

# Overview



**Thursday, May 20, 2021**

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## 8:30 – 10 am

Thursday Keynote Session

### Keynote Speaker:

- Dr. Christopher Williams, Professor of Mechanical Engineering, Virginia Tech

## 10 – 10:30 am

Networking Break & Special Programming

## 10 am – 3:30 pm

Virtual Exhibits and Student Posters

## 10:30 am – 1 pm

### Thursday Technical Sessions:

- 7A – Grease II
- 7B – Contact Mechanics I
- 7C – Engine & Drivetrain III
- 7D – Lubrication Fundamentals IV: EHL
- 7E – Tribochemistry – Materials Tribology & Nanotribology Joint Session II
- 7F – Tribotesting III
- 7G – Rolling Element Bearings V
- 7H – Surface Engineering I

## 1 – 2 pm

Plenary Program – Session #2

### Plenary Speaker:

- Dr. Jim MacLeod, Group Leader, National Research Council Canada

## 2 – 6 pm

### Thursday Technical Sessions:

- 8A – Grease III
- 8B – Contact Mechanics II
- 8C – Engine & Drivetrain IV
- 8D – Lubrication Fundamentals V: Viscosity
- 8E – Tribochemistry – Materials Tribology & Nanotribology Joint Session III
- 8F – Additive Manufacturing II: Special Symposium
- 8G – Rolling Element Bearings VI
- 8H – Surface Engineering II

## 3 – 3:30 pm

Networking Break & Special Programming

## Trade Show Hours:

- Monday, May 17: 10 am – 4 pm
- Tuesday, May 18: 10 am – 3:30 pm
- Wednesday, May 19: 10 am – 3:30 pm
- Thursday, May 20: 10 am – 3:30 pm

(All times listed are Eastern Daylight Time)

## Technical Sessions Time Grids – Thursday, May 20, 2021

| TIME            | SESSION 7A<br>Grease II   | SESSION 7B<br>Contact Mechanics I  | SESSION 7C<br>Engine & Drivetrain III  |
|-----------------|---|--|--|
|                 | Virtual Meeting Room 1  | Virtual Meeting Room 2   | Virtual Meeting Room 3   |
| 10:30 – 11 am   | The Effects of Addition of Zinc Carboxylate in Grease on the Tribological Properties of PA66-GF Composite in Contact with Carbon Steel, T. Kunishima, p. 68                           | The Origin of the Friction Coefficient for Randomly Rough Surfaces in Elastic Contact, F.-Chun Hsia, p. 68                             | A System Engineering Approach to Reduce Soot Wear, D. Halenahally Veeregowda, p. 68  |
| 11 – 11:30 am   | Tribology Bench Tests for the Development of Next-Generation Greases with Optimized Lubrication Properties, R. McAllister, p. 68  | High Temperature Contact Creep and Friction of Inconel 617 Surface Oxides, S. Salari, p. 68  | Tribofilm Chemistry for Engine Oils Formulated with Organic Polymeric Friction Modifiers, D. Gillespie, p. 68  |
| 11:30 – Noon    | Yielding Behavior of a Fumed Silica Lubricating Grease, B. Zakani, p. 68  | Analysis of Asperity Creep of a Rough Random Surface in Contact with a Rigid Flat Surface, F. Alamos, p. 68                            | Enhanced Tribofilm Formation and Wear of Engine Oils under Stressed Boundary Conditions, H. Gao, p. 68   |
| Noon – 12:30 pm |   | Investigating the Influence of Topography on the Magnitude and Variation of Surface Adhesion in Hard Contacts, L. Thimons, p. 68       | An Integrated Approach to Measure Electrical Conductivity of Working Lubricants, Y. Chen, p. 68  |
| 12:30 – 1 pm    |   |  |  |
| 1 – 2 pm        | Plenary Program #2  | Plenary Program #2   | Plenary Program #2   |
|                 | SESSION 8A<br>Grease III  | SESSION 8B<br>Contact Mechanics II   | SESSION 8C<br>Engine & Drivetrain IV   |
|                 | Virtual Meeting Room 1  | Virtual Meeting Room 2   | Virtual Meeting Room 3   |
| 2 – 2:30 pm     | Grease Improvement Process for High-Speed Passenger Trains, L. de Vries, p. 70  | Mechanics Models for Contacts in Lithium Metal Batteries, Q. Jane Wang, p. 70  | Power Loss Measurement of Planetary Gear Stages with High Power Density, F. Siglmüller, p. 72  |
| 2:30 – 3 pm     | Effect of Temperature and Surface Roughness on the Tribological Behavior of Electric Motor Greases as a Baseline for Electric Vehicle Bearing Applications, D. Sanchez Garrido, p. 70 | Exact Spectral Moments and Differentiability of the Weierstrass-Mandelbrot Fractal Function, I. Green, p. 70                           | Correlating Viscosity to Fuel Efficiency in the Heavy-Duty Diesel Engine Fuel Efficiency Tests and the Influence of Viscosity Index Improvers, L. Camposo, p. 72 |
| 3 – 3:30 pm     | Networking Break  | Networking Break   | Networking Break   |
| 3:30 – 4 pm     | Oscillating Wear – A Little Back and Forth, R. Kumar, p. 70   | An Investigation of the Elastic Cylindrical Line Contact Equations for Plane Strain and Stress Considering Friction, R. Jackson, p. 72 | Effects of Lubricant Additives on Copper in Soaking Test, X. Fang, p. 72   |
| 4 – 4:30 pm     | Using Polymers to Improve Water Resistance in H1 or Biobased Greases, E. Willett, p. 70   | Contact Mechanics Simulations of Gradient Stiffness Soft Materials, A. Dunn, p. 72   | Frictional Performance of Novel Eco-Friendly Organic Lubricity Additives in Passenger Car Motor Oil (PCMO) Formulations, R. Navaratnam, p. 72                    |
| 4:30 – 5 pm     | Grease Business Meeting   | Contact Mechanics Business Meeting   | Organic Polymeric Friction Modifiers Effects on Tribofilm Formation and Properties in HDDEO Formulations, A. Kurchan, p. 72                                      |
| 5 – 5:30 pm     |   |  | Study on Polymer Colloids as a Friction Modifier, K. Yamamoto, p. 72   |
| 5:30 – 6 pm     |   |  |  |

