Program

Composites at Lake Louise 2019

November 10-14, 2019
Fairmont Chateau Lake Louise
Alberta, Canada

Conference Chairs

John Kieffer
University of Michigan, USA

Meisha Shofner
Georgia Institute of Technology, USA

Erik Spoerke
Sandia National Laboratories, USA

Engineering Conferences International
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Recent previous conferences in this series

The series was founded by Patrick Nicholson.

Composites at Lake Louise (CALL 2013)
November 3-7, 2013
Fairmont Chateau Lake Louise
Lake Louise, Alberta, Canada

Conference Chairs:
Van Thompson, Kings College London
Jennifer Lewis, Harvard University

Composites at Lake Louise (CALL 2015)
November 8-12, 2015
Fairmont Chateau Lake Louise
Lake Louise, Alberta, Canada

Conference Chair:
Jim Smay, Oklahoma State University, USA

Composites at Lake Louise (CALL 2017)
November 12-16, 2017
Fairmont Chateau Lake Louise
Lake Louise, Alberta, Canada

Conference Chair:
Eric Duoss, Lawrence Livermore National Laboratory, USA
Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA
Conference Sponsor

Dow
Sunday, November 10, 2019

16:30 – 18:30  Conference Check-in (Alpine Gallery)
18:45 – 19:00  Conference Welcome  
Conference Chairs and ECI Technical Liaison
19:00 – 20:45  Nicholson Memorial Session  
Session Chair: Meisha L. Shofner, Georgia Institute of Technology, USA
19:00 – 19:30  Enabling circular engineering by redesigning a driver’s side front door using ultralightweight thermoplastics composites via systems level design and simulation strategy  
Srikanth Pilla, Clemson University, USA
19:30 – 20:00  Geologic entropy with economic constraints predicts mineral prices  
Alan J. Hurd, Los Alamos National Laboratory, USA
20:00 – 20:45  Geopolymers: Versatile ceramics made at ambient temperatures  
Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA
20:45   Reception (Heritage Hall)

Room locations and notes

- General Sessions will be held in Mount Temple B. Parallel sessions will be held in Mount Temple A and B.
- Poster Sessions will be in Heritage Hall.
- Breakasts will be in Lago Restaurant and lunches will be in Mount Temple C. The conference banquet location will be in Mount Temple A.
- The ECI office is the Parker Room.
- Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).
- Speakers – Please leave discussion time as previously directed by your session chair.
- Please do not smoke at any conference functions.
- Turn your mobile telephones to vibrate or off during technical sessions.
- Please write your name on your program so that it can be returned to you if lost or misplaced.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
- Emergency Contact Information: Because of privacy concerns, ECI does not collect or maintain emergency contact information for conference participants. If you would like to have this information available in case of emergency, please use the reverse side of your name badge.
Monday, November 11, 2019

07:00 – 08:00  Breakfast

08:00 – 10:00  **Composites for Energy Storage and Conversion I (Parallel Session)**
Session Chair:  Erik Spoerke, Sandia National Laboratories, USA

08:00 – 08:30  Composite polymer electrolytes for all-solid-state lithium batteries with nanostructured garnet ceramic fillers
Candace K. Chan, Arizona State University, USA

08:30 – 09:00  Hybrid organic-inorganic nano-composites for solid-state battery electrolytes
John Kieffer, University of Michigan, USA

09:00 – 09:30  Understanding the evolution of the silicon electrode SEI through model lithium silicate thin film layers
Christopher A. Apblett, Sandia National Laboratories, USA

09:30 – 10:00  Dense ceramic cathodes for lithium and sodium batteries
Paul Braun, University of Illinois at Urbana-Champaign, USA

08:00 – 10:00  **Sustainable Synthesis, Processing, and Materials Design I (Parallel Session)**
Session Chair:  Brett G. Compton, University of Tennessee, USA

08:00 – 08:30  Self-healing copolymers via van der Waals interactions
Marek Urban, Clemson University, USA

08:30 – 09:00  Vapor phase infiltration for transforming polymers into organic-inorganic hybrid materials: Processing science, structural complexity, and emerging applications
Mark D. Losego, Georgia Institute of Technology, USA

09:00 – 09:30  New furan-based thermosetting polymer systems
Giuseppe R. Palmese, Drexel University, USA

