



# 2017 ANNUAL MEETING OF THE ELECTROSTATICS SOCIETY OF AMERICA

June 13-15, 2017

University of Ottawa, Ottawa, ON, Canada

*General Chair: Poupak Mehrani, University of Ottawa, Canada*

*Technical Chair: Shubho Banerjee, Rhodes College, USA*

## Monday, June 12<sup>th</sup>

6:00 PM – 8:00 PM

## Tuesday, June 13<sup>th</sup>

7:00 AM – 8:00 AM

8:00 AM – 8:15 AM

8:15 AM – 10:00 AM

10:00 AM – 10:30 AM

10:30 AM – 12:00 PM

12:00 PM – 1:30 PM

1:30 PM – 2:15 PM

2:15 PM – 3:00 PM

3:00 PM – 3:30 PM

3:30 PM – 4:45 PM

4:45 PM – 5:45 PM

## Wednesday, June 14<sup>th</sup>

7:00 AM – 8:00 AM

8:00 AM – 9:30 AM

9:30 AM – 10:00 AM

10:00 AM – 10:30 AM

10:30 AM – 12:00 PM

12:00 PM – 1:30 PM

1:30 PM – 3:00 PM

3:00 PM – 3:30 PM

3:30 PM – 5:30 PM

6:30 PM – 9:00 PM

## Thursday, June 15<sup>th</sup>

7:00 AM – 8:00 AM

8:15 AM – 9:15 AM

9:15 AM – 10:00 AM

10:00 AM – 10:30 AM

10:30 AM – 11:30 AM

11:30 AM – 12:30 PM

12:30 PM – 12:45 PM

## 90 University, room 140-main floor

Informal Welcome Gathering & Registration

### SITE Building, 800 King Edward Ave.

Registration & Breakfast

Welcome Address

Session A: Electrically-Induced Flows and Electrokinetics I

*Coffee Break and Poster Session*

Session B: Contact Charging and Triboelectric Effects I

*Lunch*

Session C: Biological and Medical Applications

Session D: Gas Discharges and Microplasmas

*Coffee Break and Poster Session Cont.*

Session E: Measurements and Instrumentation

Session F: Materials Synthesis Processing and Behavior

### SITE Building, 800 King Edward Ave.

Registration & Breakfast

Session G: Breakdown Phenomenon and Discharge

Session H: Safety and Hazards

*Coffee Break*

Session I: Contact Charging and Triboelectric Effects II

*Lunch*

Session J: Atmospheric and Space Applications I

*Coffee Break*

Session K: Electrically-Induced Flows and Electrokinetics II

### Conference Banquet, Recognitions and Awards (DMS 4101, 55 Laurier Ave.)

### SITE Building, 800 King Edward Ave.

Breakfast

Session L: Electrically-Induced Flows and Electrokinetics III

Session M: Contact Charging and Triboelectric Effects III

*Coffee Break*

Session N: Atmospheric and Space Applications II

**Graduate Student Awards**

**Closing Remarks**

**Note:** Keynote Lectures are 25 min + 5 min for questions; Invited and Regular Talks are 12 min + 3 min for questions

**Note:** Technical sessions will be in **SITE room B0103**; Breakfast, lunch and coffee breaks will be in **SITE cafeteria**

**Sponsors:** We thank Mystic Tan, TREK INC., as well as the University of Ottawa for their sponsorships

## Tuesday, June 13, 2017

**8:00 – 8:15 AM**                      **Welcome Address:** Poupak Mehrani (University of Ottawa), General Chair  
Shubho Banerjee (Rhodes College, Memphis TN), Technical Chair