| SESSION 7D<br>Lubrication Fundamentals IV: EHL   |  | SESSION 7E<br>Tribiochemistry II  |  | SESSION 7F<br>Tribotesting III  |                 |
|--|--|---|--|---|-----------------|
| Virtual Meeting Room 4   |  | Virtual Meeting Room 5  |  | Virtual Meeting Room 6  |                 |
| Friction Increase in Starved EHL Contact, P.Sperka, p. 69  |  | Effect of Environment on Friction Reduction Capabilities of Spin-Coated MoDTC, C. Minfray, p. 69  |  | Effects of N-Butanol in Ultra-Low-Sulfur Diesel Mixtures on Wear, Friction and Viscosity, G. Molina, p. 69  | 10:30 – 11 am   |
| A New Thermo-Elastohydrodynamic Lubrication Model for Journal and Sliding Bearing Systems, S. Ardah, p. 69                                       |  |   |  | Improving Tool Life for Rotary Shear Biomass Comminution System, K. Lee, p. 69  | 11 – 11:30 am   |
| Fluid-Structure Interaction Modeling of 2D Elastohydrodynamically Lubricated Contacts, K. Singh, p. 69   |  | In Situ Tribochemical Formation of MoS <sub>2</sub> and WS <sub>2</sub> Tribofilms Using Mo and W-Containing Surfaces, M. Rodriguez Ripoll, p. 69                             |  | An Updated Method for Fuel Lubricity: Line-on-Cylinder Lubricity Evaluator (LOCLE), G. Hansen, p. 69  | 11:30 – Noon    |
| Visco-Elastohydrodynamic Lubrication of Imperfectly Bonded Polymer Coating on Elastic Substrate, Q. Jane Wang, p. 69                             |  | Mechanisms for Decomposition of Antiwear Additives on Ferrous Surfaces: A REAXFF Study of Phosphate Esters, C. Ayestaran Latorre, p. 69                                       |  | Impact-Slide Wear Testing for Evaluation of Hard Coatings for Tooling Applications, S. Bhargava, p. 69  | Noon – 12:30 pm |
| Thermal-Visco-Elastohydrodynamic Lubrication (TVEHL) of Polymer-Based Materials, Q. Jane Wang, p.69  |  | Shear-Driven Dissociation of Organosulfur Compounds on Iron, K. Mohammadtabar, p. 69  |  | Use of Gas-Phase-Synthesized Grapened as an Anti-Wear Lubricant Additive, G. Krauss, p. 69  | 12:30 – 1 pm    |
| Plenary Program #2   |  | Plenary Program #2  |  | Plenary Program #2  | 1 – 2 pm        |
|  |  |   |  |   |                 |
| SESSION 8D<br>Lubrication Fundamentals V: Viscosity  |  | SESSION 8E<br>Tribiochemistry III   |  | SESSION 8F<br>Additive Manufacturing II   |                 |
| Virtual Meeting Room 4   |  | Virtual Meeting Room 5  |  | Virtual Meeting Room 6  |                 |
| Estimating the Viscosity-Pressure Response from Friction and Film Thickness Measurements under Elastohydrodynamic Conditions, E. Gendreau, p. 72 |  | From Friction to Function, J. Felts, p. 72  |  | Effect of a Newly Developed Laser Cladding Alloy on the Tribological Properties of Cladded Hypereutectoid Rails, P.Fasihi, p. 74                              | 2 – 2:30 pm     |
| Viscosity-Temperature Equations for Petroleum-Based Lubricating Oils, J. Zakarian, p. 72   |  |   |  | Discussion of C\corrosion & Wear of Additively Manufactured Alloys, P. Renner, p. 74  | 2:30 – 3 pm     |
| Networking Break   |  | Networking Break  |  | Networking Break  | 3 – 3:30 pm     |
| A Novel Microfluidic Rheometer for Rapid Viscosity Measurements over Wide Shear Rate Ranges, G. Irvine, p. 72                                    |  | Tribocatalysis of Lubricating Carbon Films, D. Berman, p. 72  |  | Computation of Hydrodynamic and Capillary Phenomena in Binder Jet 3D Printing, J. Wagner, p. 74   | 3:30 – 4 pm     |
|  |  | Stress-Induced Mechanochemical Decomposition of Methyl Thiolate on Cu(100), A. Boscoboinik, p. 72   |  | Investigation on the Rolling Contact Fatigue Behaviours of Different Laser Cladding Materials on the Damaged Rail, H. Ding, p. 74                             | 4 – 4:30 pm     |
|  |  | In Situ Study of the Normal Pressure-Dependent Lubrication Mechanism of Phosphonium Phosphate Ionic Liquid in Nanoscale Single-Asperity Sliding Contacts, F. Mangolini, p. 72 |  | Effect of Heat Treatment and Electric Discharge Alloying on the Tribological Performance of Selective Laser Melted AlSi <sub>10</sub> Mg, B. Kuriachen, p. 74 | 4:30 – 5 pm     |
|  |  | Encapsulation of Lubricious Ionic Liquids within Polymer Microshells, F. Mangolini, p. 74   |  | Realization of a Novel Morphing Surface Using Additive Manufacturing and Its Active Control in Friction, M. Murashima, p. 74                                  | 5 – 5:30 pm     |
|  |  | Effect of Halide Contaminants on the Lubricating Properties of Phosphonium Phosphate Ionic Liquid, Z. Li, p. 74   |  |   | 5:30 – 6 pm     |
| THURSDAY >>  |  |   |  |   |                 |

