

Annual Meeting of the American Electrophoresis Society 2013

(AES)

**Topical Conference at the 2013 AIChE Annual Meeting: Global
Challenges for Engineering a Sustainable Future**

**San Francisco, California, USA
3-8 November 2013**

ISBN: 978-1-63439-023-1

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© (2013) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2013)

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

AIChE
3 Park Avenue
New York, NY 10016-5991

Phone: (203) 702-7660
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

(34a) Identification of Activated Receptor Tyrosine Kinases Using 2DE Western Blot Image Overlays	1
<i>Nancy Kendrick, Matt Hoelter, Jon Johansen</i>	
(34b) On-Chip Protein Extraction, Albumin Exclusion From Plasma, Serum Using Isotachophoresis	2
<i>Yatian Qu, Lewis A. Marshall, Juan G. Santiago</i>	
(34c) Microchannel Electrophoresis Analysis of Amyloid Protein Aggregation	5
<i>Christa N. Hestekin, Elizabeth Pryor, Melissa A. Moss</i>	
(34d) Fractionation of Nanocrystals for Femtosecond Nanocrystallography of Membrane Proteins	6
<i>Alexandra Ros, Bahige Abdallah, Christopher Kupitz, Petra Fromme</i>	
(34e) Human Fluid Sample Pretreatment for Biomarker Discovery	7
<i>Penny Ross, Frank Jahnke</i>	
(34f) Using Gradient Insulator-Based Dielectrophoresis to Capture Small Molecular Weight Proteins	8
<i>Ryan Yanashima, Mark A. Hayes</i>	
(102a) Fluidic Dielectrophoresis: Polarization, Manipulation, Biosensing At Electrical Liquid Interfaces	9
<i>Zachary R. Gagnon</i>	
(102b) Continuous Particle Sorting Using Three Dimensional Insulator Based Dielectrophoresis	10
<i>Qianru Wang, Cullen R. Buie</i>	
(102c) Electrorotation As a Tool to Study Interaction Kinetics Between Proteins, Cells in Real-Time	11
<i>Samuel Kilchenmann, Fabio Spiga, Carlotta Guiducci</i>	
(102d) Studying the Effects of Sphingolipid Metabolites On Cells' Dielectrophoretic Properties Using Contactless Dielectrophoresis	13
<i>Alireza Salmanzadeh, Elizabeth Savage, Paul C. Roberts, Eva M. Schmelz, Rafael Davalos</i>	
(102e) Dielectrophoretic Separation of Microorganisms Based On Speciation, Life-Cycle Stage	14
<i>Yi-Hsuan Su, Walter Varhue, Edna Zaenker, Cirle Warren, Nathan Swami</i>	
(102f) An Integrated Electrokinetic Chip Platform for Point-of-Care Nucleic Acid Diagnostics	15
<i>Zdenek Slouka, Satyajyoti Senapati, H.-C. Chang</i>	
(102g) A Novel Method for Measuring Proteins Zeta Potential Using Electroacoustics	16
<i>Sean Parlia, Andrei Dukhin</i>	
(131a) Insulator Based Dielectrophoresis for the Manipulation of DNA Origami	17
<i>Lin Gan, Tzu-Chiao Chao, Fernanda Camacho, Hao Yan, Alexandra Ros</i>	
(131b) Bioparticle Differentiation in An Insulator-Based Dielectrophoretic Microchannel	18
<i>Paul V. Jones, Mark A. Hayes</i>	
(131c) Fabric Microfluidics for Low-Cost Protein Separations	19
<i>Tanya Narahari, Dhananjaya Dendukuri, Shashi Murthy</i>	
(131d) Microfluidic Approach for Antibiotic Susceptibility Testing of Polymicrobial Cultures	20
<i>Ritika Mohan, Chotitath Sanpitakseree, Emre Sevgen, Amit V. Desai, Charles M. Schroeder, Paul J.A. Kenis</i>	
(131e) A Low-Cost Nucleic Acid Biosensor for Point-of-Care Application	21
<i>Satyajyoti Senapati, Zdenek Slouka, Sunny Shah, Hsueh -Chia Chang</i>	
(131f) Pico-Force Optical Exchange (pico-FOX): Separation of Particles From Molecular Components Utilizing Optical Forces With Orthogonal Fluid Flow With Applications to Malaria	22
<i>Sarah J.R. Staton, Soo Y. Kim, Colin Hebert, Sean Hart, Greg Collins, Alex Terray</i>	
(131g) Single Cell Analysis Using Time-Resolved Spectroscopic Measurements in Flow Cytometry	24
<i>Jessica P. Houston, Wenyan Li</i>	
(134a) Identifying Defect Sites in Lithium-Ion Battery Materials: Local Disorder in LiVPO₄F, Its Influence On Bulk Properties	25
<i>Robert J. Messinger, Michel Ménétrier, Dany Carlier, Jean-Marcel Ateba Mba, Laurence Croguennec, Christian Masquelier, Dominique Massiot, Michaël Deschamps</i>	
(134b) Electrochemical Properties, Characterization of Li_{1.2}Mn_{0.54}Co_{0.13}Ni_{0.13}O₂ Composite Cathode Powders Prepared by Ultrasonic Spray Pyrolysis	26
<i>Alex Langrock, Sheryl H. Ehrman, Chunsheng Wang</i>	
(134c) Atomic Layer Deposition (ALD) On the Nanostructured Li-Mn-Rich Composite Li_{1.2}Ni_{0.13}Mn_{0.54}Co_{0.13}O₂ Cathode Powder	27
<i>Xiaofeng Zhang, Ilias Belharouak</i>	
(134d) Metal Fluoride/Graphene Composites for High-Performance Li-Ion Cathodes	30
<i>Cary M. Hayner, Xin Zhao, Yue Yang Yu, Mayfair C. Kung, Harold H. Kung</i>	

