CURRICULUM VITAE

HSUEH-CHIA CHANG

Group Website: www.nd.edu/~changlab

Education	B.S.	California Institute of Technology	June 1976
	Ph.D.	Princeton University	June 1980

Professional Experience

2013-Present	Fellow, Notre Dame Institute for Asia and Asian Studies
2011	Distinguished Visiting Fellow, UK Royal Society of Engineering, Imperial College.
2010-2014	Adjunct Professor, National Tsing Hua University
2010-2014	Chief Scientific Advisor, FCubed, LLC
2006-2018	Founding and Chief Editor, Biomicrofluidics, American Institute of Physics
2005-2006	Adjunct Professor, National Cheng Kung University
2003-Present	Director, Center for Microfluidics and Medical Diagnostics, University of Notre Dame
1998-Present	Bayer Professor of Chemical Engineering, Notre Dame
1993	Senior Visitor, Department of Applied Mathematics and Theoretical Physics, University of Cambridge
1989 - 1995	Chairman, Dept. of Chemical Engineering, Notre Dame
1987 - 1998	Professor, University of Notre Dame
1984 - 1987	Associate Professor, University of Houston
1983 - 1984	Associate Professor, University of California, Santa Barbara
1980 - 1983	Assistant Professor, University of California, Santa Barbara

Awards and Honors

Wallace Memorial Honor Award, Princeton University, 1978
Regent's Junior Faculty Award, University of California, Santa Barbara, 1980
Presidential Young Investigator Award, National Science Foundation, 1985
Colburn Lecture, University of Delaware, 1988
Sigma Xi Outstanding Research Award, University of Notre Dame, 1990
Francois N. Frenkiel Award, Fluid Dynamics Division of American Physical Society, 1991
Fellow of the American Physical Society, elected 1997
Stanley Corrsin Hydrodynamics Lecture, Johns Hopkins 2002

Founding and Chief Editor, Biomicrofluidics, American Institute of Physics, 2007-18.
Distinguished Visiting Fellow Award, Royal Society of Engineering, UK, 2011.
1st Source Commercialization Award, Notre Dame, 2013.
Distinguished Lecture, Mechanical Engineering, Boston University, 2018.
Lifetime Achievement Award, American Electrophoresis Society, 2019.

Overview

Research Achievements in Chronological Order:

1. 1977-89 Advanced understanding of ignition, oscillation and chaotic behavior in reactors.
2. 1987-90 Explained the effect of surfactants on bubble transport in microchannels and analyzed droplet transport/breakup in non-circular channels in anticipation of droplet microfluidics.
3. 1989-08 Developed a theory for wetting dynamics far from equilibrium and explained stick-slip ring-formation dynamics during drop evaporation and chemical patterning.
4. 1994-99 Developed a theory for rapid ignition of automobile catalytic converters.
5. 1994-04 Delineated wave evolution on a falling film and other interfacial patterns by developing a spectral theory for solitary wave interaction.
6. 2004-11 Invented several DC electro-osmotic pumps and AC dielectrophoretic cell sorting and characterization technologies based on electrokinetics.
7. 2005-Present Discovered AC Nanocone, AC Electrospraying and Surface Acoustic Wave Nanodrop Generation and applied to mass spectrometry, nanofiber spinning, exosome lysing and droplet digital PCR.
8. 2008-Present Verified the mechanism for over-limiting ion current in ion-selective membranes and applied it to nucleic acid sensing in a biochip. Developed several molecular concentration/fractionation and pH generation on-chip membrane technologies.
9. 2009-Present Invented a Carbon Nanotube dielectrophoretic assembly and alignment technology for biosensing and FET circuits.
10. 2015-Present Invented a surface-modified solid-state nanopore technology that can distinguish short ssDNA and dsDNA (or miRNA and their duplex) by their translocation times thus avoiding PCR and ligation biases during quantification.
11. 2004-Present 28 IP disclosures represent highest in Notre Dame history. 11 have been patented with 5 more pending. 5 have been licensed by startups.

Administrative Experience

Department Chair of Chemical and Biomolecular Engineering (1989-1995)

Hired five faculty members as Chemical Engineering department Chair (1989-95), including the first woman to the Engineering College (Brennecke, member of NAE). Mentored five junior faculty: Ed Maginn, Elaine Zhu, David Go, Arezoo Ardekani, Jeremy Zartman at Notre Dame. Four won NSF Career Awards and two are women. Research expenditure doubled during chairmanship.

Founding Director of Center for Microfluidics and Medical Diagnostics (CMMD, 2003-present). The Center initiated Tech Transfer at Notre Dame. 11 issued patents and 5 pending.