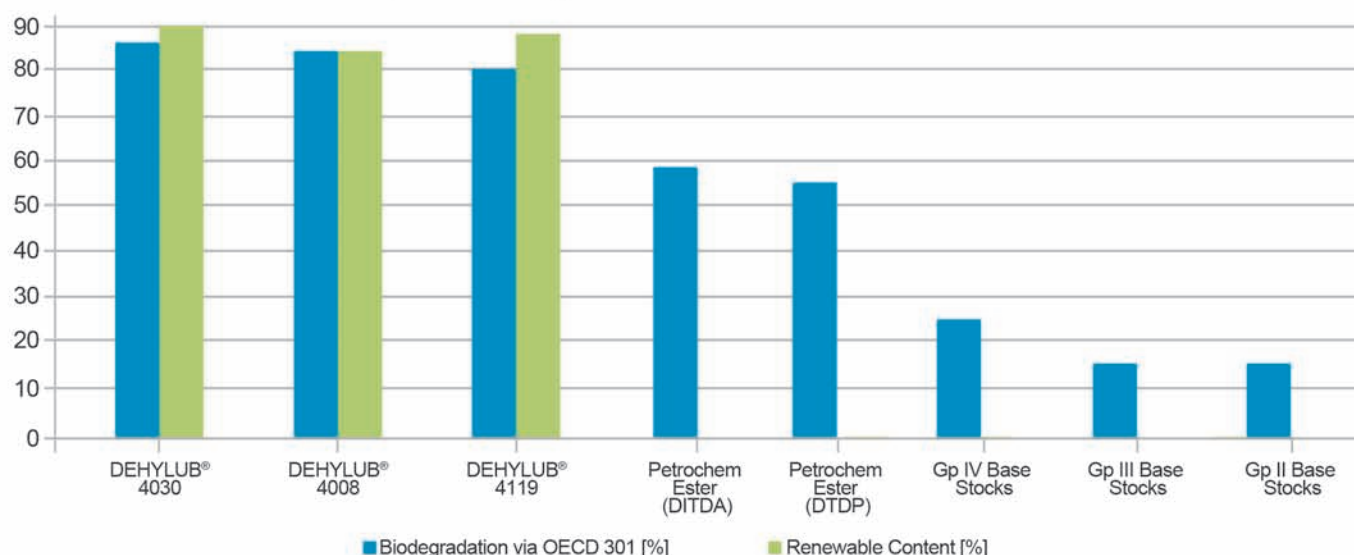
## Technical Sessions Time Grids – Thursday, May 20, 2021

| TIME            | SESSION 7G<br>Rolling Element Bearings V  | SESSION 7H<br>Surface Engineering I   |  |
|-----------------|---|---|--|
|                 | Virtual Meeting Room 7  | Virtual Meeting Room 8  |  |
| 10:30 – 11 am   | Dynamics in Kinematics – Running Noise Calculation of Bearings in the Kinematic Regime, H. Grillenberger, p. 70       | Evaluation Tests of MAO-Coatings in Environmentally Safe Lubricants, N. Poches, p. 70   |  |
| 11 – 11:30 am   | Dynamic Modeling of Cage Flexibility in Ball Bearings, K. Petuya, p. 70   | In Situ SEM Tribological Studies of 3D-Printed Super-hydrophobic Hierarchical Textures, M. Afshar p. 70   |  |
| 11:30 – Noon    | Backward Whirl-Shaped Cage Instability in Rolling Bearings, F. Unterderweide, p. 70                                   | Fabrication and Friction Characteristics of Arbitrary Biosurfaces, S. Maddox, p. 70   |  |
| Noon – 12:30 pm | A First Approximation of the Global Energy Consumption of Ball Bearings, V. Bakolas, p. 70                            |   |  |
| 12:30 – 1 pm    | Voltage Induced Roller Bearing Fatigue, A. Harder, p. 70  |   |  |
| 1 – 2 pm        | Plenary Program #2  | Plenary Program #2  |  |
|                 | SESSION 8G<br>Rolling Element Bearings VI   | SESSION 8H<br>Surface Engineering II  |  |
|                 | Virtual Meeting Room 7  | Virtual Meeting Room 8  |  |
| 2 – 2:30 pm     | Experimental and Numerical Assessment of Power Loss in an Aero-Engine Cylindrical Roller Bearing, R. Kerrouche, p. 74 | Friction Reduction Effect of Soft Coatings, Z. Chen, p. 74  |  |
| 2:30 – 3 pm     | A Novel Test Rig for the Investigation of Ball Bearing Cage Friction, T. Russell, p. 74                               | Post-Additive Manufacturing Surface Modification Technology for Controlling Microstructure and Tribological Properties of Materials, A. Amanov, p. 74 |  |
| 3 – 3:30 pm     | Networking Break  | Networking Break  |  |
| 3:30 – 4 pm     | CFD Investigation of Deep Groove Ball Bearing Fluid Flow, W. Peterson, p. 74  | Surface Engineering Business Meeting  |  |
| 4 – 4:30 pm     |   |   |  |
| 4:30 – 5 pm     |   |   |  |
| 5 – 5:30 pm     |   |   |  |
| 5:30 – 6 pm     |   |   |  |

