

# Dielectrophoresis Conference 2024

UCD O'Brien Science Centre

University College Dublin

July 1<sup>st</sup> – July 3<sup>rd</sup>

## Programme overview:

Time	Monday, July 1st	Tuesday, July 2nd	Wednesday, July 3rd		
08:40					
08:50	Welcome address				
09:00	Session 1	Session 5	Session 8 (Virtual Session)		
09:20					
09:40					
10:00					
10:20					
10:40	Coffee Break				
11:00	Plenary 1 (Kai Hoettges)	Plenary 3 (Tayloria Adams)	Coffee Break		
11:20	Session 2	Session 6	Session 9		
11:40					
12:00					
12:20					
12:40	Lunch				
13:00			Award ceremony		
13:20	Plenary 2 (Ran An)	Session 7	Lunch		
13:40					
14:00	Session 3		Session 7	End	
14:20					
14:40					
15:00	Coffee Break				
15:20	Poster session 1	Poster session 2			
15:40	Session 4	Plenary 4 (Rafael Davalos)			
16:00					
16:20					
16:40	Welcome reception	Your own break			
17:00					
17:20					
17:40					
19:30		Dinner			

## Monday, July 1<sup>st</sup>

### Welcome address (8:50 – 9:00)

#### Session 1 (9:00 – 10:40) *Chair: Ralph Hölzel*

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- 9:00 R Fernández-Mateo, V Calero, H Morgan, P García-Sánchez, A Ramos  
Traveling-wave electrophoresis around a dielectric micropillar
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- 9:20 R Fernández-Mateo, R Gannoun, H Morgan, A Ramos, P García-Sánchez  
Trapping of particles in microfluidic constrictions driven by AC electric fields
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- 9:40 Siarhei Zavatski, Olivier J.F. Martin  
Dielectrophoretic polarizability factor of bio-nanoparticles in aqueous conductive buffers
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- 10:00 ML Jiménez, M Ibáñez, S Martín-Martín, RA Rica  
Memory effects in electro-optical dynamic response
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- 10:20 Shivam Yadav, Rodrigo Martinez-Duarte  
Characterizing recirculation in microfluidic devices to prevent dead volume
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### Coffee break (10:40 – 11:00)

#### Plenary 1 (11:00 – 11:40) *Chair: Rodrigo Martinez-Duarte*

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- 11:00 K Hoettges, M Mueller  
Impedance sensing as a proxy for force generation in 3D tissue-engineered muscle constructs
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#### Session 2 (11:40 – 12:40) *Chair: Rodrigo Martinez-Duarte*

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- 11:40 Lewis Keeble, Nicolas Moser, Jesus Rodriguez-Manzano, Pantelis Georgiou  
On-CMOS Photolithographic Microelectrodes for Electrokinetic Actuation of DNA Towards Enhanced ISFET-Based Detection
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- 12:00 Bastien Oliva, Lylia Challier, Vincent Noël, Cécile Jauzein  
Printed electrodes for dielectrophoretic sorting of marine microorganisms: design, fabrication and characterization of a new analytical tool
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- 12:20 Yagmur Ceren Alatas, Uzay Tefek, Berk Kucukoglu, Naz Bardakci, Sayedus Salehin, M. Selim Hanay  
Microwave Impedance Cytometry with 3D Electrodes
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### Lunch (12:40 – 13:40)

#### Plenary 2 (13:40 – 14:20) *Chair: Blanca Lapizco-Encinas*

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- 13:40 Qingrong He, Adrienne Minerick, Ran An  
Biased-alternating current electrophoresis in spatially non-uniform electric fields
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#### Session 3 (14:20 – 15:20) *Chair: Blanca Lapizco-Encinas*

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- 14:20 P Zimmer, O Andreiev, M Costella, M Frénéa-Robin, E Laurenceau, J-P Cloarec, M Canva, J Marchalot  
Direct observation of DEP and ACEO effects induced with top-bottom electrodes for enhanced target capture in surface-based biosensing applications
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- 14:40 Aaditya Venkatesha Babu Bangaru, Holton Shults, Axel Gumira, Stuart J Williams  
Dielectrophoretic slide: Microfluidic platform for dielectric analysis of microparticles
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- 15:00 Tudor-Alexandru Filip, Ina Turcan, Marius-Andrei Olariu  
Hands-on study on dielectrophoretic direct assembling of MXene flakes
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### Coffee break and poster session 1 (15:20 – 16:40)