(134e) Nanostructured Li₂S-Graphene Composites As Cathode for High Energy Density Li-S Batteries	31
<i>Kai Han, Jingmei Shen, Cary M. Hayner, Yue Yang Yu, Mayfair C. Kung, Harold H. Kung</i>	
(134f) Carbon/Sulfur Microspheres With Multi-Modal Pore Structures for Lithium-Sulfur Battery Cathodes	32
<i>Cunyu Zhao, Lianjun Liu, Huilei Zhao, Ying Li</i>	
(134g) Nanofiber-Based Cathode Electrocatalysts Supported On Carbon Substrates for Lithium-Air Rechargeable Batteries	33
<i>Yong Lak Joo, Jun Yin, Jangwoo Kim</i>	
(134h) Low-Temperature Dehydrogenation From Aminoborane Complexes Under Carbon Dioxide Atmospheres	34
<i>Jae W. Lee, Ran Xiong, Junshe Zhang</i>	
(134i) Intermittent Electrical Energy Storage By Liquid Organic Hydrogen Carriers	P IC
<i>Wolfgang Arlt, Karsten Müller, Daniel Teichmann</i>	
(134j) Synthesis of Nanoporous Palladium Powder With Controlled Pore, Particle Size for Hydrogen Storage Applications	36
<i>Patrick Cappillino, Christopher Jones, Khalid Hattar, Blythe Clark, Michelle Hekmaty, Benjamin Jacobs, David B. Robinson</i>	
(192a) Fabrication of Porous Carbon Nanofibers With Adjustable Pore Sizes As Electrodes for Supercapacitors	37
<i>Chau Tran, Vibha Kalra</i>	
(192b) Enhanced Energy Storage By Tunable Electrolyte Confinement in Structure-Directed CNT Arrays	38
<i>Katherine T. Nicol, Dustin Zastrow, Justin J. Hill</i>	
(192c) Multifunctional Nitrogen-Rich “Brick-and-Mortar” Carbon As High Performance Supercapacitor Electrodes, Oxygen Reduction Electrocatalysts	39
<i>Dingshan Yu, Li Wei, Yuan Chen</i>	
(192d) Multiwalled Carbon Nanotubes With Tuned Surface Functionalities for Electrochemical Energy Storage	40
<i>Huige Wei, Hongbo Gu, Jiang Guo, Suying Wei, Zhanhu Guo</i>	
(192e) Three-Dimensional Core@Shell Nanostructured Array for Microscale Electrochemical Energy Storage	41
<i>Yuanbing Mao, Xing Sun</i>	
(192f) Microfabricated Nickel Oxide Supercapacitors Based On High Aspect Ratio Concentric Cylindrical Electrodes	42
<i>Andac Armutlulu, Sue Ann Bidstrup Allen, Mark G. Allen</i>	
(192g) Pretreatment Effects On Charge Storage of Early Transition-Metal Carbides, Nitrides	43
<i>Abdoulaye Djire, Priyanka Pande, Alice E. S. Sleightholme, Aniruddha Deb, Paul G Rasmussen, James Penner-Hahn, Levi T. Thompson</i>	
(192h) Doped Transition Metal Oxide Composite Electrodes for Supercapacitor Applications	46
<i>Prashanth Jampani Hanumantha, Karan Kadakia, Dae Ho Hong, James Poston, Manivannan Ayyakkannu, Prashant N. Kumta</i>	
(192i) Novel 3-D MnO₂/Holey Graphene Nanostructure for Supercapacitor Applications With Enhanced Electrochemical Performances	47
<i>Lixin Wang, Tiejun Meng, Mahbuba Ara, Da Deng, Simon Ng</i>	
(192j) Electrochemical Energy Storage of Magnetic Carbon Nanocomposites: Role of Magnetocapacitance, Magneto-hydrodynamics	48
<i>Jiahua Zhu, Suying Wei, Zhanhu Guo</i>	
(192k) Synthesis, Characterization of Orange Peel As Electrodes in Li-Ion Capacitors	49
<i>Arenst Andreas Arie</i>	
(196a) Microfluidic Droplet Dehydration For Separation, Purification Of Biomolecules	50
<i>Shelley L. Anna</i>	
(196b) Electrodes for Microfluidic Control, Sensing	51
<i>Cindy Harnett</i>	
(196c) Merging Electrical, Centripetal Forces With An Enzyme Cascade On a Compact Disc for the Ultimate in Analytical Performance in Molecular Diagnostics	52
<i>Marc J. Madou, Rahul Kamath, Regis Peytavi</i>	
(196d) Electrokinetics, High Pressure Liquid Chromatography	53
<i>Don Arnold</i>	
(196e) Single Cell Genomics	54
<i>Stephen Quake</i>	