09:30 – 10:00  A new paradigm in functionally graded adhesives
Daniel Schmidt, UML Plastics Engineering, USA

10:00 – 10:30  Coffee Break

10:30 – 12:30  **Composites for Energy Storage and Conversion II (Parallel Session)**
Session Chair:  Paul Braun, University of Illinois at Urbana-Champaign, USA

10:30 – 11:00  Novel calcium ion conducting solid electrolyte with NASICON-type structure
Nobuhito Imanaka, Osaka University, Japan

11:00 – 11:30  The ion seeps tonight: Assessing ionic transport in multilayered nanocomposites
Erik Spoerke, Sandia National Laboratories, USA

11:30 – 12:00  Electrochemical artificial muscle yarns and textiles that harvest and store environmentally available energies
Ray Baughman, The University of Texas at Dallas, USA
Monday, November 11, 2019 (continued)

12:00 – 12:30 Multi-component colloidal nanorod heterostructures and their optoelectronic/photovoltaic applications
Moonsub Shim, University Of Illinois, USA

10:30 – 12:30 Sustainable Synthesis, Processing, and Materials Design II (Parallel Session)
Session Chair: Mark D. Losego, Georgia Institute of Technology, USA

10:30 – 11:00 Direct-write additive manufacturing of polymer and ceramic composites
Brett Compton, University of Tennessee, USA

11:00 – 11:30 Hyperbaric laser chemical vapor deposition of high-strength aluminum-silicon-carbide nanocomposite fibers for aerospace and transportation applications
James L. Maxwell, La Trobe University, Australia

11:30 – 12:00 Cold sintered ceramic composites for microwave applications
Ian Reaney, University of Sheffield, United Kingdom

12:00 – 12:30 Design of ceramic-polymer optical composites for building energy efficiency: Infrared property control and transparent bulk thermal insulators
Paul Clem, Sandia National Laboratories, USA

12:30 – 13:30 Lunch

13:30 – 14:15 Poster Session I

14:15 – 19:00 Ad hoc discussions / Networking / Free time

19:00 – 21:00 Mechanics of Complex Systems I
Session Chair: Erik Spoerke, Sandia National Laboratories, USA

19:00 – 19:30 Engineered Molding Compound (EMC): Optimizing the design, performance, and economics of carbon fiber composites for industrial applications
Jason Reese, Dow Chemical, USA

19:30 – 20:00 Bioinspired design of structural and thermal interface materials
Nima Rahbar, Massachusetts Institute of Technology, USA

20:00 – 20:30 Soft matter structure measurement by polarized resonant soft X-ray scattering
Dean DeLongchamp, NIST, USA

20:30 – 21:00 Profiles in local glass transition temperature near and across polymer interfaces in nanostructured blends
Connie B. Roth, Emory University, USA
Tuesday, November 12, 2019

07:00 – 08:00  Breakfast

08:00 – 10:00  Materials Design for Biomedical Applications I (Parallel Session)
Session Chair: John A. Nychka, University of Alberta, Canada

     08:00 – 08:30  Hierarchical hybrid materials for robust and reusable functional devices
                Sharmila Mukhopadhyay, Wright State University, USA

     08:30 – 09:00  Organic-inorganic hybrid polymer coatings with controlled biofunctionality
                Svetlana A. Sukhishvili, Texas A&M University, USA

     09:00 – 09:30  Protein-based drug delivery and thermal protection via Mof encapsulation
                Jeremiah Gassensmith, University of Texas at Dallas, USA

     09:30 – 10:00  Additive manufacturing of monomer-free ORMOCER®-based composites
                for dental and audiological application
                Herbert Wolter, Fraunhofer Institute for Silicate Research ISC, Germany

08:00 – 10:00  Mechanics of Complex Systems II (Parallel Session)
Session Chair: Connie B. Roth, Emory University, USA

     08:00 – 08:30  High rate deformation behavior and extraordinary energy absorption of
                carbon nanotube mats and glassy polymer thin films
                Edwin Thomas, Rice University, USA

     08:30 – 09:00  Defect coupling: The last frontier in predicting the strength, life, and
                durability of fiber reinforced composite laminates
                Kenneth Reifsnider, University Texas Arlington, USA

