



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 12th

6:00 PM – 8:00 PM

Tuesday, June 13th

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 14th

7:00 AM – 8:00 AM

8:15 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 15th

7:00 AM – 8:00 AM

8:30 AM – 9:30 AM

9:30 AM – 10:00 AM

10:00 AM – 10:45 AM

10:45 AM – 11:45 AM

11:45 AM – 12:00 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 Contd.

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

Coffee Break

Session M: Contact Charging and Triboelectric Effects III

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 B0138**; Breakfast, lunch and coffee breaks will be in **SITE cafeteria**

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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: Karen Aplin (Oxford University, UK)

- 8:15 – 8:45** **A1** **Keynote Lecture:** H.-T. Charles Fan and Jorge Arinez (General Motors Company, USA), *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, USA), *Experimental Study of Corona Jet Produced by a Circular Tube Fitted with a Nozzle.*
- 9:00 – 9:15** **A3** Katsuo Sakai, (Electrostatic Generator Laboratory, Japan), *The third trial for the new electrostatic generator that is driven by Asymmetric electrostatic force.*
- 9:15 – 9:30** **A4** V. Vivacqua¹, M. Ghadiri¹, A. M. Abdullah², A. Hassanpour¹, M. J. F. A. Al-Marri², B. Azzopardi³, B. Hewakandamby³, B. Kermani⁴ (¹University of Leeds UK, ²Qatar University, ³University of Nottingham UK, ⁴Keytech UK), *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, Japan), *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, Japan), *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: Shesha H. Jayaram (University of Waterloo, Canada)

- 10:30 – 10:45** **B1** Daniel J. Breton, Emily Asenath-Smith, and Nathan Lamie (Cold Regions Research and Engineering Laboratory, USA), *Tribocharging and Materials Analysis of Firearm Propellants.*
- 10:45 – 11:00** **B2** Tatsushi Matsuyama, Junichi Ida, and Hideo Yamamoto (Soka University, Japan), *A discussion on the maximum charge held by a single particle limited by gas discharge.*
- 11:00 – 11:15** **B3** Li Xie and Jun Zhou (Lanzhou University, China), *Contact electrification of particles considering effect of relative humidity.*
- 11:15 – 11:30** **B4** Mark Horenstein, Ryan Eriksen, and Malay Mazumder (Boston University, USA), *Quasi Three-Phase Traveling Wave Generation for an Electrodynamic Screen Via Snake Electrode Pattern with No High-Voltage Crossover Connections.*
- 11:30 – 11:45** **B5** Mizuki Shoyama and Shuji Matsusaka (Kyoto University, Japan), *Charging and Levitation of Small Particles by Mesh Electrode.*
- 11:45 – 12:00** **B6** Matthew Ibbotson, E. Van Cleve, A. L. Collins, and C.G. Camara (Tribogenics, USA), *Novel non-contact macroscopic triboelectric and tribological device.*

12:00 – 1:30 PM **Lunch**

Session C: Biological and Medical Applications

Tuesday, June 13, 1:30 PM

Session Chair: Maciej A. Noras (UNC Charlotte, USA)

- 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, USA), *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: Maciej A. Noras (UNC Charlotte, USA)

- 2:15 – 2:30** **D1** Chaoao Shi, Kazimierz Adamiak, and G. S. Peter Castle (Western University, Canada), *Investigation of Characteristics of Dielectric Barrier Discharge Using a Numerical Model.*
- 2:30 – 2:45** **D2** N. Manivannan, W. Balachandran, G. Agozzino¹, M. Jayamurthy, D. Brennen, and M. Abbod (Brunel University, UK), *NOx abatement from the exhaust of a diesel engine with non-thermal plasma and Ag/Al₂O₃ catalyst.*
- 2:45 – 3:00** **D3** Xiaozhou Shen, Xiaozhou Shen, Joseph Toth, R. Mohan Sankaran, Daniel Lacks (Case Western Reserve University, USA), *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: Jamal Seyed-Yagoobi (Worcester Polytechnic Institute, USA)