#### Session 4 (16:40 – 17:40) *Chair: Pablo García Sánchez*

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- 16:40 Laura Weirauch, Jasper Giesler, Michael Baune, Georg R. Pesch, Jorg Thöming  
Multidimensional sorting of mixed microparticles in a mesh-based dielectrophoretic device
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- 17:00 Blanca H. Lapizco-Encinas  
On the development of microfluidic separations combining linear and nonlinear electrokinetics effects
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- 17:20 X Knigge, E-M Laux, S Stanke, C Wenger, FF Bier, R Hölzel  
AC electrokinetics on nano-electrode arrays: Spatial manipulation of viruses and molecules
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### Welcome reception in the UCD Club (17:40)

Includes Finger Food

## Tuesday, July 2nd

### Session 5 (8:40 – 10:40) Chair: Ran An

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8:40	AYL Jiang, AR Yale, JN Hanamoto, CR Douglas, CC Ro, NS Lav, VP Dang, K Di, J Deyell, DA Bota, LA Flanagan <b>Glioblastoma chemotherapeutic resistance is tied to membrane electrophysiological properties and glycosylation</b>
9:00	D Butzke, I Lamprecht, R Hölzel <b>Properties of single K562 cells determined by wide-band electrorotation</b>
9:20	KSP Clarke, CC Kingdon, EM Lacerda, EJ Kruchek, O Griffiths, R Hoque, R Lewis, MP Hughes, FH Labeed <b>Significant Changes in the Electrophysiological Properties of White Blood Cells in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome During Hyperosmotic Stress</b>
9:40	Fatima H Labeed <i>et al.</i> <b>Electrical rhythms in human platelets: Is cardiovascular disease electrophysiological?</b>
10:00	Edwin D. Lavi, Brandon Eberl, Erin Henslee <b>Electrophysiological Responses to Oxidative Stress in Human Erythrocytes</b>
10:20	Alexandra R. Hyler, Kyle S. Kinskie, Dean E. Thomas, Kyle M. Brown, Josie L. Duncan, Jaka Cemazar, Jeff Schultz, Simeon Brown, Farhad Shiri, Steven A. Soper, Rafael V. Davalos <b>PDMS Fabrication: Challenges and Promise for Commercialization of Electrokinetic Cell Sorting Microfluidic Devices</b>

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### Coffee break (10:40 – 11:00)

### Plenary 3 (11:00 – 11:40) Chair: Fatima Labeed

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11:00	Tayloria NG Adams <b>Exploring the Functional Heterogeneity of Stem Cells with Dielectrophoresis</b>
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### Session 6 (11:40 – 12:50) Chair: Fatima Labeed

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11:40	Mark A Hayes, Jerry Sheu, AKM Fazul Karim Rasel, Sean Seyler <b>Quantifying the Force on Freely Diffusing Proteins in an Electric Field Gradient</b>
12:00	JP Ware, S Hamilton, K Tao, C Ross, S Nicholas, J Riesterer, E Stimson, SD Ibsen <b>Electrochemical sensing of particles isolated from complex mixtures via dielectrophoresis</b>
12:20	Christian Ross, Sean Hamilton, Stuart D. Ibsen <b>DEP Collection from Plasma and On-Chip PCR Amplification of DNA</b>

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### Lunch (12:40 – 13:40)

### Session 7 (13:40 – 15:20) Chair: Stuart Ibsen

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13:40	G Özkayar, GR Pesch, P ten Dijke, PE Boukany <b>A continuous stream heterogeneous cancer cell manipulation device by combining hydrodynamic focusing and insulator-based dielectrophoresis (IDEP)</b>
14:00	C Brandi, A Lefevre, A De Ninno, F Ruggiero, E Verona, M Gauthier, P Bisegna, A Bolopion, F Caselli <b>Real-time impedance-based dielectrophoretic manipulation of single particles</b>
14:20	S Moscato, A Ballo, P Memmolo, P Bonacci, N Musso, V Romanello, C Caruso, S Stefani, R Pethig, M Bucolo and M Camarda <b>An Automated Electro Cell-Physiometry (ECP) Platform Based on Broad-Band (30 kHz–300 MHz) Electrorotation and Dielectrophoresis</b>
14:40	B Arzhang, E Kovacs, A Fazelkhanh, J Lee, R Gill, J Cochingco, E Salimi, GE Bridges, and DJ Thomson <b>Apparatus for simultaneous dielectric and optical analysis of cells</b>
15:00	Carlos David González-Gómez, Emilio Ruiz-Reina, Raúl A. Rica <b>Brownian dynamics of interacting particles confined in an aqueous hybrid electro-optical trap</b>
15:20	Note on Special Issue <b>Dielectrophoresis 2025</b> in ELECTROPHORESIS journal (10 min)