### Session A: Electrically-Induced Flows and Electrokinetics I

**Tuesday, June 13, 8:15 AM**

Session Chair: TBA

- 8:15 – 8:45**                      **A1**    **Keynote Lecture:** H.-T. Charles Fan and Jorge Arinez (General Motors Company), *Full Vehicle Simulation of Electrostatic Paint Spray Simulation.*
- 8:45 – 9:00**                      **A2**    **Invited Talk:** Feng C. Lai, I. W. Brindle, and F. C. Lai (University of Oklahoma), *Experimental Study of Corona Jet Produced by a Circular Tube Fitted with a Nozzle.*
- 9:00 – 9:15**                      **A3**    Katsuo Sakai, (Electrostatic Generator Laboratory), *The third trial for the new electrostatic generator that is driven by Asymmetric electrostatic force.*
- 9:15 – 9:30**                      **A4**    V. Vivacqua<sup>1</sup>, M. Ghadiri<sup>1</sup>, A. M. Abdullah<sup>2</sup>, A. Hassanpour<sup>1</sup>, M. J. F. A. Al-Marri<sup>2</sup>, B. Azzopardi<sup>3</sup>, B. Hewakandamby<sup>3</sup>, B. Kermani<sup>4</sup> (<sup>1</sup>University of Leeds, <sup>2</sup>Qatar University, <sup>3</sup>University of Nottingham, <sup>4</sup>Keytech), *Evaluation of a Novel Electrode Design for Separation of Water-in-Oil Dispersions by Electrocoalescence.*
- 9:30 – 9:45**                      **A5**    Hidemasa Takana and Koyo Saegusa (Tohoku University), *Effect of Pulsed Voltage on Characteristics of Ionic Liquid Electrospray.*
- 9:45 – 10:00**                      **A6**    Marius Blajan, Akihiko Ito, Jaroslav Kristof, and Kazuo Shimizu (Shizuoka University), *3-D Numerical Simulation of Vortex Generator by Microplasma.*

**10:00 – 10:30 AM**                      **Coffee Break and Poster session**

### Session B: Contact Charging and Triboelectric Effects I

**Tuesday, June 13, 10:30 AM**

Session Chair: TBA

- 10:30 – 10:45**                      **B1**    Daniel J. Breton, Emily Asenath-Smith, and Nathan Lamie (Cold Regions Research and Engineering Laboratory), *Tribocharging and Materials Analysis of Firearm Propellants.*
- 10:45 – 11:00**                      **B2**    Joshua Méndez-Haper, George McDonald, Josef Dufek, Mike Malaska, and Devon Burr (Georgia Tech), *Electric Titan: A world molded by electrostatics.*
- 11:00 – 11:15**                      **B3**    Tatsushi Matsuyama, Junichi Ida, and Hideo Yamamoto (Soka University), *A discussion on the maximum charge held by a single particle limited by gas discharge.*
- 11:15 – 11:30**                      **B4**    Li Xie and Jun Zhou (Lanzhou University), *Contact electrification of particles considering effect of relative humidity.*
- 11:30 – 11:45**                      **B5**    Mark Horenstein, Ryan Eriksen, and Malay Mazumder (Boston University), *Quasi Three-Phase Traveling Wave Generation for an Electrodynamical Screen Via Snake Electrode Pattern with No High-Voltage Crossover Connections.*
- 11:45 – 12:00**                      **B6**    Mizuki Shoyama and Shuji Matsusaka (Kyoto University), *Charging and Levitation of Small Particles by Mesh Electrode.*

**12:00 – 1:30 PM**                      **Lunch**

### Session C: Biological and Medical Applications

**Tuesday, June 13, 1:30 PM**

Session Chair: TBA

- 1:30 – 2:00**                      **C1**    **Keynote Lecture:** Philip Chi Lip Kwok (The University of Hong Kong), *Electrostatics of pharmaceutical aerosols.*
- 2:00 – 2:15**                      **C2**    **Invited Talk:** Emil Alexov (Clemson University), *Modeling electrostatics in molecular biology: application to motor domain motion along microtubule.*

