Final Program

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Program

Composites at Lake Louise 2015

November 8-12, 2015

Fairmont Chateau Lake Louise
Lake Louise, Alberta, Canada

Conference Chair

Jim Smay
Oklahoma State University
USA

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**Sunday, November 8, 2015**

16:30 – 19:00 Conference Check-in  (Lobby outside LeFroy Room, ECI Conference Office)

18:45 – 20:30 **Plenary Session**  (Victoria Ballroom)
   Session Chair: James Smay

18:45 – 19:00 **Welcome and Conference Overview**
   James Smay, Conference Chair
   Linn Hobbs, ECI Technical Liaison

19:00 – 19:45 **Deterministic three-dimensional composite structures for energy storage**
   Paul Braun, University of Illinois at Urbana-Champaign, USA

19:45 – 20:30 **Nicholson Memorial Lecture**
   Towards accelerated medical innovation
   Jeff M Karp, Institution of Brigham and Women’s Hospital, USA

20:45 – 22:00 **Reception**  (Red Room, ante-room outside Victoria Ballroom)

**NOTES**

- The **Plenary** and **Biocomposites** sessions will be held in **Victoria Ballroom**.
- **Functional Composites Session 1** will be held in the **Agnes Room**, except Thursday
- **Functional Composites Session 2** will be held in the **Sun Room**.
- The **Structural Composites** sessions will be held in the **Louise Room**, except Thursday
- The **Poster Session** will be held at the rear of the **Victoria Ballroom**.
- The **ECI office** will be the **Lefroy Room**.
- **Breakfasts** will be in the **Poppy Brasserie**.
- **Lunches** and the conference **Banquet** will be in the **Victoria Ballroom**.
- Audiotaping, videotaping and photography of presentations are prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- **Please do not smoke at any conference functions.**
- Turn your cellular telephones to vibrate or off during technical sessions.
- 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.
- Please write your name in the front of this program booklet so it can be returned if misplaced.
Monday, November 9, 2015

07:00 – 08:30  Breakfast

08:30 – 09:15  **Plenary Session** (Victoria Ballroom)
Session Chair: Jennifer Lewis

*Rare earths, rare-earth oxides, and the oxides’ unique character: Application for environmental catalysts*
Nobuhito Imanaka, Osaka University, Japan

09:30 – 12:30  **Biocomposites Session** (Victoria Ballroom)
Session Chairs: Valeria Milam and Erik Spoerke

09:30 – 09:50  *Self-assembly directs enamel formation and regeneration*
Malcolm Snead, University of Southern California, USA

09:50 – 10:10  *Polymer melts inside nanoscale cylindrical pores: Chain conformations, polymer diffusion and local dynamics*
Karen Winey, University of Pennsylvania, USA

10:10 – 10:30  *Aptamer panning against gold*
Valeria Milam, Georgia Institute of Technology, USA

10:30 – 10:50  *Engineering hydrogels for dynamic modulation of stem cell activity*
Kristopher Kilian, University of Illinois at Urbana-Champaign, USA

10:50 – 11:10  *Printing living tissues*
Jennifer A Lewis, Harvard SEAS, USA

11:10 – 11:30  *Engineered GAG-based coatings for mesenchymal stem cells*
Johnna Temenoff, Georgia Tech/Emory University, USA

11:30 – 11:50  *Supramolecular peptide composite assemblies: Mimicking biological form and function in synthetic systems*
Erik David Spoerke, Sandia National Laboratories, USA

11:50 – 12:10  *The development of bioresorbable Fe-Mn alloys for orthopedic implantation*
Lia Stanciu, Purdue University, USA

12:10 – 12:30  *Additively manufactured bio-based composites*
Jennifer Rodriguez, Lawrence Livermore National Lab, USA

09:30 – 12:30  **Structural Composites Session** (Louise Room)
Session Chairs: Michael Kessler and Chris Hansen

09:30 – 09:50  *Additive manufacturing of metals at high rate yielding controlled microstructure*
James McGuffin-Cawley, Case Western Reserve University, USA

09:50 – 10:10  *Reactive Ni-Al nanostructured composites through electrochemical dispersion deposition*
Christopher A Apblett, Sandia National Laboratories, USA
Monday, November 9, 2015 (continued)

10:10 – 10:30  Additive manufacturing of bulk refractory fiber within the Ta-Hf-C system for ultra high-temperature reinforced composite materials
James Maxwell, Dynetics Company, USA