(252a) Low-Cost 3D-Printed Electrokinetic Systems	55
<i>Katarina Bengtsson, Nathaniel D. Robinson</i>	
(252b) Inexpensive Electrokinetic Microfluidic Systems Using Printed Circuit Board Substrates	56
<i>Nathan Romero, Liam Parkes, Douglas Jackson, John Naber, Stuart J. Williams</i>	
(252d) Effect of Insulating Post Shape On Particle Trapping With Insulator-Based Dielectrophoresis	57
<i>Aytug Gencoglu, Alexandra La Londe, Karuna S. Koppula, Maria Romero-Creel, Blanca H. Lapizco-Encinas</i>	
(252e) Frequency-Selective Polarization of the Electrical Double-Layer Around Nano-Colloids	58
<i>Yi-Hsuan Su, Walter Varhue, Mikiyas Tsegaye, Ali Rohani, Nathan Swami</i>	
(252f) Unsteady Electrohydrodynamic Drop Deformation	59
<i>Javier Lanauze, Lynn M. Walker, Aditya S. Khair</i>	
(252g) Hybrid-Field Microfluidics Enhanced Polyplex Synthesis, Delivery	60
<i>Fangfang Ren, Shuyan Huang, Shengnian Wang</i>	
(301b) A Study of Doped Nonpolar Liquids Using Electrochemical Impedance Spectroscopy	61
<i>Benjamin Yezer, Aditya S. Khair, Paul Sides, Dennis C. Prieve</i>	
(301c) Surfactant-Mediated Electrophoretic Properties of Non-Polar Dispersions	62
<i>Joohyung Lee, Sven H. Behrens</i>	
(301d) Factors Influencing Particle Charge in Apolar Media	63
<i>Matthew M. Gacek, Edward L. Michor, John C. Berg</i>	
(301e) Why Ionic Surfactants Exhibit Linear Conductivity-Concentration Dependence in Non-Polar Liquids	64
<i>Andrei Dukhin</i>	
(301a) Electrophoresis Of pH-Regulated Particles In The Presence Of Multiple Ionic Species	65
<i>Shiojenn Tseng, Jyh-Ping Hsu, Nan Wang</i>	
(320a) Ratchet Nanofiltration of DNA	66
<i>Joel Thomas, Daniel W. Olson, Mark Joswiak, Sung-Gyu Park, Kevin D. Dorfman</i>	
(320b) Simultaneous Purification, Fractionation of Nucleic Acids, Proteins From Complex Samples Using Isotachophoresis	67
<i>Yatian Qu, Lewis A. Marshall, Juan G. Santiago</i>	
(320c) Direct Numerical Simulation of Electrokinetic Chaos Near Ion-Selective Surfaces	71
<i>Scott M. Davidson, Clara L. Druzgalski, Mathias B. Andersen, Ali Mani</i>	
(320d) Numerical Simulations of Traveling Wave Electroosmosis At Nanoscale	72
<i>Jiri Hrdlicka, Dalimil Snita, Niketan Patel</i>	
(320e) Electrokinetic Translocation of Nanoparticles Through Nanopores Under Concentration Gradients	73
<i>Guoqing Hu, Junrong Wang</i>	
(320f) Stern Layer Effect On the Field Effect Regulation of Surface Charge Property, Electroosmotic Flow in a Silica Nanochannel	74
<i>Li-Hsien Yeh</i>	
(320g) An Electrokinetic Probe of DNA Binding Interactions Via Resonant Entropic Trapping	75
<i>Nan Shi, Victor M. Ugaz</i>	
(358a) Directed Dielectrophoretic Assembly of Thin Highly Organized Photoreactive Biocoatings of Cyanobacteria	76
<i>Oscar I. Bernal, Michael C. Flickinger, Orlin D. Velev</i>	
(358b) Co-Electrophoretic Deposition of Composites: Understanding Deposition Mechanisms	77
<i>Andrew J. Pascall, Brian Mihaljevich, Kyle T. Sullivan, Joshua D. Kuntz</i>	
(358c) Assembly of Janus Particles In Combined Electric, Magnetic Fields	78
<i>Ilona Kretzschmar</i>	
(358d) The Impact of Geometric Anisotropy On Colloids Under Electric Fields	79
<i>Fuduo Ma, Sijia Wang, David T. Wu, Ning Wu</i>	
(358e) Effects of Microtopography On Two-Dimensional Electrokinetic Patterning of Colloids On An Electrode Surface	80
<i>Stuart J. Williams</i>	
(358f) Electrolyte Dependence of Particle Motion Near An Electrode During AC Polarization	81
<i>Christopher L. Wirth, Paul J. Sides, Dennis C. Prieve</i>	
(358g) Predicting the Disorder-Order Transition of Dielectrophoretic Colloidal Assembly With Dielectric Spectroscopy	83
<i>Peter J. Beltramo, Eric M. Furst</i>	
(358h) The Preparation of Environmental Friendly Gelatin-Gum Arabic Microcapsule for Electrophoretic Display	84
<i>Hongli Liu, Shirong Wang, Xianggao Li, Yin Xiao</i>	