Tuesday, June 13, 2:15 PM

**Session D: Gas Discharges and Microplasmas**

Session Chair: TBA

- 2:15 – 2:30**      **D1**    Chaoao Shi, Kazimierz Adamiak, and G. S. Peter Castle (Western University), *Investigation of Characteristics of Dielectric Barrier Discharge Using a Numerical Model.*
- 2:30 – 2:45**      **D2**    N. Manivannan, W. Balachandran, G. Agozzino<sup>1</sup>, M. Jayamurthy, D. Brennen, and M. Abbod (Brunel University), *NO<sub>x</sub> abatement from the exhaust of a diesel engine with non-thermal plasma and Ag/Al<sub>2</sub>O<sub>3</sub> catalyst.*
- 2:45 – 3:00**      **D3**    Xiaozhou Shen, Xiaozhou Shen, Joseph Toth, R. Mohan Sankaran, Daniel Lacks (Case Western Reserve University), *Direct Non-Oxidative Methane Conversion by Dielectric Barrier Discharge – a Modeling Study.*
- 3:00 – 3:30 PM**      **Coffee Break and Poster Session contd.**

**Session E: Measurements and Instrumentation**

Tuesday, June 13, 3:30 PM

Session Chair: TBA

- 3:30 – 3:45**      **E1**    Matti Murtomaa, anne Peltonen, and Jarno Salonen (University of Turku), *Development of a four electrode induction probe for charge measurements in fluidized beds.*
- 3:45 – 4:00**      **E2**    Michael Reznikov (Physical Optics Corp.), *A fixed surface potential probe with the swing capacitive electrometer compared to the vibrating Kelvin probe.*
- 4:00 – 4:15**      **E3**    Toshiyuki Sugimoto, Yuki Yoshida, and Nobuo Nomura (Yamagata University), *Estimation of paint thickness from measured surface potential charged by corona discharge.*
- 4:15 – 4:30**      **E4**    Janne Peltonen, Matti Murtomaa, Kelly Robinson, and Jarno Salonen (University of Turku), *Measurements of binary powder mixture resistivities.*
- 4:30 – 4:45**      **E5**    Norimitsu Ichikawa (Kogakuin University), *Measurement of electrostatically induced voltages in two metal boxes by using spark gap and electromagnetic wave sensor.*

**Session F: Materials Synthesis Processing and Behavior**

Tuesday, June 13, 4:45 PM

Session Chair: TBA

- 4:45 – 5:00**      **F1**    Rajesh Sharma, Samuel King, Mesut Yurukcu, and Tansel Karabacak (Arkansas State University), *Multijunction thin film electrodes for photoelectrolysis.*
- 5:00 – 5:15**      **F2**    Mahdi Elghazali, Mahdi Elghazali, and Manoj Sachdev, Ajoy Opal (University of Waterloo), *Design methodology for ESD power supply clamps in advanced CMOS technologies.*
- 5:15 – 5:30**      **F3**    Faisal Aldawsari, Chitral Angamma, and Shesha Jayaram (University of Waterloo), *Influence of Interphase on the Electrical Properties of Silicone Nanocomposites.*
- 5:30 – 5:45**      **F4**    Mahdi Khanali and Shesha Jayaram (University of Waterloo), *Use of dielectric spectroscopy in analysing the wood degradation due to weathering and ageing.*

