

Annual Meeting of the American Electrophoresis Society 2014 (AES)

Topical Conference at the 2014 AIChE Annual Meeting

Atlanta, Georgia, USA
16-21 November 2014

ISBN: 978-1-5108-1243-7

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact AIChE
at the address below.

AIChE
120 Wall Street, FL 23
New York, NY 10005-4020

Phone: (800) 242-4363
Fax: (203) 775-5177

www.aiche.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

(37a) Microchannel Electrophoresis for the Analysis of Amyloid Protein Oligomers	1
<i>Christa N. Hestekin, Melissa A. Moss, Elizabeth Pryor and Jennifer Kurtz</i>	
(37b) Dielectrophoretic Preconcentration and Detection of Neuropeptides at Graphene-Modified Electrodes in a Nanochannel.....	2
<i>Bankim J. Sanghavi, Walter Varhue and Nathan Swami</i>	
(37c) Human Fluid Sample Pretreatment for Biomarker Discovery.....	3
<i>Frank Jahnke and Penny Ross</i>	
(37d) Quantification of 2D Gel Western Blot Overlay Images.....	4
<i>Nancy Kendrick, Matt Hoelter, Andrew Koll and Jon J Johansen</i>	
(37e) Woven Fabric As a Low-Cost Microfluidic Platform for Tuned Electrophoretic Separations	5
<i>Tanya Narahari, Dhananjay Dendukuri and Shashi Murthy</i>	
(37f) Using Proteins As Resolution Probes to Quantify Gradient Insulator-Based Dielectrophoresis	6
<i>Ryan Yanashima, Paul V. Jones and Mark A. Hayes</i>	
(127a) Characterizing the Dielectric Properties of Human Mesenchymal Stem Cells and the Effects of Charged Elastin-like Polypeptide Copolymer Treatment	7
<i>Tayloria Adams, Paul A. Turner, Amol V. Janorkar, Feng Zhao and Adrienne R. Minerick</i>	
(127b) Membrane Capacitance As a Label-Free Marker of Neural Stem Cell Fate.....	8
<i>Jamison L. Nourse, Syed Nawas Ahmed, Janahan Arulmoli, Lisa McDonnell and Lisa A. Flanagan</i>	
(127c) Membrane Capacitance: A Biomarker for Tumourigenicity/Stem Cell-like in Human Oral Cancer Cells	9
<i>Xiao Liang, Karen Graham, Ann Johannessen, Daniela Costea and Fatima H. Labeed</i>	
(127d) Electrical Tweezer for Highly Parallelized Electro-Rotation Measurements over a Wide Frequency Bandwidth for Characterizing Microbial Subpopulations.....	10
<i>Ali Rohani, Walter Varhue and Nathan Swami</i>	
(127e) Integrated Ion-Exchange Membrane Based Microfluidic Platform for Early Detection of Oral Cancer.....	11