(392i) Electrokinetic Behavior of Large Polystyrene Particles in Insulator Based Dielectrophoresis	86
<i>Aytug Gencoglu, Nicholas Gulati, Dylan Bruening, Alexandra La Londe, Karuna S. Koppula, Blanca Lapizco-Encinas</i>	
(392j) Size Based Separation of Lipid Droplets Using Insulator-Based Dielectrophoresis	87
<i>Aytug Gencoglu, Alex Meyers, Paul Dalhaimer, Blanca Lapizco-Encinas</i>	
(392d) Assembly of “Anisotropic” Colloidal Dimers, Spheres Under Applied Electric Fields	88
<i>Fuduo Ma, Sijia Wang, David T. Wu, Ning Wu</i>	
(392k) Using Low Frequency Electrical Signals for Particle Separations with Dielectrophoresis	89
<i>Aytug Gencoglu, David Olney, Alexandra La Londe, Karuna S. Koppula, Blanca Lapizco-Encinas</i>	
(392e) X-Ray, Raman Transparent Solvent Resistant Microfluidic Platforms to Screen Solid Forms of Pharmaceuticals	90
<i>Sachit Goyal, Aristotle Economou, Garam Lee, Yuchuan Gong, Geoff G.Z. Zhang, Paul J.A. Kenis</i>	
(392g) Cell Lysis in Microfluidic Devices Employing DC Electric Currents	92
<i>Roberto C. Gallo-Villanueva, Carlos E. Rodriguez-Lopez, Rocio I. Díaz-de-la-Garza, Blanca Lapizco-Encinas, Sergio O. Martinez-Chapa</i>	
(392h) Fabrication of 3D Electrodes for Electrorotation Experiments	93
<i>Samuel Kilchenmann, Carlotta Guiducci</i>	
(392a) Bioparticle Separation in An Insulator-Based Dielectrophoretic Microchannel	96
<i>Paul V. Jones, Mark A. Hayes</i>	
(392f) Brownian Dynamics Simulations of Electrophoretic DNA Separations in a Conducting Post Array	97
<i>Chin-An Chen, Chih-Chen Hsieh</i>	
(392c) An Ipad-Based Brownian Dynamics Simulator for Electrokinetics in the Classroom	98
<i>Nan Shi, Victor M. Ugaz</i>	
(392b) Dual-Electrode Electrochemical Detection for Microchip Electrophoresis: Voltammetric Identification of Chemically Labile Species	99
<i>Pann Pichetsurnthorn, Dulan Gunasekara, Susan Lunte</i>	
(403a) Rapid Dialysis in Microfluidic Devices Using Hydrogel Membrane Micro-Windows: Phoretic Migration Under Imposed Gradients	100
<i>Joel S. Paustian, Todd M. Squires</i>	
(403b) The Electrokinetic Properties of Cationic Surfactants Adsorbed On a Hydrophobic Substrate: Effect of Chain Length, Concentration	101
<i>Glareh Azadi, Petia M. Vlahovska, Anubhav Tripathi</i>	
(403c) Spatial, Temporal Analysis of 2nd-Kind Electro-Osmotic Instability in Cross-Flow	102
<i>Mathias B. Andersen, Clara L. Druzgalski, Joseph W. Nichols, Ali Mani</i>	
(403d) The Influence of Dielectric Decrement On Electrokinetics	103
<i>Hui Zhao, Shengjie Zhai</i>	
(403e) Tilted Post Arrays: DNA Electrophoresis in Anisotropic Media	104
<i>Kevin D. Dorfman, Zhen Chen</i>	
(403f) Advancement in the Modeling of Insulator Based Dielectrophoresis	105
<i>Karuna S. Koppula, Aytug Gencoglu, David Olney, Alexandra La Londe, Blanca H. Lapizco-Encinas</i>	
(403g) Theoretical Investigation of Polarizability of Soft Biological Particles	106
<i>Naga Neehar Dingari, Cullen R. Buie</i>	
(481a) Investigation of a Novel Platform for Manipulation of Microparticles Using Dielectrophoresis	107
<i>Stephanie Angione, Derek Croote, Sara Karlberg, Anubhav Tripathi</i>	
(481b) Design of Electrothermal Pumps Using Resistive Heaters	109
<i>Stuart J. Williams, Nicolas G. Green</i>	
(481c) Design, Simulation of An Automated Rare Blood Cell Detector	110
<i>Zhixi Qian, Eugene Boland, Paul W. Todd, Thomas R. Hanley</i>	
(481d) An Injection-Molded Device for Purification of Nucleic Acids From Whole Blood Using Isotachophoresis	111
<i>Lewis A. Marshall, Anita Rogacs, Carl Meinhart, Juan G. Santiago</i>	
(481e) Microfluidic Electrokinetic Sample Holder for Serial Femtosecond Crystallography	114
<i>Raymond Sierra, Hartawan Laksmono, Michael Bogan</i>	
(481f) Semi-Preparative Isotachoporesis for Fractionation of RNA From Blood	116
<i>Robert J. Meagher, Charbel Eid</i>	
(481g) DEP Isolation of Cancer Related Circulating Cell Free (CCF) DNA Biomarkers Directly From Blood	117
<i>Michael J. Heller, Avery Sonnenberg, Jennifer Y. Marciniak, Laura Rassenti, Emanuela Ghia, Elaine Skowronski, Sareh Manouchehri, George Widhopf, Thomas J. Kipps</i>	