     09:00 – 09:30  Tricomponent composites with cellulose nanocrystals and chitin
                nanofibers - Exploring potential synergy through component interactions
                Meisha Shofner, Georgia Institute of Technology, USA

     09:30 – 10:00  Precise 3D structuring of polymer nanocomposites using triaxial magnetic
                fields
                Namiko Yamamoto, The Pennsylvania State University, USA

10:00 – 10:30  Coffee Break

10:30 – 12:00  Materials Design for Biomedical Applications II (Parallel Session)
Session Chair: Svetlana A. Sukhishvili, Texas A&M University, USA

     10:30 – 11:00  Ceramic composite bone tissue scaffolds
                John A. Nychka, University of Alberta, Canada

     11:00 – 11:30  Improved mechanical performance of a next-generation hybrid bone
                adhesive
                Alina Kirillova, Duke University, USA

     11:30 – 12:00  Natural functionally-graded composites in hard-to-soft tissue (bone-
                tendon) junctions
                Linn W. Hobbs, Massachusetts Institute of Technology, USA
Tuesday, November 12, 2019 (continued)

12:00 – 12:30  How big should your nanoindentation be? The implications of indentation size in assessing the properties of complex structure  
David F. Bahr, Purdue University, USA

10:30 – 12:30  Mechanics of Complex Systems III (Parallel Session)  
Session Chair: Namiko Yamamoto, The Pennsylvania State University, USA

10:30 – 11:00  Directions of zero thermal expansion in anisotropic oxides  
Scott J. McCormack, University of Illinois at Urbana Champaign, USA

11:00 – 11:30  Activating extrinsic and intrinsic toughening mechanisms in polycrystalline ceramics and their composites via microstructural engineering  
Jessica A. Krogstad, University of Illinois, Urbana Champaign, USA

11:30 – 12:00  A new paradigm to evaluate the cleavage energy of brittle materials  
Dov Sherman, Tel-Aviv University, Israel

12:00 – 12:30  Strategies to strengthen ceramics for windows and domes  
Ivar Reimanis, Colorado School of Mines, USA

12:30 – 13:30  Lunch

13:30 – 14:15  Poster Session II

14:15 – 20:15  Ad hoc discussions / Free Time / Networking

20:15 – 20:45  Conference Banquet Talk  
Session Chair: John Kieffer, University of Michigan, USA

Cosmic composites: Rocks from space and their astonishing influence on earth and humanity  
Gregory A. Brennecka, University of Münster, Germany
Wednesday, November 13, 2019

07:00 – 08:00  Breakfast

08:00 – 10:00  **Sustainable Synthesis, Processing, and Materials Design III (Parallel Session)**
                Session Chair: Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA

08:00 – 08:30  Processing and structure of Bopp film with nanoparticle-based additives
               Krishnamurthy Jayaraman, Michigan State University, USA

08:30 – 09:00  Imparting machine intelligence into direct ink write manufacturing
               J. Daniel Berrigan, Air Force Research Laboratory, USA

09:00 – 09:30  Bioinspired nanocomposites: Ordered 2D materials within a 3D lattice
               Iryna Polishchuk, Technion-Israel Institute of Technology, Israel

09:30 – 10:00  Scaling up graphene PET nano-composites for industry applications
               Jay C. Hanan, Oklahoma State University, USA

08:30 – 10:00  **Functional Materials I (Parallel Session)**
                Session Chair: Geoff L. Brennecka, Colorado School of Mines, USA

08:30 – 09:00  3D printing functional composites & devices
               Michael McAlpine, University of Minnesota, USA

09:00 – 09:30  Additive manufacturing of inorganic-organic hybrid materials for transdermal biosensor applications
               Roger Narayan, North Carolina State University, USA

08:00 – 10:00  Bio-Nanopatterning: Inkjet printed nanopatterned aptamer-based sensors for improved optical detection of foodborne pathogens
               Lia Stanciu, Purdue University, USA

10:00 – 10:30  Coffee Break

10:30 – 12:00  **Functional Materials II (Parallel Session)**
                Session Chair: Lia Stanciu, Purdue University, USA

10:30 – 11:00  Perovskite nitrides: A new playground for functional materials
               Geoff L. Brennecka, Colorado School of Mines, USA