## Poster Session

Tuesday, June 13  
10:00 – 10:30 AM and 3:00 – 3:30 PM

- Outi Alanen, Matti Murtomaa, and Jarno Salonen (University of Turku), *A novel method for mass production of coaxial electrospun fibers.*
- Imed Eddine Achouri, Thami Zeghloul, Hamou Nouri, Abdelkader Mekhalef Benhafssa, Gontran Richard, Karim Medles, and Lucian Dascalescu (University of Poitiers), *Tribo-aero-electrostatic separation of micronized waste plastics.*
- Ahlem Ben Ab, Gontran Richard, Ana-Maria Delisor, Amar Tilmatine, Lucian Dascalescu, Thami Zeghloul (University of Poitiers), *Selective electric charging and sorting of PP and HIPS from mm-size granular waste plastics using a roll-type tribo-electrostatic separator.*
- Chen Li, Zifan Wanga, Xiaoyan Huang, Farzaneh Jalalinejada Kwangseok Choib, and Lifeng Zhanga (University of Saskatchewan), *Characterization of Tribocharging Behaviour of Pharmaceutical Granules in a Turbulent Flow Tribocharger.*
- Li Liangliang, Li Yipeng, Liu Quanzhen, Gao Xin, SUN Lifu (SINOPEC Research Institute of Safety Engineering), *Experimental study on the electrostatic risk factors in the process of refueling and uploading meanwhile at petrol stations.*
- He Meng (SINOPEC research institute of safety engineering), *Electrostatic hazards of applying foam to protect exposed flammable product pools.*
- W. Mike Arnold (Callaghan Innovation), *The Cell Membrane Conductivity Disparity.*
- Angela Antoniu, *Electrical dipoles, extracellular signals, and surface measurements: an example.*
- Khandakar Nusrat Islam and Mark Gilmore (University of New Mexico), *Characterization of methods of surface charge removal for the reduction of electrostatic discharge events in explosive environments.*
- Zerin Mahzabin Khan (University of Ottawa), *Recent Innovations in Electromyography for Biomedical Applications: A Systematic Literature Review.*
- Yi Song, Shubho Banerjee, and Blake Wilkerson (Rhodes College), *Electrostatics of equal-sized spheres at small separation.*

**Wednesday, June 14, 2017****Session G: Breakdown Phenomenon and Discharge****Wednesday, June 14, 8:00 AM**

Session Chair: TBA

- 8:15 – 8:45**      **G1**    **Keynote Lecture:** Elyse Rosenbaum (University of Illinois at Urbana-Champaign), *Breakdown phenomena and discharges.*
- 8:45 – 9:00**      **G2**    Michael Hogue, Rachel Cox, Jaysen Mulligan, Jayanta Kapat, Kareem Ahmed, Jennifer Wilson, and Luz Marina Calle (NASA Kennedy Space Center), *Revision of Paschen's Law Relating to the ESD of Aerospace Vehicle Surfaces.*
- 9:00 – 9:15**      **G3**    Jiann-Lin Su and Tsong-Yi Wen (National Taiwan University of Science and Technology), *Nanoparticle Collection Using Electrostatic Precipitator with Spike Corona Electrode.*
- 9:15 – 9:30**      **G4**    Zahirul Hasan Khan<sup>1</sup>, George D. Bouzianas<sup>2</sup>, Theodoros K. Koumbis<sup>2</sup>, Vasileios N. Zagkanas<sup>2</sup> (<sup>1</sup>HRZ Research & Consultancy, <sup>2</sup>Fieldscale), *A Comparative Study of Experimental and Simulation Results of Sieving Electrostatic Precipitator.*

**Session H: Safety and Hazards****Wednesday, June 14, 9:30 AM**

Session Chair: TBA

- 9:30 – 9:45**      **H1**    Choi Kwangseok<sup>1</sup>, Yuta Endo<sup>1</sup>, Naoto Nogera<sup>2</sup>, Teruo Suzuki<sup>2</sup> (<sup>1</sup>National Institute of Occupational Safety and Health, Japan), *Electrostatic discharges inside storage silo during loading of polypropylene powders.*
- 9:45 – 10:00**    **H2**    Kelly Robinson (Electrostatic Answers), *Solvent Exposure Compromises Some Antistatic Containers.*
- 10:00 – 10:30 AM**      **Coffee Break**