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## 2021 STLE Virtual Annual Meeting & Exhibition

TECHNICAL SESSIONS | **Thursday, May 20, 2021**

### 7A • Virtual Meeting Room 1

#### GREASE II

**Session Chair:** William Tuszynski, Unami Group, Quakertown, PA

**Session Vice Chair:** Kuldeep Mistry, The Timken Company, North Canton, OH

**10:30 – 11 am**

**3490804: The Effects of Addition of Zinc Carboxylate in Grease on the Tribological Properties of PA66-GF Composite in Contact with Carbon Steel**

Takeshi Kunishima, Jules Galipaud, Gaylord Guillonnet, Gaëtan Bouvard, Jean-Christophe Abry, Clotilde Minfray, Vincent Fridrici, Philippe Kapsa, Laboratoire de Tribologie et Dynamique des Systemes, Ecully, Auvergne-Rhône-Alpes, France

**11 – 11:30 am**

**3499579: Tribology Bench Tests for the Development of Next-Generation Greases with Optimized Lubrication Properties**

Rory McAllister, Marc Masen, Philippa Cann, Imperial College London, London, United Kingdom

**11:30 am – Noon**

**3484425: Yielding Behavior of a Fumed Silica Lubricating Grease**

Behzad Zakani, Dana Grecov, University of British Columbia, Vancouver, British Columbia, Canada

### 7B • Virtual Meeting Room 2

#### CONTACT MECHANICS I

**Session Chair:** Morgan Jones, Sandia National Laboratories, Albuquerque, NM

**Session Vice Chair:** Kylie Van Meter, Florida State University, Tallahassee, FL

**10:30 – 11 am**

**3483691: The Origin of the Friction Coefficient for Randomly Rough Surfaces in Elastic Contact**

Feng-Chun Hsia, Cyrian Leriche, Steve E. Franklin, Bart Weber, Advanced Research Center for Nanolithography, Amsterdam, Netherlands; Daniel Bonn, Universiteit van Amsterdam Faculteit der Natuurwetenschappen Wiskunde en Informatica, Amsterdam, Noord-Holland, Netherlands

**11 – 11:30 am**

**3499189: High Temperature Contact Creep and Friction of Inconel 617 Surface Oxides**

Sepehr Salari, Ali Beheshti, George Mason University, Fairfax, VA; Saifur Rahman, Andreas Polycarpou, Texas A&M University College Station, College Station, TX

**11:30 am – Noon**

**3497896: Analysis of Asperity Creep of a Rough Random Surface in Contact with a Rigid Flat Surface**

Fernando Alamos, David Go, University of Notre Dame College of Engineering, Notre Dame, IN; Martin Philo, GKN Aerospace, Santa Ana, CA; Steven Schmid, University of North Carolina at Charlotte, Charlotte, NC

**Noon – 12:30 pm**

**3498933: Investigating the Influence of Topography on the Magnitude and Variation of Surface Adhesion in Hard Contacts**

Luke Thimons, Abhijeet Gujrati, Tevis Jacobs, University of Pittsburgh, Pittsburgh, PA; Antoine Sanner, Lars Pastewka, University of Freiburg, Freiburg, Germany

### 7C • Virtual Meeting Room 3

#### ENGINE AND DRIVETRAIN III

**Session Chair:** Feng Dong, Borg Warner, Auburn Hills, MI

**10:30 – 11 am**

**3499264: A System Engineering Approach to Reduce Soot Wear**

Deepak Halenahally Veeregowda, Angela Maria Tortora, Edona Hyla, Ducom Instruments, Groningen, Netherlands

**11 – 11:30 am**

**3485400: Tribofilm Chemistry for Engine Oils Formulated with Organic Polymeric Friction Modifiers**

David Gillespie, John Eastwood, Croda International plc, Goole, East Yorkshire, United Kingdom

**11:30 am – Noon**

**3483859: Enhanced Tribofilm Formation and Wear of Engine Oils under Stressed Boundary Conditions**

Hong Gao, Shell Global Solutions, Houston, TX

**Noon – 12:30 pm**

**3497315: An Integrated Approach to Measure Electrical Conductivity of Working Lubricants**

Yan Chen, Hong Liang, Texas A&M University, College Station, TX

## 7D • Virtual Meeting Room 4

### LUBRICATION FUNDAMENTALS IV: EHL

**Session Chair:** Daniele Dini, Imperial College of London, London, United Kingdom

**Session Vice Chair:** Q. Jane Wang, Northwestern University, Evanston, IL

10:30 – 11 am

#### 3519637: Friction Increase in Starved EHL Contact

Petr Sperka, Ivan Krupka, Martin Hartl, Vysoke Ucení Technické v Brně Fakulta Strojního Inženýrství, Brno, Czechia