11:00 – 11:30  Ag nanowire-based nanocomposites for interconnects of flexible/wearable electronics
               Byungil Hwang, Chung-Ang University, South Korea

11:30 – 12:00  Self-strengthening polymer composites by vibration
               Aaron Esser-Kahn, University of Chicago, USA
Wednesday, November 13, 2019 (continued)

10:30 – 12:30  Sustainable Synthesis, Processing, and Materials Design IV (Parallel Session)
Session Chair: J. Daniel Berrigan, Air Force Research Laboratory, USA

10:30 – 11:00  Development and optimization of hybridized glass/carbon Lft composites for cost and performance
Kristin Hardin, Nippon Electric Glass, USA

11:00 – 11:30  Carbon oxidation over silver/perovskite-type oxide composite catalysts
Hidenori Yahiro, Ehime University, Japan

11:30 – 12:00  Beyond nanosilica: Geopolymeric nanoaluminosilicates for functional nanocomposites
Dong-Kyun Seo, Arizona State University, USA

12:00 – 12:30  In situ synchrotron studies of oxide ceramics to 3,000°C
Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA

12:30 – 13:30  Lunch

13:30 – 14:15  Poster Session III

14:15 – 19:00  Free Time / Networking

19:00 – 21:00  Mechanics of Complex Systems IV
Session Chair: Meisha L. Shofner, Georgia Institute of Technology, USA

19:00 – 19:30  Coherent nanoprecipitates within a biogenic single crystal: From spinodal decomposition to a prestressing strategy
Boaz Pokroy, Technion, Israel

19:30 – 20:00  Role of nanoscale coherent precipitates on the thermo-mechanical response of martensitic materials
Alejandro Strachan, Purdue University, USA

20:00 – 20:30  Design, printing, and characterization of aerospace morphing structures
Jeffery Baur, Air Force Research Laboratory, USA
Thursday, November 14, 2019

07:00 – 08:00  Breakfast

08:00 – 09:30  **Impromptu I: Things we definitely know do not work**  
Session Chairs: John Kieffer, University of Michigan, USA  
Meisha L. Shofner, Georgia Institute of Technology, USA  
Erik Spoerke, Sandia National Laboratories, USA

08:30 – 11:30  **Poster Session IV**

10:00 – 10:30  Coffee Break

10:30 – 12:00  **Impromptu II: Things we believe will work with the right collaborator(s)**  
Session Chairs: John Kieffer, University of Michigan, USA  
Meisha L. Shofner, Georgia Institute of Technology, USA  
Erik Spoerke, Sandia National Laboratories, USA

12:00 – 12:15  Closing Remarks and Future Directions

12:15  Lunch and Departures
Posters

Composites at Lake Louise 2019

November 10-14, 2019
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Alberta, Canada
1. **Self-healable copolymers via van der Waals interactions**  
   Siyang Wang, Clemson University, USA

2. **Reconstitution of elastic properties – New insights into the functional behavior of polymer matrix composites**  
   John Kieffer, University of Michigan, USA

3. **Fracture of 3D printed brittle open-cell structures under compression**  
   Dov Sherman, Tel-Aviv University, Israel

4. **Reprintable self-healing polymer networks**  
   Svetlana Sukhishvili, Texas A&M University, USA

5. **Walnut shell extract as sustainable, eco-friendly and cost-effective green corrosion inhibitor for fabrication of active protective nanocomposite coating based on mesoporous carbon hollow nanospheres**  
   Seyyedarash Haddadi, University of British Columbia, Canada

6. **Deeper understanding of cobalt-doped SiC nanowires as excellent electromagnetic wave absorbers**  
   Caiyun Liang, Harbin Institute of Technology, China

7. **A novel and cost-effective double-capsule nanocomposite coating based on carbon hollow spheres with self-healing performance for corrosion protection**  
   Seyyedarash Haddadi, University of British Columbia, Canada

8. **Investigating the mechanical properties of nonfunctionalized mwcnt reinforced polymer (pmma) nanocomposites**  
   Anand Joshi, G H Patel College of Engineering and Technology, India

9. **Sintering of hierarchically-structured boron carbide for toughening and multifunctionality**  
   Namiko Yamamoto, The Pennsylvania State University, USA