<i>Satyajyoti Senapati, Zdenek Slouka, Sunny Shah, Sharon Stack and Hsueh-Chia Chang</i>	
(127f) Portable Smartphone-Enabled DNA Analysis.....	12
<i>Aashish Priye and Victor M. Ugaz</i>	
(128a) Selective Concentration and Separation of Colloidal Particles By Positive Reservoir-Based Dielectrophoresis (rDEP)	13
<i>Cory Thomas, Andrew Todd, Xinyu Lu and Xiangchun Xuan</i>	
(128b) Ising Lattices of Asymmetric Colloidal Dimers Under Electric Fields.....	14
<i>Fuduo Ma, Sijia Wang, Hui Zhao, David T. Wu and Ning Wu</i>	
(222n) Local Electrochemical Kinetics Allows for the Formulation of Physically Realistic Boundary Conditions for Fast Electrokinetic Applications	15
<i>Michal Pribyl and Dalimil Snita</i>	
Optoelectric Assembly and Manipulation of Beads in a Vertical Tower Configuration	16
<i>Katherine Clayton, Avanish Mishra, Stuart J. Williams and Steven T. Wereley</i>	
(128e) Electrokinetic Colloid and Micro-Vortex Dynamics in Heterogeneous Nano-Slot Devices.....	17
<i>Gilad Yossifon, Neta Leibowitz, Yoav Green, Jarrod Schiffbauer and Simwook Park</i>	
(222c) Size, Shell Material and Medium Conductivity Dependence on Dielectrophoretic Behaviors of Air Core, Chitosan/Poly-L-Lysine Shell Nanoparticles: Experimental Results	18
<i>Chungja Yang, Adrienne R. Minerick, Chun-Jen Wu and Agnes E. Ostafin</i>	
(214a) Electrohydrodynamic Particle Structuring on a Drop Interface	19
<i>Petia M. Vlahovska and Malika Ouriemi</i>	
(214b) The Effects of Charge Relaxation and Charge Convection on Nonlinear Electrohydrodynamic Drop Deformation.....	20
<i>Javier Lanauze, Lynn Walker and Aditya S. Khair</i>	
(214c) A Deep Tertiary Minimum in the Particle/Electrode Interaction Energy in Oscillatory Fields.....	21
<i>William D. Ristenpart, Taylor Woehl, Kelley Heatley, Bing Jie Chen, Nicholas H. Talken and Cari S. Dutcher</i>	
(214d) Electrokinetic Biosensing at Liquid Interfaces By Fluidic Dielectrophoresis	22
<i>Nicholas Mavrogianis and Zachary R. Gagnon</i>	
(214e) Insulator-Based Micropipette Dielectrophoretic Trapping of Particles	25
<i>Stuart J. Williams and Daniel Algeier</i>	
Optoelectric Trapping and Manipulation of Metal Nanoparticles	26
<i>Avanish Mishra, Stuart J. Williams and Steven T. Wereley</i>	