- 3:30 – 3:45** **E1** Matti Murtomaa, Janne Peltonen, and Jarno Salonen (University of Turku, Finland), *Development of a four electrode induction probe for charge measurements in fluidized beds.*
- 3:45 – 4:00** **E2** Michael Reznikov (Physical Optics Corp., USA), *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, Japan), *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, Finland), *Measurements of binary powder mixture resistivities.*
- 4:30 – 4:45** **E5** Norimitsu Ichikawa (Kogakuin University, Japan), *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: Michael Hogue (NASA Kennedy Space Center, USA)

- 4:45 – 5:00** **F1** Rajesh Sharma, Samuel King, Mesut Yurukcu, and Tansel Karabacak (Arkansas State University, USA), *Multijunction thin film electrodes for photoelectrolysis.*
- 5:00 – 5:15** **F2** Mahdi Elghazali, Manoj Sachdev, and Ajoy Opal (University of Waterloo, Canada), *Design methodology for ESD power supply clamps in advanced CMOS technologies.*
- 5:15 – 5:30** **F3** Mahdi Khanali and Shesha Jayaram (University of Waterloo, Canada), *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

- Imed Eddine Achouri, Thami Zeghloul, Hamou Nouri, Abdelkader Mekhalef Benhafssa, Gontran Richard, Karim Medles, and Lucian Dascalescu (University of Poitiers, France), *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, France), *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, Canada), *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, China), *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, China), *Electrostatic hazards of applying foam to protect exposed flammable product pools.*
- W. Mike Arnold (Callaghan Innovation, New Zealand), *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, USA), *Characterization of methods of surface charge removal for the reduction of electrostatic discharge events in explosive environments.*
- Zerin Mahzabin Khan (University of Ottawa, Canada), *Recent Innovations in Electromyography for Biomedical Applications: A Systematic Literature Review.*
- Shubho Banerjee, Yi Song, and Blake Wilkerson (Rhodes College, USA), *Electrostatics of equal-sized spheres at small separation.*
- Faisal Aldawsari, Chitral Angamma, and Shesha Jayaram (University of Waterloo, Canada), *Influence of Interphase on the Electrical Properties of Silicone Nanocomposites.*

Wednesday, June 14, 2017**Session G: Breakdown Phenomenon and Discharge****Wednesday, June 14, 8:15 AM**

Session Chair: W. Mike Arnold (Callaghan Innovation, New Zealand)

- 8:15 – 8:45** **G1** **Keynote Lecture:** Elyse Rosenbaum (University of Illinois at Urbana-Champaign, USA), *Electrostatic Discharge: A Reliability Threat to Integrated Circuits.*
- 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, USA), *Revision of Paschen's Law Relating to the ESD of Aerospace Vehicle Surfaces.*
- 9:00 – 9:15** **G3** Jiann-Lin Su and Tsrong-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 Khan¹, George D. Bouzianas², Theodoros K. Koumbis², Vasileios N. Zagkanas² (¹HRZ Research & Consultancy Canada, ²Fieldscale Greece), *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: W. Mike Arnold (Callaghan Innovation, New Zealand)

- 9:30 – 9:45** **H1** Choi Kwangseok¹, Yuta Endo¹, Naoto Nogera², Teruo Suzuki² (¹National 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, USA), *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: Rajesh Sharma (Arkansas State University, USA)

- 10:30 – 10:45** **I1** Joseph Toth and Matti Murtomaa (University of Turku, Finland), *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, France), *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, UK), *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, USA), *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, Czech Republic), *Triboelectrification of Polymers.*
- 11:45 – 12:00** **I6** Dylan Carter and Christine Hartzell (University of Maryland, USA), *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: Elyse Rosenbaum (University of Illinois at Urbana-Champaign, USA)