10:30 – 10:50  Nanoscale deformation of composite structures and heterophase interfaces
Shen J. Dillon, University of Illinois at Urbana-Champaign, USA

10:50 – 11:10  Thermosetting polymers and composites from agricultural oils
Michael Kessler, Washington State University, USA

11:10 – 11:30  Cure kinetics and interfacial phenomena in polymer matrix composites
John Kieffer, University of Michigan, USA

11:30 – 11:50  High efficient material and process combination for future aircraft applications based on advanced sheet molding compound technologies
Marc Fette, Helmut Schmidt University, Germany

11:50 – 12:10  Automated fiber placement of multifunctional fiber-reinforced composites
Chris Hansen, University of Massachusetts, Lowell, USA

12:10 – 12:30  Icosahedral phase strengthened nanocomposites for structural components
Thomas Watson, Pratt & Whitney, USA

09:30 – 11:50  Functional Composites Session 1 (Agnes Room)
Session Chairs: Eric Duoss and Daniel Therriault

09:30 – 09:50  Design of multifunctional composites and their use for the 3-D printing of microsystems
Daniel Therriault, Ecole Polytechnique De Montreal, Canada

09:50 – 10:10  Carbon nanocomposites structure and properties: Insights from TEM tomography
James Liddle, National Institute of Standards and Technology (NIST), USA

10:10 – 10:30  Well-ordered nanohybrids and nanoporous materials from block copolymer templates
Rong Ming Ho, National Tsing Hua University, Taiwan

10:30 – 10:50  Nanostructured metal-ceramic composites by internal reduction
Ivar Reimanis, Colorado School of Mines, USA

10:50 – 11:10  Additive manufacturing of cellular materials with tailored properties
Eric Duoss, Lawrence Livermore National Laboratory, USA

11:10 – 11:30  Shape reconfigurable liquid metals
Michael Dickey, North Carolina State University, USA

11:30 – 11:50  Transport of nanoparticles in polyelectrolyte solutions as a model of polymer nanocomposite processing
Jacinta C. Conrad, University of Houston, USA
Monday, November 9, 2015 (continued)

09:30 – 12:10  **Functional Composites Session 2**  (Sun Room, beyond Victoria Ballroom)
Session Chairs: Nobuhito Imanaka and Brett Compton

09:30 – 09:50  **Imaging the interphase in polymer composites**
Chelsea Davis, National Institute of Standards and Technology, USA

09:50 – 10:10  **Stimulus-responsive and conductive composites for remote sensing applications**
Anastasia Elias, University of Alberta, Canada

10:10 – 10:30  **Fabrication and characterization of locally resonant acoustic metamaterials made with resonators generated from core-shell drops**
Carlos Martinez, Purdue University, USA

10:30 – 10:50  **Stability of oxides/environmental barrier coating candidate materials in high-temperature, high-velocity steam**
Elizabeth Opila, University of Virginia, USA

10:50 – 11:10  **Click chemistry and its unique benefits in composite formulation**
Christopher Bowman, University of Colorado Boulder, USA

11:10 – 11:30  **Single and double heterojunction nanorods for optoelectronics**
Moonsub Shim, University of Illinois at Urbana-Champaign, USA

11:30 – 11:50  **Bicontinuous networks of metal and elastomer for shape morphing composites**
Robert Shepherd, Cornell University, USA

11:50 – 12:10  **3D printing of composites with controlled architecture**
Brett Compton, University of Tennessee, USA

12:30 – 13:30  Lunch

13:30 – 19:00  Free Time

19:00 – 21:30  **Evening Plenary Session**  (Victoria Ballroom)
Session Chairs: James Smay and Jennifer Lewis

19:00 – 19:45  **Dispersion of powders in complex systems**
James Adair, The Pennsylvania State University, USA

19:45 – 20:30  **Magneto-ionic control of interfacial magnetism**
Geoffrey Beach, Massachusetts Institute of Technology, USA

20:30 – 21:15  **Concept and development of solid state ionic capacitors**
Takaaki Tsurumi, Tokyo Institute of Technology, Japan
Tuesday, November 10, 2015

07:00 – 08:30  Breakfast

08:30 – 09:15  **Plenary Session**  
Session Chair: Jamie Grunlan

*Use of capillary flow to create flexible and embedded electronics*  
Lorraine Francis, University of Minnesota, USA

09:30 – 12:10  **Biocomposites Session (Victoria Ballroom)**  
Session Chairs: Ray Baughman and Kaushik Chatterjee