(128f) Electric Field Directed Assembly of Anisotropic Colloids.....	27
<i>Fuduo Ma, Sijia Wang, Hui Zhao, David T. Wu and Ning Wu</i>	
(222a) A Comparative Study of AC Electroosmotic Micropumps By Computational Modeling of Non-Equilibrium Electrokinetics.....	28
<i>Matías Vázquez-Piñón, Javier A. Hernández-Castro, Sergio Camacho-León, Roberto C. Gallo-Villanueva, Jesús Santana-Solano and Sergio O. Martínez-Chapa</i>	
(222b) Combination of Vertical and Planar Electrodes for Electrorotation and Cell Positioning in Microchambers	35
<i>Samuel Kilchenmann, Fabio Spiga and Carlotta Guiducci</i>	
(222d) Brownian Dynamics Simulations of Electrophoretic DNA Separation in a Post Array By Pulsed Electric Field.....	37
<i>Chin-An Chen and Chih-Chen Hsieh</i>	
(222e) Experimental Study of DNA Electrophoresis in Post Array with Pulsed Electric Field	38
<i>Jui-Ting Huang and Chih-Chen Hsieh</i>	
(222f) Frequency Sweep Rate Dependence on the Dielectrophoretic Response of Polystyrene Beads and Red Blood Cells	39
<i>Tayloria Adams, Kaela M. Leonard and Adrienne R. Minerick</i>	
(222g) Improving Dielectrophoretic Manipulation Efficiency Employing Pitted and Bumpy Interdigitated Electrodes.....	40
<i>Victor H. Perez-Gonzalez, Vinh Ho, Rene Celis-Cordova, Lawrence Kulinsky, Marc J. Madou and Sergio O. Martinez-Chapa</i>	
(222h) Simulation and Modeling of Insulator Based Dielectrophoresis	42
<i>Karuna S. Koppula, Aytug Gencoglu, Mario Saucedo-Espinoza and Blanca Lapizco-Encinas</i>	
(222i) Microfluidic Platform for Impedance Characterization of Endothelial Cells Under Fluid Shear Stress	43
<i>Vanessa Velasco and Stuart J. Williams</i>	
(222j) Study of Cell Viability after Manipulation with Insulator-Based Dielectrophoresis	47
<i>Alexandra La Londe, Maria Romero-Creel and Blanca Lapizco-Encinas</i>	
(222k) Low Cost Fabrication of Microchannels for Lab-on-a-Chip Applications.....	48
<i>Monsur Islam, Rucha Natu and Nathan Swami</i>	
(222l) Electrokinetic Particle Sorting By Shape in a Spiral Microchannel.....	49
<i>Xinyu Lu, John DuBose, Shizhi Qian, Sang Woo Joo and Xiangchun Xuan</i>	
(222m) Electrokinetic Instabilities in Ferrofluid Flows.....	50
<i>Dhileep Thanjavur, Steven Pasternak, Yilong Zhou, Xinyu Lu and Xiangchun Xuan</i>	
(222o) The Impact of Electrode Geometry in Dielectrophoretic Effect for Multilayer Ppydep-Based Devices	51
<i>Victor H. Perez-Gonzalez, Vinh Ho, Sergio O. Navarro-Rodriguez, Lawrence Kulinsky, Marc J. Madou and Sergio O. Martinez-Chapa</i>	
Simultaneous Detection and Quantification of Water- and Fat-Soluble Vitamins with Liquid Chromatography and Tandem Ion Trap-Mass Spectrometry.....	53
<i>Maryam Khaksari, Lynn Mazzoleni, Chunhai Ruan, Peng Song, Neil Hershey, Robert Kennedy, Mark A. Burns and Adrienne R. Minerick</i>	
Improving the Design of Insulator-Based Dielectrophoretic Devices.....	54
<i>Mario Saucedo-Espinoza, Mallory Rauch and Blanca Lapizco-Encinas</i>	
Dielectrophoretic Behavior of Polystyrene Particles Under Direct Current and Low Frequency Electric Fields.....	55
<i>Mallory Rauch, Alexandra La Londe and Blanca Lapizco-Encinas</i>	
Rapid Electrokinetic Patterning: Manipulating Particles with Laser and Electric Field.....	56
<i>Avanish Mishra, Katie Clayton, Stuart J. Williams and Steven T. Wereley</i>	
Electrokinetic Separation of Cells Using Ionic Liquids (ILs) Catalysts	57
<i>Rajeshwari Taruvai Kalyana Kumar, Izabelle De Mello Gindri, Pradyotha Kanchustambham, Danieli Rodrigues and Shalini Prasad</i>	
Identification and Characterization of Rare Cells through Electrokinetic Cell Oscillations	58
<i>Rajeshwari Taruvai Kalyana Kumar, David Kinnamon, Duy Huu Bui, Chunli Shao, John Minna and Shalini Prasad</i>	
Reproducibility Using the Amersham™ WB System	59
<i>Åsa Hagner McWhirter, Anita Larsson, Elisabeth Wallby, Anna Edman-Örlefors, Ola Rönn and Phil Beckett</i>	
Exploiting Absolute Negative Mobility with Dielectrophoresis for Mitochondrial Sample Preparation-.....	60
<i>Jinghui Luo and Alexandra Ros</i>	
Low Cost Microwave Plasma Generation for the Irreversible Sealing of PDMS Microfluidic Devices-.....	62
<i>Jeremiah Dustin and Soumya Srivastava</i>	