11 – 11:30 am

#### 3516692: A New Thermo-Elastohydrodynamic Lubrication Model for Journal and Sliding Bearing Systems

Suhaib Ardah, Imperial College London, London, United Kingdom; Francisco Profito, Polytechnic School of the University of São Paulo, São Paulo, Brazil; Daniele Dini, Imperial College London, London, United Kingdom

11:30 am – Noon

#### 3493168: Fluid-Structure Interaction Modeling of 2D Elastohydrodynamically Lubricated Contacts

Kushagra Singh, Farshid Sadeghi, Purdue University, West Lafayette, IN

Noon – 12:30 pm

#### 3520760: Visco-Elastohydrodynamic Lubrication of Imperfectly Bonded Polymer Coating on Elastic Substrate

Q. Jane Wang, Tao He, Xin Zhang, Northwestern University, Evanston, IL; Yuchuan Liu, Zhe Li, Hun June Kim, Seongchan Park, General Motors Corp, Pontiac, MI

12:30 – 1 pm

#### 3520772: Thermal-Visco-Elastohydrodynamic Lubrication (TVEHL) of Polymer-Based Materials

Q. Jane Wang, Tao He, Xin Zhang, Northwestern University, Evanston, IL; Yuchuan Liu, Zhe Li, Hun June Kim, Seongchan Park, General Motors Corp, Pontiac, MI

## 7E • Virtual Meeting Room 5

### TRIBOCHEMISTRY

#### *Materials Tribology & Nanotribology Joint Session II*

**Session Chair:** John Curry, Sandia National Laboratories, Albuquerque, NM

**Session Vice Chair:** Tomas Babuska, Lehigh University, Bethlehem, PA

10:30 – 11:30 am

#### INVITED TALK

#### 3573521: Effect of Environment on Friction Reduction Capabilities of Spin-Coated MoDTC

Clotilde Minfray, Jules Galipaud, Mayssa Al Karboutly, Julien Fontaine, Thierry Le Mogne, Manuel Cobian, Ecole Centrale de Lyon, Ecully, Rhône-Alpes, France; Gleb Veryasov, Pooja Gaval, Alexandre Verchere, Clément Camp, Alessandra Quadrelli, Chimie Catalyse Polymères et Procédés, Villeurbanne, Rhône-Alpes, France; Bruno Reynard, Laboratoire de Géologie de Lyon Terre Planètes Environnement, Villeurbanne, Auvergne-Rhône-Alpes, France

11:30 am – Noon

#### 3499581: In Situ Tribochemical Formation of MoS<sub>2</sub> and WS<sub>2</sub> Tribofilms Using Mo and W-Containing Surfaces

Manel Rodriguez Ripoll, AC2T research GmbH, Wiener Neustadt, Austria; Bernhard Kohlhauser, Carsten Gachot, TU Wien, Vienna, Austria; Carmen Vladu, CEST GmbH, Wiener Neustadt, Austria

Noon – 12:30 pm

#### 3499082: Mechanisms for Decomposition of Antiwear Additives on Ferrous Surfaces: A REAXFF Study of Phosphate Esters

Carlos Ayestaran Latorre, James Ewen, Daniele Dini, Imperial College London, London, United Kingdom; Arash Khajeh, Ashlie Martini, University of California, Merced, Merced, CA; Joshua Moore, Joseph Remias, Afton Chemical Corp., Richmond, VA

12:30 – 1 pm

#### 3491049: Shear-Driven Dissociation of Organosulfur Compounds on Iron

Karen Mohammadtabar, Ashlie Martini, University of California, Merced, Merced, CA; Stefan Eder, Nicole Doerr, AC2T Research GmbH, Wiener Neustadt, Austria

## 7F • Virtual Meeting Room 6

### TRIBOTESTING III

**Session Chair:** Robert Jackson, Auburn University, Auburn, AL

**Session Vice Chair:** Md Hafizur Rahman, University of Nevada Reno, Reno, NV; Pawan Panwar, University of California Merced, Merced, CA

10:30 – 11 am

#### 3496872: Effects of N-Butanol in Ultra-Low-Sulfur Diesel Mixtures on Wear, Friction and Viscosity

Gustavo Molina, John Morrison, Valentin Soloiu, Cesar Carapia, Georgia Southern University, Statesboro, GA

11 – 11:30 am

#### 3498614: Improving Tool Life for Rotary Shear Biomass Comminution System

Kyungjun Lee, Oak Ridge National Laboratory, Knoxville, TN

11:30 am – Noon

#### 3499241: An Updated Method for Fuel Lubricity: Line-on-Cylinder Lubricity Evaluator (LOCLE)

Gregory Hansen, Southwest Research Institute, San Antonio, TX

Noon – 12:30 pm

#### 3499325: Impact-Slide Wear Testing for Evaluation of Hard Coatings for Tooling Applications

Suvrat Bhargava, Ranjan Deshmukh, Bradley Schultz, Rodney Martens, TE Connectivity, Middletown, PA