09:30 – 09:50  **Structural optimization of fiber-reinforced composite dental bridges**  
Alex Fok, University of Minnesota, USA

09:50 – 10:10  **Scalable directed assembly of nanostructured soft materials**  
Chinedum Osuji, Yale University, USA

10:10 – 10:30  **Powerful artificial muscles for morphing composites and other applications**  
Ray Baughman, University of Texas at Dallas, USA

10:30 – 10:50  **PGX – Technology: A versatile technology for generating advanced biopolymer materials**  
Bernhard Seifried, Ceapro Inc., Canada

10:50 – 11:10  **Graphene/ Polymer composites for biomedical applications: Tissue scaffolds, prosthetic joints and gene delivery**  
Kaushik Chatterjee, Indian Institute of Science, India

11:10 – 11:30  **Layered biomimetic and kirigami nanocomposites**  
Nicholas Kotov, University of Michigan, Ann Arbor, USA

11:30 – 12:10  **Self-organized soft-hard interfaces: From surfaces to biologically integrated hybrid materials**  
Candan Tamerler-Behar, University Kansas, USA

11:50 – 12:10  **Electric eels: Bizarre natural phenomena or inspiration for novel nanocomposite energy storage**  
Erik David Spoerke, Sandia National Laboratories, USA

09:30 – 11:50  **Structural Composites Session** (Louise Room)  
Session Chairs: Kevin Ewsuk and Daniel Schmidt

09:30 – 09:50  **Composite metallic nanofoam structures**  
David Bahr, Purdue University, USA

09:50 – 10:10  **Characterization and modeling to design and develop tailored-property filled glass composites**  
Kevin Ewsuk, Sandia National Laboratories, USA

10:10 – 10:30  **Structural composites from high performance bioepoxies**  
Daniel Schmidt, University of Massachusetts, USA

10:30 – 10:50  **Role of molecular interactions on the mechanics of nanocomposites**  
Dinesh Katti, North Dakota State University, USA
Tuesday, November 10, 2015 (continued)

10:50 – 11:10  Amorphous metal sandwich composites with unprecedented strength
Jay Hanan, Oklahoma State University, USA

11:10 – 11:30  Nanoclay based composite scaffolds for development of novel humanoid environment
Kalpana Katti, North Dakota State University, USA

11:30 – 11:50  The break evolution process in composite microcomposites
Gale Holmes, National Institute of Standards & Technology, USA

09:30 – 12:10  Functional Composites Session 1 (Agnes Room)
Session Chairs: Alan Hurd and Cheng Zhu

09:30 – 09:50  Deposition dynamics for processing functional polymer nanocomposite membranes
John A Howarter, Purdue University, USA

09:50 – 10:10  Dynamical mechanical behavior of graphene and CNT materials under hypersonic projectile penetration
Edwin L Thomas, Rice University, USA

10:10 – 10:30  Three-dimensional printing of graphene-based composite aerogels
Cheng Zhu, Lawrence Livermore National Lab, USA

10:30 – 10:50  Chemically modified graphene-based composite paper electrodes for long-cycle metal-ion batteries
Gurpreet Singh, Kansas State University, USA

10:50 – 11:10  Functional nanogels applied to materials development
Jeffrey Stansbury, University of Colorado, USA

11:10 – 11:30  Composite materials for energy and sustainable development
Alan Hurd, Los Alamos National Laboratory, USA

11:30 – 11:50  Constructing nanocrystal-in-glass composites for smart windows
Delia Milliron, University of Texas at Austin, USA

11:50 – 12:10  Design and fabrication of microstructured composites using mechanical and magnetic stimuli
Rafael Libanori, ETH Zurich, Switzerland

09:30 – 12:10  Functional Composites Session 2 (Sun Room, beyond Victoria Ballroom)
Session Chairs: Ian Reaney and Serge Bourbigot

09:30 – 09:50  Cellulose nanofibers networks for structural nanomaterials and biocomposites with multiple functions
Lars Berglund, KTH Royal Institute of Technology, Sweden
**Tuesday, November 10, 2015 (continued)**