(253a) One-Step Cell Lysis and DNA Concentration in a Multisection Insulator-Based Dielectrophoretic Device	63
<i>Roberto C. Gallo-Villanueva, Carlos E. Rodriguez-Lopez, Rocio I. Díaz-de-la-Garza, Blanca Lapizco-Encinas and Sergio O. Martinez-Chapa</i>	
(253b) DEP Isolation and Detection of Cancer Related DNA Biomarkers – a Comparison of PCR and DNA Sequencing Results for Blood and Plasma	64
<i>Michael J. Heller</i>	
(253c) Exploiting Absolute Negative Mobility with Dielectrophoresis for Mitochondrial Sample Preparation	65
<i>Jinghui Luo and Alexandra Ros</i>	
(253d) Carbon-Electrode Dielectrophoresis for Sample Preparation	67
<i>Nathan Swami</i>	
(253e) Rapid, Specific, and Efficient Affinity Purification of Target Molecules By Combining Isotachophoresis and Affinity Chromatography	69
<i>Viktor Shkolnikov and Juan G. Santiago</i>	
(253f) Designing an Integrated Biosensing Platform for Sample-to-Answer Solution	76
<i>Zdenek Slouka, Satyajyoti Senapati, Sunny Shah and Hsueh-Chia Chang</i>	
(322a) An Entropic Force Microscope Enables Nano-Scale Conformational Probing of Biomolecules	77
<i>Nan Shi and Victor M. Ugaz</i>	
(322b) Quantification of Transcriptome and Functional Proteins from the Same Single Cells	78
<i>Jun Wang</i>	
(322c) Probing Space Charge and Resolving Overlimiting Current Mechanisms at the Micro-Nanochannel Interface Using Electrochemical Impedance Spectroscopy	80
<i>Neta Leibowitz, Jarrod Schiffbauer, Uri Liel, Sinwook Park and Gilad Yossifon</i>	
(322d) An Orbital Shear Platform for in-Vitro Real-Time Endothelium Characterization	81
<i>Vanessa Velasco, Mark Gruenthal, Stuart J. Williams, Jonathan M. D. Thomas, R. Eric Berson and Robert Keynton</i>	
(322e) Diffusion-Based Microfluidic PCR for “One-Pot” Analysis of Cells	83
<i>Sai Ma, Despina Nelia Loufakis, Zhenning Cao, Yiwen Chang, Luke Achenie and Chang Lu</i>	
(322f) High Throughput Microfluidic Separation of Tumor Initiating Cells (TICs) Using Contactless Dielectrophoresis	84
<i>Jaka Cemazar, Lisa Anders, Scott D. Cramer and Rafael V. Davalos</i>	
(340a) On-Demand Control of the Limiting Current in Nano-Slot Devices By Varying the Diffusion Layer Length	85
<i>Sinwook Park and Gilad Yossifon</i>	
(340b) Coupling AC Dielectrophoresis with DC Ion Concentration Polarization in Nanochannels for Ultrafast Biomarker Enrichment	86
<i>Nathan Swami, Mikiyas Tsegaye and Walter Varhue</i>	
(340c) Tilted Post Arrays for Separating Long DNA	87
<i>Joel D. P. Thomas and Kevin D. Dorfman</i>	
(340d) Electrophoretic Mobility of Nanoparticles Confined in Nanochannels	88
<i>Yu-Wei Liu, Sumita Pennathur and Carl Meinhart</i>	
(340e) Broken Symmetry in the Electrokinetic Flow Surrounding Asymmetric Colloidal Dimers	89
<i>Fuduo Ma, Hui Zhao and Ning Wu</i>	
(340f) Electrical Impedance Spectroscopy of Colloid-Nanoslot Interactions	90
<i>Jarrod Schiffbauer, Sinwook Park and Gilad Yossifon</i>	
(398a) Electrokinetic Manipulation for Characterization and Capture of Circulating Tumor Cells	91
<i>Brian Kirby</i>	
(398b) New Applications of Electrophoretic Deposition	92
<i>Jan Talbot</i>	
(398c) Bigger, Cheaper, Faster, More! DEP-Well Electrodes for Cell Electrophysiology	106
<i>Michael Hughes</i>	
(398d) Electrophoresis and Electromigration in Planar Nanofluidic Channels	107
<i>Sumita Pennathur</i>	
(398e) Field-Driven Dynamics of Metallo-Dielectric Particles and Particle Ensembles: From Programmed Assembly to Directed Motility and Actuation	108
<i>Orlin D. Velev</i>	
(443a) Nonlinear Electrokinetic Effects on Particle Motion Near a Microchannel Constriction	109
<i>Qianru Wang, Naga Neehar Dingari and Cullen R. Buie</i>	
(443b) Fundamentals of Dielectrophoretic Particle Trapping in Arrays of Insulating Structures	110
<i>Mario Saucedo-Espinosa and Blanca Lapizco-Encinas</i>	