- 1:30 – 2:00** **J1** **Keynote Lecture:** Karen Aplin (Oxford University, UK), *Electrical processes in planetary atmospheres.*
- 2:00 – 2:15** **J2** Mark Horenstein (Boston University, USA), *Ultra-Sensitive Electric-Field Sensor for Underwater Object Detection.*
- 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** 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., USA), *Comprehensive Modeling of Surface Dust Removal via Electrostatic and Dielectrophoretic Forces in Planetary Exploration Missions.*
- 2:45 – 3:00** **J5** Shubho Banerjee, Blake Wilkerson, and Yi Song (Rhodes College, USA), *The mathematics behind the close approach of two equal-sized charged spheres..*

3:00 – 3:30 PM **Coffee Break**

Session K: Electrically-Induced Flows and Electrokinetics II

Wednesday, June 14, 3:30 PM

Session Chair: Kelly Robinson (Electrostatic Answers, USA)

- 3:30 – 3:45** **K1** **Invited Talk:** Lei Yang and Jamal Seyed-Yagoobi (Worcester Polytechnic Institute, USA), *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, Poland), *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, USA), *Performance of an Electrohydrodynamic Gas Pump Fitted in a Nozzle*
- 4:15 – 4:30** **K4** Yoshio Higashiyama and Masafumi Kamada (Yamagata University, Japan), *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, Japan), *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, USA), *Performance of Electrohydrodynamic Gas Pump in a Square Channel.*
- 5:00 – 5:15** **K7** Michal Talmor, Lei Yang, and Jamal Seyed-Yagoobi (Worcester Polytechnic Institute, USA), *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: *The Physics of the Puppies*, Dr. Mark Horenstein, Boston University, USA

Thursday, June 15, 2017

Session L: Electrically-Induced Flows and Electrokinetics III

Thursday, June 15, 8:30 AM

Session Chair: Thami Zeghloul (University of Poitiers, France)

- 8:30 – 8:45** **L1** Maciej Noras and Alzarrio Rolle (University of North Carolina at Charlotte, USA), *Influence of electric and magnetic fields on behavior of electrosprays in an elevated pressure environment.*
- 8:45 – 9:00** **L2** A. K. M. Monayem H. Mazumder, Farhana A. Khan, Ali Beheshti, Ramesh K. Guduru (Lamar University, USA), *Electrohydrodynamic Gas Pump in a Square Channel with Two-Stage Corona Wind Generator.*
- 9:00 – 9:15** **L3** Vladimir Chirkov, Aleksandr Lashko, and Marina Reznikova (St. Petersburg State University, Russia), *The investigation of the transition from electrical coalescence to non-coalescence of two water droplets.*
- 9:15– 9:30** **L4** Rezaur Rahman, A. K. M. Monayem H. Mazumder, Jenny Zhou (Lamar University, USA), *Electrical Characteristics of Electrohydrodynamic Gas Pump in a Square Channel.*

9:30 – 10:00 AM **Coffee Break**

Session M: Contact Charging and Triboelectric Effects III

Thursday, June 15, 10:00 AM

Session Chair: Tatsushi Matsuyama (Soka University, Japan)

- 10:00 – 10:15** **M1** Eli Van Cleve, M. Ibbotson, A. L. Collins, and C. G. Camara (Tribogenics, USA), *Simulation of non-contact macroscopic triboelectric and tribological device.*
- 10:15 – 10:30** **M2** Fahad Chowdhury¹, Alberto Passalacqua², Andrew Sowinski¹, Manjil Ray², and Poupak Mehrani¹ (¹University of Ottawa Canada, ²Iowa State University USA), *An Euler-Euler CFD Model for Gas-Solid Fluidized Beds Incorporating Electrostatic Charging due to Particle-Wall Collisions.*
- 10:30 – 10:45** **M3** Joshua Méndez-Haper, George McDonald, Josef Dufek, Mike Malaska, and Devon Burr (Georgia Tech, USA), *Electric Titan: A world molded by electrostatics.*

10:45 – 11:45 **Graduate Student Awards:** Shubho Banerjee (Rhodes College), Technical Chair

11:45 – 12:00 **Closing Remarks:** Sheshakamal Jayaram (University of Waterloo), ESA President

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