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<th>Time</th>
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<th>Speaker and Institution</th>
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<td>09:50 – 10:10</td>
<td>Composites on fire at reduced scale: evaluation, characterization and modeling</td>
<td>Serge Bourbigot, Lille University of Science and Technology, France</td>
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<td>10:10 – 10:30</td>
<td>Designer electrocatalysts from transition metal oxide heterostructure</td>
<td>Jin Suntivich, Cornell University, USA</td>
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<td>10:30 – 10:50</td>
<td>Low cost synthesis of silicon-based ceramic powders from Na, K and Cs Geopolymer</td>
<td>Waltraud (Trudy) Kriven, University of Illinois at Urbana-Champaign, USA</td>
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<td>10:50 – 11:10</td>
<td>Processing, properties and prospects for melt infiltrated (MI) SiCf-ceramic composites</td>
<td>Raj Narain Singh, Oklahoma State University, USA</td>
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<td>11:10 – 11:30</td>
<td>Laser-based three-dimensional printing of zirconium oxide hybrid materials</td>
<td>Roger Narayan, UNC/NCSU, USA</td>
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<td>11:30 – 11:50</td>
<td>Stimuli responsive nanocomposites based on cellulose nanocrystals</td>
<td>Johan Foster, Virginia Tech, USA</td>
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<td>11:50 – 12:10</td>
<td>Substitution and sustainability in functional materials and devices</td>
<td>Ian Reaney, University of Sheffield, United Kingdom</td>
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<td>12:30 – 13:30</td>
<td>Lunch (Victoria Ballroom)</td>
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<td>Free Time</td>
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<td>19:00 – 21:15</td>
<td>Banquet (Victoria Ballroom)</td>
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Wednesday, November 11, 2015

07:00 – 08:30  Breakfast

08:30 – 09:15  **Plenary Session** (Victoria Ballroom)
Session Chair: Trudy Kriven

*Exploration of the materials paradigm with respect to bioinspiration*
John Nychka, University of Alberta, Canada

09:30 – 11:30  **Biocomposites Session** (Victoria Ballroom)
Session Chairs: Tobias Niebel and Boaz Pokroy

09:30 – 09:50  **Novel anti-decay self-setting paste of hydroxyapatite/collagen nanocomposite utilizing GPTMS**
Masanori Kikuchi, National Institute for Materials Science, Japan

09:50 – 10:10  **Direct printing of 2-component silicones in facial & body prostheses**
James Smay*, Oklahoma State University USA; Trevor Coward, King’s College London, UK

10:10 – 10:30  **Magnetically assisted assembly of bioinspired composites**
Tobias S Niebel, ETH Zurich, Switzerland

10:30 – 10:50  **Preparation of chitosan-siloxane porous hybrids with hydroxyapatite for repair of skull defect**
Yuki Shirosaki, Kyushu Institute of Technology, Japan

10:50 – 11:10  **Ice formation in iron containing hydrogel films**
Hyun-Joong Chung, University of Alberta, Canada

11:10 – 11:30  **Bio-inspired hybrid nanocomposites in single crystalline hosts: From structure to function**
Boaz Pokroy, Technion - Israel Institute of Technology, Israel

09:30 – 11:50  **Structural Composites Session** (Louise Room)
Session Chairs: Hongbing Lu and Hilmar Koemer

09:30 – 09:50  **Probing micro- and nano-scale elastic modulus variation in organic-rich shale—A naturally occurring composite**
Corinne Packard, CSM, USA

09:50 – 10:10  **Increasing dispersion, performance, and pot-life in cellulose nanocrystal/waterborne epoxy composites**
Meisha Shofner, Georgia Institute of Technology, USA

10:10 – 10:30  **Experimentally characterizing the behavior of fiber reinforced composite laminates under multi-axial loading: A historical review and current state of the art**
John Wolodko, Alberta Innovates - Technology Futures, Canada

10:30 – 10:50  **Simultaneously strong and tough continuous nanofibers for next generation structural supernanocomposites**
Yuris Dzenis, University of Nebraska-Lincoln, USA
Wednesday, November 11, 2015 (continued)

10:50 – 11:10  Ductile organic aerogels for multifunctional applications  
Hongbing Lu, The University of Texas at Dallas, USA

11:10 – 11:30  Biologically inspired and impact-resistant composites  
David Kisailus and Christopher Salinas, University of California, USA

11:30 – 11:50  Physical aging and glass transition of single component nanocomposites  
Hilmar Koerner, Air Force Research Lab, USA

09:30 – 12:10  Functional Composites Session (Agnes Room)  
Session Chairs: Geoffrey Brennecka and Avner Rothschild

09:30 – 09:50  Multilayer nanocoatings capable of separating gases, killing bacteria and stopping fire  
Jaime C Grunlan, Texas A&M University, USA

09:50 – 10:10  Designing fire safe composites  
Maude Jimenez, Lille University of Science and Technology, France