(482a) Characterization of the Permeability of the Brain Endothelium Due to Electroporation Using a Dynamic Microengineered Model	119
<i>Mohammad Bonakdar, Paulo Garcia, Rafael Davalos</i>	
(482b) Electroporation of Cells On Chip Using High Frequency Electric Fields Without Electrode-Sample Contact	120
<i>Michael B. Sano, Rafael V. Davalos</i>	
(482c) Aunps-Polyplex-Electroporation Enhanced DNA, RNA Delivery	122
<i>Shuyan Huang, Yingbo Zu, Yang Lu, Shengnian Wang</i>	
(482d) Cell Allignment Under Unidirectional Electropulsion In A Microfluidic Device	123
<i>Despina Nelie Loufakis, Zhenning Cao, Sai Ma, David Mittelman, Chang Lu</i>	
(482e) Cell Electrofusion Chip Based On Micro-Cavity Microelectrodes.....	124
<i>Ning Hu, Shizhi Qian, Sang Woo Joo</i>	
(482f) Dielectrophoretic Separation of Electroporated Cells	125
<i>Jaka Cemazar, Tadej Kotnik</i>	
(482g) Dielectrophoretic Detection Of Human Oral Cancer Using 3D Well Electrodes.....	126
<i>Karen Graham, Hayley Mulhall, Stefano Fedele, Michael Hughes, Stephen Porter, Kai Hoettges, Mark Lewis, James Mcaul, Nicholas Kalavrezos, Fatima Labeed</i>	
(527a) Big Advantages of Thinking Small	127
<i>R. Muller</i>	
(527d) Electroporation for Extraction of Intracellular Proteins, Genes	128
<i>Chang Lu</i>	
(527e) A Microfluidic Toolbox To Experimentally Probe Macromolecular Transport During Gel Electrophoresis: Insights, Opportunities	129
<i>Victor M. Ugaz</i>	
(527f) Reminiscences About Electrophoresis.....	130
<i>David E. Garfin</i>	

Author Index