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### Coffee break and poster session 2 (15:30 – 16:40)

### Plenary 4 (16:40 – 17:20) Chair: Adrienne Minerick

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16:40	Rafael V Davalos, Josie Duncan <b>Design, Development, and Application of Contactless Dielectrophoresis</b>
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### Dinner at the Woollen Mills Restaurant (19:30) Bus transfer available from UCD

## Wednesday, July 3rd

### Session 8, Virtual Session (9:00 – 11:00) *Chair: Lisa Flanagan / Georg Pesch*

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9:00	<u>Michael Pycraft Hughes</u> <b>Multi-conductivity Clausius-Mossotti analysis: the electrophysiological Rosetta stone</b>
9:15	<u>EA Frants, AA Krylov, S Amiroudine, EA Demekhin</u> <b>Numerical simulation of nonlinear electrophoresis of dielectric particle</b>
9:30	<u>Sankha Shuvra Das, Gilad Yossifon</u> <b>Optoelectronic Trajectory Reconfiguration of Electrically Powered Active Particles</b>
9:45	<u>Raphael Oladokun, Christopher Smith, Timothy Eubank, and Soumya Srivastava</u> <b>Dielectrophoretic Characterization and COMSOL Analysis of Late Carcinoma Using PBMCs from MMTV-PyMT (PyMT) and MMTV-WT (WT) Mammary Carcinoma Models</b>
10:00	<u>Sai Deepika Reddy Yaram, Soumya K Srivastava</u> <b>Biophysical characterization of HL-60 infected with Anaplasma spp.</b>
10:15	<u>Michihiko Nakano, Ryu Nakabayashi, Rie Koyama, Masafumi Inaba, Junya Suehiro</u> <b>Investigation of crossover frequency of cancerous exosomes</b>
10:30	<u>Mehrzad Sasanpour, Sarah Mitchell, Jason Ware and Stuart D. Ibsen</u> <b>Internal Standard Protocol for Dielectrophoresis-Based Recovery and Quantification of Cancer-Derived Extracellular Vesicles from Plasma</b>

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### Coffee break (11:00 – 11:20)

### Session 9 (11:20 – 13:20) *Chair: Alexandra Hyler*

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11:20	<u>Oreoluwa Griffiths, Srdjan Cirovic, Csaba Matta, Rebecca Lewis, Michael Hughes, Fatima Labeed</u> <b>The Dielectric Study of Animal Chondrogenesis</b>
11:40	<u>Matthew P Johnson, Muhammad Hamza Tariq, Nupur Kohli, Michael Pycraft Hughes</u> <b>Frozen transport of cell-based therapeutics is limiting clinical success, can DEP provide insight or a simple pre-infusion test?</b>
12:00	<u>Sarah Mitchell, Sean Hamilton, Stuart D. Ibsen</u> <b>Implementing High Conductance Dielectrophoresis in Undiluted Plasma for the Isolation of Organelle Fragments Released from Necrosis and Cell Lysis Events</b>
12:20	<u>A Malakian, A Modestino, J Bueno, A Machireddy, J Ware, S Hamilton, E Stimson, S Mitchell, JC Saldivar, A Woodfin, C Dambacher, K Gustafson, D Shea, S Ranganathan, M Sasanpour, C Ross, D Keith, J Lim, X Song, SM Lippman, R Sears, T Morgan, M Heller, <u>SD Ibsen</u></u> <b>Dielectrophoresis-Based Collection of Orthogonal Biomarkers for the Detection of Pancreatic Cancer</b>
12:40	<u>Azade Tahmasebi, Sanaz Habibi, Jeana L. Collins, Ran An, Esmaeil Dehdashti, <u>Adrienne R. Minerick</u></u> <b>pH Gradients in Dielectrophoresis; Explorations Around the Charging Frequency, with Two Electrode Geometries, and Electrode Passivation</b>
13:00	<u>Yifan Zhou, Jiayao Wu, Huai Zheng, Sang Woo Joo</u> <b>Universal Droplet Manipulation through Oscillational Deposition of Opposite Surface Charges</b>