10:10 – 10:30  Printed and structurally integrated electronics for air force applications  
John D. Berrigan, Air Force Research Lab, USA

10:30 – 10:50  Chemical heterogeneity in electroceramics: The good, the bad, and the difficult to characterize  
Geoff Brennecka, Colorado School of Mines, USA

10:50 – 11:10  Enhancing grain boundary ionic conductivity in mixed ionic electronic conductors  
Kyle Brinkman, Clemson University, USA

11:10 – 11:30  Mechanisms and models for SiC fiber strength changes after oxidation in air and steam  
Randall Hay, Air Force Research Laboratory, USA

11:30 – 11:50  Iron oxide thin film photoelectrodes for water splitting  
Avner Rothschild, Technion - Israel Institute of Technology, Israel

11:50 – 12:10  Using polymer brushes to tune the structure-plasmonic relationship in polymer nanocomposites containing nanorods  
Russell Composto, University of Pennsylvania, USA

12:10 – 12:30  Oxygen and carbon dioxide separation membranes based on mixed conductors  
Hitoshi Takamura, Tohoku University, Japan

12:10 – 13:30  Lunch

13:30 – 19:00  Free Time
Wednesday, November 11, 2015 (continued)

19:00 – 20:00  **Evening Plenary Session**  
Session Chairs: James Smay and Jennifer Lewis

19:00 – 19:15  **Conference Awards**  
Linn Hobbs, Massachusetts Institute of Technology, USA  
ECI Technical Liaison

19:15 – 20:00  **Evening Speaker**  
Electronic and optical hybrid materials via self-assembly and nanoimprint lithography  
James Watkins, University of Massachusetts Amherst, USA

20.00 – 21.00  **Poster Session**  (rear of Victoria Room)
**Thursday, November 12, 2015**

07:00 – 08:30  Breakfast

08:30 – 09:15  **Plenary Session**

Session Chairs: Raj Singh and James Smay

*Role of interfaces in polymer matrix composites and methodologies to improve and characterize interfaces in composites*

Ranji Vaidyanathan, Oklahoma State University, USA

09:30 – 10:10  **Structural and Functional Composites Session** (Victoria Ballroom)

Session Chairs: Kirk Ziegler and Ahihide Kuwabara

09:30 – 09:50  **Augmented finite element method for virtual testing of high temperature CMCs**

Qingda Yang, University of Miami, USA

09:50 – 10:10  **Controlling the interfacial properties of one-dimensional nanostructures**

Kirk Ziegler, University of Florida, USA

10:10 – 10:30  **Thermally conductive composites**

Oren Regev, Gen-Gurion University of the Negev, Israel

10:30 – 10:50  **Atomistic structures and transport phenomena at interfaces in lithium battery materials**

Akihide Kuwabara, Japan Fine Ceramics Center, Japan

10:50 – 11:10  **Radiation resistance of vanadium-graphene nanolayered composites**

Seung Min Han, Korea Advanced Institute of Science and Technology, Korea

11:30 – 13:30  Lunch and departures
Poster Presentations

1. **Nature's tough composites: A look into biological fibrous architectures**  
   Christopher Salinas/David Kisailus, University of California, USA

2. **Hard/Soft composited materials for stretchable electronics**  
   Hyun-Joong Chung, University of Alberta, Canada

3. **Biopolymer composites from high-cellulose pulps and/or nanocellulose**  
   Fabiola Vilaseca, KTH Royal Institute of Technology, Sweden

4. **Center for bioplastics and biocomposites: Bringing INDUSTRY and UNIVERSITIES together to develop new biobased products and technologies**  
   Michael R. Kessler, Washington State University, USA

5. **Characterizing the functionality of transmembrane ion channels using planar bilayer membranes device and stopped flow spectrometer**  
   Andrew Jo, University of Alberta, Canada

6. **Manufacturing and testing of lightweight, liner-less all-composite tanks for storage and transportation of CNG**  
   Ranji Vaidyanathan, Oklahoma State University, USA

7. **Mica platelet-reinforced, geopolymer composites**  
   Patrick Keane, University of Illinois at Urbana-Champaign, USA

8. **Mechanical behavior and properties of REPO4 studied by nanoindentation**  
   Corinne E. Packard, Colorado School of Mines, USA

9. **In situ study of phase transformations and phase equilibria in the tantala and hafnia binary system**  
   Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA

10. **Thermal expansion and phase transformation behavior in the rare-earth titanate system**  
    Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA