials in advanced technologies: energy harvesting and storage (batteries, super-capacitors, PV), flexible/stretchable electronics, and organic electronics
- Mechanics of 1D/2D materials and derivatives: nanowires, nano/micro-fibrillates, thin membranes, multilayers, and low dimensional origami
- Multifunctional materials in response to mechanical, chemical, electrical, and thermal stimuli
- Mechanics and materials in advanced manufacturing: additive manufacturing, fiber and textile, lithography, DRIE, and self-assembly
- Degradation, damage and fracture mechanics, reliability, prognostics and health management
- Meso-/micro-/nano-mechanics of defects and interfaces in materials
- Materials genome: multiscale modeling and experimentation of material behavior
- Interface topics between biology and engineering: biomechanics of soft tissues, cells, vesicles, subcellular structures and bio-molecules, bio-mimetic materials, bio-medical materials and devices
- Fluid mechanics, micro-fluidics, nano-fluidics, and fluid-structure interactions
- Mechanics in robotics: soft machine and robots, micro-robotics, nanobots, haptics, and bio-mimetic robots
- Experimental and computational nonlinear dynamics and control
- Structure and material optimization under uncertainty
- Engineering education and innovation



Abhijit Dasgupta
Co-chair



Teng Li
Co-chair

Local Organizing Team

Helim Aranda-Espinoza, Bala Balachandran, Inderjit Chopra, Nikhil Chopra, Peter Chung, Abhijit Dasgupta, Don DeVoe, Alison Flatau, Liangbing Hu, Ken Kiger, Sung Lee, Teng Li, Yifei Mo, Chunsheng Wang, Yunfeng Zhang