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### Award ceremony (13:20 – 13:40) *Chair: Mark Hayes*

### Lunch (13:40 – 14:40)

**Poster Session 1 (Monday, July 1<sup>st</sup>, 15:40 – 16:40) *odd poster numbers***

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1	<u>Mary Clare O'Donnell</u> , Georg Pesch <b>Separating End-of-Life Battery Materials using Dielectrophoretic Filtration</b>
3	J. Hunter West, Tonoy K. Mondal, <u>Aaditya VB Bangaru</u> , Stuart J Williams <b>Well-based dielectrophoretic particle trapping experiments using conductive nanofiber mats</b>
5	<u>Olivia Gedra</u> , Mark Stremmer, Rafael Davalos <b>A microfluidic device for continuous buffer exchange</b>
7	<u>KM Brown</u> , KS Kinskie, DE Thomas, JL Duncan, J Cemazar, J Schultz, S Brown, F Shiri, SA Soper, RV Davalos, AR Hyler <b>Investigating Manufacturing Techniques and Raw Materials for DEP-Based Microfluidic Sorting Devices on the CytoR1™ Platform</b>
9	<u>Thilini N. Rathnaweera</u> , Robbyn K. Anand <b>On-chip single-cell analytics made easier: iDEP-based single-cell isolation facilitated by easy-to-align wireless electrodes</b>
11	<u>Mary Krystelle Catacutan</u> , Sung Mun Lee, Michael Pycraft Hughes (presented by Matthew Johnson) <b>3D Dielectrophoresis Analysis Reveals pH-Dependent Responses in Breast Cancer Cells</b>
13	<u>Delaney Shea</u> , Jason Ware, Shelby Nicholas, Stuart Ibsen <b>Applying Dielectrophoresis to Isolate and Analyze Bacteria-Derived Nanoparticles from Bodily Fluid</b>
15	<u>Xueping Zou</u> , Junyu Chen, Daniel Spencer, Hywel Morgan <b>A single-cell impedance cytometer</b>

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**Poster Session 2 (Tuesday July 2<sup>nd</sup>, 15:40 – 16:40) *even poster numbers***

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2	Jasper Giesler, Laura Weirauch, Jorg Thöming, Michael Baune, <u>Georg Pesch</u> <b>High-throughput dielectrophoretic separator based on printed-circuit boards</b>
4	<u>Nicolas Ruysen</u> , Bastien Oliva, Lylia Challier, Vincent Noël, Benjamin Rotenberg <b>Membrane-less dielectrophoretic microfiltration: a numerical study</b>
6	Paolo Bonacci, Samuele Moscato, Vito Romanello, Andrea Ballo, Stefania Stefani, Nicolò Musso, Maide Bucolo, <u>Massimo Camarda</u> <b>A critical balance between conductivity and osmolarity in buffers for Dielectrophoretic and Electrorotation experiments</b>
8	<u>KS Kinskie</u> , DE Thomas, KM Brown, JL Duncan, J Cemazar, J Schultz, S Brown, F Shiri, SA Soper, RV Davalos, AR Hyler <b>An Investigation of Materials Used in Microfluidic Fabrication of CytoChips™ for Dielectrophoresis-Based Cell Sorting</b>
10	<u>DE Thomas</u> , KS Kinskie, KM Brown, JL Duncan, J Cemazar, J Schultz, S Brown, F Shiri, SA Soper, RV Davalos, AR Hyler <b>PDMS Permeability Affects Cell Recovery and Viability in DEP-Based Cell Sorting Microfluidics</b>
12	<u>Ella Stimson</u> , Delaney Shea, Michelle Gomes, Jason Ware, Randall Armstrong, Srivathsan Ranganathan, Michael Heller, Stuart Ibsen <b>Utilizing Dual-Electrokinetic Techniques for Rapid Isolation and Analysis of Cancer Associated Protease Activity</b>
14	<u>C Brandi</u> , A De Ninno, F Ruggiero, V Mussi, P Bisegna, M Nanni, F Caselli <b>Analysis of single nuclei in a microfluidic electro-optical cytometer towards metaphases enrichment</b>
16	<u>Xiang Wang</u> , Bethany Martin, Daniel Spencer, Mark Sutton, Hywel Morgan <b>Single-Cell Impedance Spectroscopy to Evaluate Bacteria Reaction</b>

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