12:30 – 1 pm

#### 3499723: Use of Gas-Phase-Synthesized Grapened as an Anti-Wear Lubricant Additive

Gordon Krauss, Albert Dato, Harvey Mudd College, Claremont, CA; Matthew Siniawski, Loyola Marymount University, Los Angeles, CA



## 2021 STLE Virtual Annual Meeting & Exhibition

TECHNICAL SESSIONS | **Thursday, May 20, 2021**

### 7G • Virtual Meeting Room 7

#### ROLLING ELEMENT BEARINGS V

**Session Chair:** Daniel Merk, Schaeffler Technologies, Schweinfurt, Bavaria, Germany

**10:30 – 11 am**

##### 3480732: Dynamics in Kinematics – Running Noise Calculation of Bearings in the Kinematic Regime

Hannes Grillenberger, Schaeffler Technologies AG and Co KG, Herzogenaurach, Germany

**11 – 11:30 am**

##### 3481713: Dynamic Modeling of Cage Flexibility in Ball Bearings

Karine Petuya, Univ Lyon, INSA-Lyon, CNRS, LaMCoS, Safran Aircraft Engines, France, Villeurbanne, Rhône, France; Daniel Nelias, Nans Biboulet, Univ Lyon, INSA-Lyon, CNRS, LaMCoS, Villeurbanne, France

**11:30 am – Noon**

##### 3485034: Backward Whirl-Shaped Cage Instability in Rolling Bearings

Florian Unterderweide, Matthias Weigold, Eberhard Abele, Technical University Darmstadt, Darmstadt, Germany

**Noon – 12:30 pm**

##### 3483379: A First Approximation of the Global Energy Consumption of Ball Bearings

Vasileios Bakolas, Philipp Roedel, Oliver Koch, Michael Pausch, Schaeffler Technologies AG and Co KG, Herzogenaurach, Germany

**12:30 – 1 pm**

##### 3483683: Voltage Induced Roller Bearing Fatigue

André Harder, Lukas Piske, Tobias Schirra, Eckhard Kirchner, Technical University Darmstadt, Darmstadt, Germany

### 7H • Virtual Meeting Room 8

#### SURFACE ENGINEERING I

**Session Chair:** Ali Beheshti, George Mason University, Fairfax, VA

**Session Vice Chair:** Suvrat Bhargava, TE Connectivity, Middletown, PA

**11 – 11:30 am**

##### 3497576: Evaluation Tests of MAO-Coatings in Environmentally Safe Lubricants

Nikita Poches, Vladimir Malyshev, National University of Oil and Gas (Gubkin University), Moscow, Russian Federation; Nicole Döerr, AC2T research GmbH, Wiener Neustadt, Austria

**11:30 am – Noon**

##### 3499607: In Situ SEM Tribological Studies of 3D-Printed Super-hydrophobic Hierarchical Textures

Mahyar Afshar Mohajer, Min Zou, University of Arkansas, Fayetteville, AR

**Noon – 12:30 pm**

##### 3497892: Fabrication and Friction Characteristics of Arbitrary Biosurfaces

Shelby Maddox, Xiaoxiao Han, Xiangbo Meng, Min Zou, University of Arkansas, Fayetteville, AR

### 8A • Virtual Meeting Room 1

#### GREASE III

**Session Chair:** Wenyang Zhang, Tesla, Inc., Sunnyvale, CA

**Session Vice Chair:** William Tuszynski, Unami Group, Quakertown, PA

**2 – 2:30 pm**

##### 3481391: Grease Improvement Process for High-Speed Passenger Trains

Lieuwe de Vries, Sathwik Chatra, SKF, Houten, Utrecht, Netherlands

**2:30 – 3 pm**

##### 3499663: Effect of Temperature and Surface Roughness on the Tribological Behavior of Electric Motor Greases as a Baseline for Electric Vehicle Bearing Applications

Daniel Sanchez Garrido, Samuel Leventini, Ashlie Martini, University of California, Merced, Merced, CA

**3 – 3:30 pm – Break**

**3:30 – 4 pm**

##### 3485475: Oscillating Wear – A Little Back and Forth

Rajeev Kumar, Larry Decker, ExxonMobil Research and Engineering Company Annandale, Annandale, NJ; Joseph Kaperick, Afton Chemical Corporation, Richmond, VA

**4 – 4:30 pm**

##### 3499464: Using Polymers to Improve Water Resistance in H1 or Biobased Greases

Erik Willett, Functional Products Inc., Macedonia, OH

### 4:30 – 5 pm – Grease Business Meeting

### 8B • Virtual Meeting Room 2

#### CONTACT MECHANICS II

**Session Chair:** Kylie Van Meter, Florida State University, Tallahassee, FL

**Session Vice Chair:** Tomas Babuska, Lehigh University, Bethlehem, PA

**2 – 2:30 pm**

##### 3520752: Mechanics Models for Contacts in Lithium Metal Batteries

Q. Jane Wang, Xin Zhang, Northwestern University, Evanston, IL; Stephen Harris, E O Lawrence Berkeley National Laboratory, Berkeley, CA

**2:30 – 3 pm**

##### 3490405: Exact Spectral Moments and Differentiability of the Weierstrass-Mandelbrot Fractal Function

Itzhak Green, Georgia Institute of Technology, Atlanta, GA

**3 – 3:30 pm – Break**





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# 2021 STLE Virtual Annual Meeting & Exhibition