**Session I: Contact Charging and Triboelectric Effects II****Wednesday, June 14, 10:30 AM**

Session Chair: TBA

- 10:30 – 10:45**      **I1**    Joseph Toth and Matti Murtomaa (University of Turku), *Triboelectric charging through particle-particle contact using acoustic levitation.*
- 10:45 – 11:00**      **I2**    Gontran Richard, Abdelkader Nadjem, Karim Medles, Miloud Kachi, Thami Zeghloul, and Lucian Dascalescu (University of Poitiers), *Tribocharging of PP and PVC granules after exposure to a dielectric barrier discharge (DBD). Effect of DBD exposure duration, voltage amplitude and frequency.*
- 11:00 – 11:15**      **I3**    U. Zafar, M. Ali, F. Alfano, and M. Ghadiri (University of Leeds), *Evaluation of a New Method for Assessing Triboelectric Charging Propensity of Particles.*
- 11:15 – 11:30**      **I4**    Xing Jin and Jeffrey S. Marshall (University of Vermont), *Contact Electrification of Suspended Particles in a Turbulent Fluid.*
- 11:30 – 11:45**      **I5**    Ladislav Konopka, Simon Jantac, Jarmila Kucerova, and Juraj Kosek (University of Chemistry and Technology Prague), *Triboelectrification of Polymers.*
- 11:45 – 12:00**      **I6**    Dylan Carter and Christine Hartzell (University of Maryland), *A Method for Measuring Charge Separation in Granular Mixtures in Vacuum.*
- 12:00 – 1:30 PM**      **Lunch**

**Session J: Atmospheric and Space Applications I****Wednesday, June 14, 1:30 PM**

Session Chair: TBA

- 1:30 – 2:00**      **J1**    **Keynote Lecture:** Karen Aplin (Oxford University), *Electrical processes in planetary atmospheres.*
- 2:00 – 2:15**      **J2**    Carlos I. Calle, (NASA Kennedy Space Center), *Electrostatic Charge Relaxation of Dust Particles in the Martian Atmosphere.*
- 2:15 – 2:30**      **J3**    Giles Harrison, Keri Nicoll, and Karen Aplin (University of Reading, UK), *Remote sensing of cloud base charge.*
- 2:30 – 2:45**      **J4**    M. R. Johansen, J. R. Phillips III, P. J. Mackey, Rachel E. Cox, S. J. Clements, C. I. Calle (NASA), *Numerical Simulations of an Electrostatic Precipitator for Mars In-Situ Resource Utilization.*

**2:45 – 3:00**      **J5**    Jesus A. Dominguez, J. R. Phillips III, P. J. Mackey, M. D. Hogue, M. R. Johansen, R. E. Cox, and C. I. Calle (Vencore Inc.), *Comprehensive Modeling of Surface Dust Removal via Electrostatic and Dielectrophoretic Forces in Planetary Exploration Missions.*

**3:00 – 3:30 PM**      **Coffee Break**

**Session K: Electrically-Induced Flows and Electrokinetics II**

**Wednesday, June 14, 3:30 PM**

Session Chair: TBA

- 3:30 – 3:45**      **K1**    **Invited Talk:** Lei Yang and Jamal Seyed-Yagoobi (Worcester Polytechnic Institute), *Liquid-Phase Flow Distribution Control in Meso-Scale with Directionally Reversed Electrohydrodynamic Conduction Pumping Configuration.*
- 3:45 – 4:00**      **K2**    Janusz Podliński, Magdalena Danowska, Tomasz Izdebski, and Mirosław Dors (Institute of Fluid Flow Machinery, Polish Academy of Sciences), *Electrohydrodynamic pump with bipolar corona discharge supplied by unipolar DC voltage.*
- 4:00 – 4:15**      **K3**    Feng C. Lai, J. H. Lin, and S. C. Lin (University of Oklahoma), *Performance of an Electrohydrodynamic Gas Pump Fitted in a Nozzle*
- 4:15 – 4:30**      **K4**    Yoshio Higashiyama and Masafumi Kamada (Yamagata University), *Dehumidification by fine charged droplets ejected by corona discharge from a water droplet.*
- 4:30 – 4:45**      **K5**    Keiichiro Yoshida, Michael J. Johnson, and David B. Go (Osaka Institute of Technology), *Evaluation on ionic wind generated with a ring-shaped DBD device having an exhaust nozzle.*
- 4:45 – 5:00**      **K6**    Farhana A. Khan, Stefan Andrei, A. K. M. Monayem H. Mazumder, Ramesh K. Guduru (Lamar University), *Performance of Electrohydrodynamic Gas Pump in a Square Channel.*
- 5:00 – 5:15**      **K7**    Vladimir Chirkov, Aleksandr Lashko, and Marina Reznikova (St. Petersburg State University), *The investigation of the transition from electrical coalescence to non-coalescence of two water droplets.*
- 5:15 – 5:30**      **K8**    Michal Talmor, Lei Yang, and Jamal Seyed-Yagoobi (Worcester Polytechnic Institute), *Numerical study of directional EHD conduction driven flow distribution control in small scales in the presence of external pressure loads.*