(443c) Dielectric Decrement Effects on Nonlinear Electrophoresis of Ideally Polarizable Particles	111
<i>Jeffrey L. Moran, Wai Hong Ronald Chan, Bruno M. Figliuzzi and Cullen R. Buie</i>	
(443d) Solution pH Changes in Non-Uniform AC Electric Fields Above the Electrode Charging Frequency.....	112
<i>Ran An and Adrienne R. Minerick</i>	
(443e) Electrically Induced Hydrodynamic Interactions in Capillary Electrophoresis of Polyelectrolytes	113
<i>Mert Arca, Jason Butler and Anthony J.C. Ladd</i>	
(443f) Examining Frequency Dispersion in Non-Linear Electrokinetic Flow Using μpiv	114
<i>Alicia M Boymelgreen, Matan Zehavi and Gilad Yossifon</i>	
(497a) Electromigration and Adsorption of Charge Carriers in Doped Nonpolar Liquids.....	115
<i>Benjamin Yezer, Aditya S. Khair, Paul J. Sides and Dennis C. Prieve</i>	
(497b) Charging of Hydrophobic Polymer Particles By Basic Surfactants in a Nonpolar Liquid.....	116
<i>Joohyung Lee and Sven H. Behrens</i>	
(497c) Conductive Hydrogel Membranes Produced By Electrophoretic Deposition at the Interface of Immiscible Liquids	117
<i>Youngsoo Joung, Jeffrey L. Moran, Robert Butler Ramirez and Cullen R. Buie</i>	
(497d) Microfluidic Mixing of Nonpolar Liquids By Contact Charge Electrophoresis	118
<i>Charles A. Cartier, Aaron M. Drews and Kyle J. M. Bishop</i>	
(497e) Contact Charge Electrophoresis for Powering Micro- and Nanotechnology	119
<i>Kyle J. M. Bishop, Aaron M. Drews, Charles Cartier and Mikolaj Kowalik</i>	
(497f) Continuous Label-Free Particle Separation Via Wall-Induced Lift in Electrophoresis	120
<i>Xinyu Lu, Cory Thomas and Xiangchun Xuan</i>	
(498a) An Electrophysiological Study of Chemotherapeutic Agents on Cancerous CELLS Using Dielectrophoresis (DEP)	121
<i>Sina Mahabadi, Michael Hughes and Fatima H. Labeed</i>	
(498b) Insulator Based Dielectrophoresis to Correlate Cell Polarizability and Electrocompetency	122
<i>Zhifei Ge, Jeffrey L. Moran, Paulo Garcia and Cullen R. Buie</i>	
(498c) Micronanotip Injection Electroporation	124
<i>Yingbo Zu, Shuyan Huang and Shengnian Wang</i>	
(498d) Microfluidic Electroporation for Delivery of Cell-Penetrating Peptide Conjugates of Peptide Nucleic Acids (PNA) for Antisense Inhibition of Intracellular Bacteria	125
<i>Sai Ma, Betsy Schroeder, Chen Sun, Despina Nelie Loufakis, Zhenning Cao, Nammalwar Sriranganathan and Chang Lu</i>	
(498e) A Rapid Microfluidic Assay for Optimization of Bacterial Electroporation Conditions	126
<i>Paulo A. Garcia, Zhifei Ge, Jeffrey L. Moran and Cullen R. Buie</i>	
(498f) Electrophysiology of Human Erythrocytes Exhibits Circadian Variation.....	128
<i>Erin A. Henslee, Kai F. Hoettges, Henry O. Fatoyinbo, Malcolm von Schantz and Fatima H. Labeed</i>	
(541a) Isoelectric Focusing: Current Limitations and Prospects.....	130
<i>Alexander Stoyanov</i>	
(541b) Surface-Enabled Isoelectric Focusing (sIEF) with Carrier Ampholyte Type pH Gradient.....	131
<i>Adrienne R. Minerick, Zhichao Wang and C. F. Ivory</i>	
(541c) Mathematical Modeling and Simulation Software for Electrophoresis.....	132
<i>Michael Bello</i>	
(541d) Joachim Kohn (1912-1987) and the Origin of Cellulose Acetate Zone Electrophoresis.....	133
<i>Richard M. Rocco</i>	
(541e) The Monkey King: A Personal View of the Long Journey Towards a Proteomic Nirvana	160
<i>Pier Righetti</i>	
Author Index	