TECHNICAL SESSIONS | **Thursday, May 20, 2021**

**8B** | Contact Mechanics II (con't)

**3:30 – 4 pm**

## **3491370: An Investigation of the Elastic Cylindrical Line Contact Equations for Plane Strain and Stress Considering Friction**

Robert Jackson, Kefei Xu, Nolan Chu, Auburn University, Auburn, AL

**4 – 4:30 pm**

## **3499152: Contact Mechanics Simulations of Gradient Stiffness Soft Materials**

Alison Dunn, Md Mahmudul Hasan, Christopher Johnson, University of Illinois at Urbana-Champaign, Urbana, IL

**4:30 – 5 pm – Contact Mechanics Business Meeting**

## **8C • Virtual Meeting Room 3 ENGINE AND DRIVETRAIN IV**

**Session Chair:** Carlos Sanchez, Southwest Research Institute, San Antonio, TX

**2 – 2:30 pm**

## **3485320: Power Loss Measurement of Planetary Gear Stages with High Power Density**

Felix Siglmüller, Joshua Götz, Martin Sedlmair, Thomas Lohner, Karsten Stahl, Gear Research Centre (FZG), Technical University of Munich, Garching bei München, Germany

**2:30 – 3 pm**

## **3488659: Correlating Viscosity to Fuel Efficiency in the Heavy-Duty Diesel Engine Fuel Efficiency Tests and the Influence of Viscosity Index Improvers**

Lucas Camposo, Phil Hutchinson, Boris Eisenberg, Julien Couet, Evonik Oil Additives, Horsham, PA

**3 – 3:30 pm – Break**

**3:30 – 4 pm**

## **3480558: Effects of Lubricant Additives on Copper in Soaking Test**

Xinggao Fang, Afton Chemical, Richmond, VA

**4 – 4:30 pm**

## **3483835: Frictional Performance of Novel Eco-Friendly Organic Lubricity Additives in Passenger Car Motor Oil (PCMO) Formulations**

Ramesh Navaratnam, Patech Fine Chemical, Dublin, OH

**4:30 – 5 pm**

## **3484509: Organic Polymeric Friction Modifiers Effects on Tribofilm Formation and Properties in HDDEO Formulations**

Alexei Kurchan, Croda, New Castle, DE

**5 – 5:30 pm**

## **3484985: Study on Polymer Colloids as a Friction Modifier**

Kenji Yamamoto, Kazuki Marumo, Tsuyoshi Hiratsugu, ADEKA Corporation, Arakawa-ku, Tokyo, Japan

## **8D • Virtual Meeting Room 4**

### **LUBRICATION FUNDAMENTALS V: VISCOSITY**

**Session Chair:** Ashlie Martini, University of California Merced, Merced, CA

**Session Vice Chair:** Nicole Dörr, AC2T research GmbH, Wiener Neustadt, Austria

**2 – 2:30 pm**

## **3486295: Estimating the Viscosity-Pressure Response from Friction and Film Thickness Measurements under Elastohydrodynamic Conditions**

Eliane Gendreau, Janet Wong, Imperial College London, London, United Kingdom; Sarah Matthews, Shell Global Solutions (UK) Ltd., London, United Kingdom

**2:30 – 3 pm**

## **3473059: Viscosity-Temperature Equations for Petroleum-Based Lubricating Oils**

Jack Zakarian, JAZTech Consulting, LLC, Orinda, CA; Ashlie Martini, Shaun Flannigan, Julian Gonzalez, University of California, Merced, Merced, CA

**3 – 3:30 pm – Break**

**3:30 – 4 pm**

## **3500906: A Novel Microfluidic Rheometer for Rapid Viscosity Measurements over Wide Shear Rate Ranges**

Gordon Irvine, Charles Nider, Pascal Bru, Formulacion, Inc, Worthington, OH; Patrycja Adamska, Yoann Lefevre, Gerard Meunier, Formulacion, Dallas, TX

## **8E • Virtual Meeting Room 5**

### **TRIBOCHEMISTRY**

*Materials Tribology & Nanotribology Joint Session III*

**Session Chair:** Tomas Grejtak, Lehigh University, Bethlehem, PA

**2 – 3 pm**

### **INVITED TALK**

## **3580562: From Friction to Function**

Jonathan Felts, Texas A&M University, College Station, TX

**3 – 3:30 pm – Break**

**3:30 – 4 pm**

## **3496775: Tribocatalysis of Lubricating Carbon Films**

Diana Berman, Asghar Shirani, Daniel Pleshek, University of North Texas, Denton, TX; Stephen Berkebile, Army Research Laboratory, Aberdeen Proving Ground, MD

**4 – 4:30 pm**

## **3499515: Stress-Induced Mechanochemical Decomposition of Methyl Thiolate on Cu(100)**

Alejandro Boscoboinik, University of Pennsylvania, Philadelphia, PA; Wilfred Tysoe, University of Wisconsin-Milwaukee, Milwaukee, WI

**4:30 – 5 pm**

## **3483055: In Situ Study of the Normal Pressure-Dependent Lubrication Mechanism of Phosphonium Phosphate Ionic Liquid in Nanoscale Single-Asperity Sliding Contacts**

Filippo Mangolini, Zixuan Li, Andrei Dolocan, Oscar Morales Collazo, Hugo Celio, Joan Brennecke, The University of Texas at Austin, Austin, TX; Jerzy Sadowski, Brookhaven National Laboratory, Upton, NY