**Conference Banquet, Recognitions and Awards**

**Wednesday, June 14, 6:30 PM**

Banquet talk: Dr. Mark Horenstein, Boston University, USA

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**Thursday, June 15, 2017**
**Session L: Electrically-Induced Flows and Electrokinetics III****Thursday, June 15, 8:15 AM**

Session Chair: TBA

- 8:15 – 8:30**      **L1**    Adrian Ieta<sup>1</sup>, Sohrab Gousheh<sup>1</sup>, Kyle Zeller<sup>1</sup>, Justin D'Antonio<sup>1</sup> and Marius Chirita<sup>2</sup> (<sup>1</sup>SUNY Oswego, <sup>2</sup>NIRDECM, Timisoara), *Improved Data Acquisition System for the Study of EHD-Air Flow Induced Rotational Motion.*
- 8:30 – 8:45**      **L2**    Maciej Noras and Alzarrio Rolle (University of North Carolina at Charlotte), *Influence of electric and magnetic fields on behavior of electrosprays in an elevated pressure environment.*
- 8:45 – 9:00**      **L3**    A. K. M. Monayem H. Mazumder, Farhana A. Khan, Ali Beheshti, Ramesh K. Guduru (Lamar University), *Electrohydrodynamic Gas Pump in a Square Channel with Two-Stage Corona Wind Generator.*
- 9:00 – 9:15**      **L4**    Rezaur Rahman, A. K. M. Monayem H. Mazumder, Jenny Zhou (Lamar University), *Electrical Characteristics of Electrohydrodynamic Gas Pump in a Square Channel.*

**Session M: Contact Charging and Triboelectric Effects III****Thursday, June 15, 9:15 AM**

Session Chair: TBA

- 9:15 – 9:30**      **M1**    Matthew Ibbotson, E. Van Cleve, A. L. Collins, and C.G. Camara (Tribogenics), *Novel non-contact macroscopic triboelectric and tribological device.*
- 9:30 – 9:45**      **M2**    Eli Van Cleve, M. Ibbotson, A. L. Collins, and C. G. Camara (Tribogenics), *Simulation of non-contact macroscopic triboelectric and tribological device.*
- 9:45 – 10:00**    **M3**    Fahad Chowdhury, Alberto Passalacqua, Andrew Sowinski, and Poupak Mehrani (University of Ottawa), *An Euler-Euler CFD Model for Gas-Solid Fluidized Beds Incorporating Electrostatic Charging due to Particle-Wall Collisions.*

**10:00 – 10:30 AM****Coffee Break****Session N: Atmospheric and Space Applications II****Thursday, June 15, 10:30 AM**

Session Chair: TBA

- 10:30 – 10:45**    **N1**    Mark Horenstein (Boston University), *Ultra-Sensitive Electric-Field Sensor for Underwater Object Detection.*
- 10:45 – 11:00**    **N2**    Carlos I. Calle, P.J. Mackey, J.R. Phillips III, M.R. Johansen, M.D. Hogue, and R.E. Cox (NASA), *Electrodynamic Dust Shield Demonstration on the International Space Station.*
- 11:00 – 11:15**    **N3**    Shubho Banerjee, Blake Wilkerson, and Yi Song (Rhodes College), *The mathematics behind the close approach of two equal-sized charged spheres.*

**11:15 – 12:15****Graduate Student Awards:** Shubho Banerjee (Rhodes College), Technical Chair**12:15 – 12:30****Closing Remarks:** Sheshakamal Jayaram (University of Waterloo), ESA President

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