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# 2021 STLE Virtual Annual Meeting & Exhibition

TECHNICAL SESSIONS | **Thursday, May 20, 2021**

8E | Tribiochemistry (con't)

5 – 5:30 pm

## 3483058: Encapsulation of Lubricious Ionic Liquids within Polymer Microshells

Filippo Mangolini, Erynn Naccarelli, Jieming Yan, Ryan Misage, The University of Texas at Austin, Austin, TX

5:30 – 6 pm

## 3483064: Effect of Halide Contaminants on the Lubricating Properties of Phosphonium Phosphate Ionic Liquid

Zixuan Li, Filippo Mangolini, Hugo Celio, Nicolás Vergara, Jude Kershaw, Oscar Morales Collazo, Andrei Dolocan, Joan Brennecke, The University of Texas at Austin, Austin, TX

8F • Virtual Meeting Room 6

## ADDITIVE MANUFACTURING II: SPECIAL SYMPOSIUM

**Session Chair:** Michael Khonsari, Louisiana State University, Baton Rouge, LA

2 – 2:30 pm

## 3580820: Effect of a Newly Developed Laser Cladding Alloy on the Tribological Properties of Cladded Hypereutectoid Rails

Panahsadat Fasihi, Ralph Abrahams, Wenli Yan, Monash University, Clayton, Victoria, Australia; Peter Mutton, Monash University Institute of Railway Technology, Clayton, Victoria, Australia

2:30 – 3 pm

## 3581292: Discussion of Corrosion & Wear of Additively Manufactured Alloys

Peter Renner, Swarn Jha, Yan Chen, Ajinkya Raut, Siddhi Mehta, Hong Liang, Texas A&M University, College Station, TX

3 – 3:30 pm – Break

3:30 – 4 pm

## 3583730: Computation of Hydrodynamic and Capillary Phenomena in Binder Jet 3D Printing

Joshua Wagner, C. Fred Higgs III, Rice University, Houston, TX

4 – 4:30 pm

## 3583888: Investigation on the Rolling Contact Fatigue Behaviours of Different Laser Cladding Materials on the Damaged Rail

Hao hao Ding, Tianxing Xie, Wenjian Wang, Qiyue Liu, Southwest Jiaotong University Tribology Research Institute, Chengdu, Sichuan, China

4:30 – 5 pm

## 3584327: Effect of Heat Treatment and Electric Discharge Alloying on the Tribological Performance of Selective Laser Melted AISi<sub>10</sub>Mg

Basil Kuriachen, Thasleem P, Joy M L, National Institute of Technology Calicut, Calicut, Kerala, India; Deepak Kumar, Indian Institute of Technology Delhi, New Delhi, Delhi, India; Afzaal Ahmed, Indian Institute of Technology Palakkad, Palakkad, Kerala, India

5 – 5:30 pm

## 3584282: Realization of a Novel Morphing Surface Using Additive Manufacturing and Its Active Control in Friction

Motoyuki Murashima, Yusuke Imaizumi, Masato Kawaguchi, Noritsugu Umehara, Takayuki Tokoroyama, Nagoya Daigaku, Nagoya, Aichi, Japan; Toshiyuki Saito, Masayuki Takeshima, Kabushiki Kaisha JTEKT, Nagoya, Aichi, Japan; Yosuke Tsukiyama, Isami Nitta, Niigata Daigaku, Niigata, Niigata, Japan

8G • Virtual Meeting Room 7

## ROLLING ELEMENT BEARINGS VI

**Session Chair:** Nikhil Londhe, The Timken Co., North Canton, OH

2 – 2:30 pm

## 3485344: Experimental and Numerical Assessment of Power Loss in an Aero-Engine Cylindrical Roller Bearing

Rami Kerrouche, Azzedine Dadouche, Mahmoud Mamou, National Research Council Canada, Ottawa, Ontario, Canada; Salah Boukraa, Université Saad Dahlab Blida 1 Institut d'Aéronautique et des Etudes Spatiales, Ottawa, Ontario, Canada

2:30 – 3 pm

## 3495520: A Novel Test Rig for the Investigation of Ball Bearing Cage Friction

Thomas Russell, Farshid Sadeghi, Wyatt Peterson, Purdue University, West Lafayette, IN

3 – 3:30 pm – Break

3:30 – 4 pm

## 3499500: CFD Investigation of Deep Groove Ball Bearing Fluid Flow

Wyatt Peterson, Purdue University, West Lafayette, IN

8H • Virtual Meeting Room 8

## SURFACE ENGINEERING II

**Session Chair:** Harpal Singh, Sentient Science, West Lafayette, IN

**Session Vice Chair:** Kora Farokhzadeh, Bruker Nano Surfaces, San Jose, CA

2 – 2:30 pm

## 3472312: Friction Reduction Effect of Soft Coatings

Zhou Chen, Zhejiang University, Hangzhou, Zhejiang, China

2:30 – 3 pm

## 3500367: Post-Additive Manufacturing Surface Modification Technology for Controlling Microstructure and Tribological Properties of Materials

Auezhan Amanov, Ruslan Karimbaev, Seimi Choi, Young-Sik Pyun, Sun Moon University, Asan, Republic of Korea

3 – 3:30 pm – Break

## 3:30 – 4 pm – Surface Engineering Business Meeting