Founding executive committee of the Notre Dame Advanced Diagnostics and Therapeutics Initiative.

Founding Editor of Biomicrofluidics, AIP's first biological journal, and founded the Advanced Microfluidics and Nanofluidics international conference series.

Advisory Committee to VP of Research Notre Dame 2016-18.

Tech Transfer Experience

Technologies licensed to Cubed Laboratories (cubedlabs.com) for food safety, AgenDx Biosciences (www.agendxbio.com) for cancer screening, ImpDx (www.impedx.com) for Sepsis Screening and Scientific Methods (www.scientificmethods.com) for water filtration.

Developing a GMO food screening platform with the Far Eastern Group.

Won the Notre Dame 1st Source Commercialization Award
< http://www.insideindianabusiness.com/newsitem.asp?ID=59027>.

Editorial Experience

Founding and Chief Editor of Biomicrofluidics of the American Institute of Physics (2006-2018). First AIP journal in medical/biological fields, first to be electronic only and first to be open-access. Highest ranked journal in the ISI Fluids and Plasma Physics category. Founded an affiliated conference Advances in Microfluidics and Nanofluidics that has been held at Hong Kong, Singapore, Dalian, Notre Dame, Taipei, Beijing, Singapore and Hobart.

Personal Statement on Recent Research/Professional Activity (2004-2015) and Vision

I was born to a diaspora Chinese family and grew up in Taiwan, Singapore, Malaysia and California. My early career included two moves to be with my mathematician wife and a stint as the Department Chair (at 35). My original research was on the mathematical theories of nonlinear reaction dynamics, reactant transport and interfacial fluid dynamics. Building on this diverse background, I reoriented my research in 2002 towards the development of diagnostic biochips based on electrokinetics. With collaborators/students from backgrounds in fabrication, manufacturing, medicine and chemistry, I have successfully developed commercializable biochip devices. These biochips are unique in their integration of electronic circuitry with ionic

circuitry dominated by ion-selective media like membranes and gels. They utilize unique ion-selective electrokinetic phenomena like external polarization, water splitting, rectification etc to isolate, fractionate and quantify cells, vesicles and biomolecules. Specific biochip technologies from my lab include flow and pressure actuation, dielectrophoretic cell sorting and molecule concentration, electrophoretic exosome isolation and purification, acoustic cell and vesicle lysing, droplet molecular quantification and cell encapsulation, molecular sensing and fractionation etc. Eleven of these technologies have been patented, with 5 more pending. Five have been licensed to startups. I served as the Chief Scientific Advisor of F Cubed LLC (now Cubed Laboratories) for 4 years. I believe integration of electrokinetic and other modules into robust point-of-care (POC) diagnostic biochips that can detect a large number of unknown molecular targets will transform health care within the next decade. I founded a new journal, Biomicrofluidics of the American Institute of Physics, in 2006 to serve this community. Since 2003, more than 15 PhD and post-doc students from my laboratory have embarked on academic careers in electrokinetics as tenure-track professors in all engineering and science disciplines over 5 continents. Three of them (Jason Keith, Zilin Chen and Leslie Yeo) now hold endowed chairs, two (Jason Keith and Adrienne Minerick) are Deans and four of them (Jayne Wu, Dmitry Kopelevich, Adrienne Minerick and Zach Gagnon) were awarded the NSF Career Award and three are women. With Leslie Yeo, a former postdoc, I coauthored a key book in the field, Electrokinetically Driven Microfluidics and Nanofluidics by Cambridge University Press.

Lectureships

Colburn Lectureship, University of Delaware, 1988
James and Catherine Pattern Lectureship, University of Colorado, Boulder, 1992.
Invited General Lecture at International Union of Theoretical and Applied Mechanics Symposium on Nonlinear Instability of Nonparallel Flows, Potsdam, 1993
Invited General Lecture at International Union of Theoretical and Applied Mechanics Symposium on Structure and Dynamics of Nonlinear Waves in Liquids, Hannover, Germany, 1994.
Invited General Lecture at International Union of Theoretical and Applied Mechanics. Nonlinear Singularities in Deformation and Flow(Haifa, 1997).
Keynote Lecture, Second Joint US/China Chemical Engineering Conference, Beijing, May 1997.
Keynote Lecture, 13th International Congress of Chemical and Process Engineering CHISA'98, Prague, August 1998.
Stanley Corrsin Hydrodynamics Lecture, Johns Hopkins, March 2002.
Keynote Speaker, ASME International Conference on Micro-channels and Mini-channels, Rochester, June 2004; Pohang, June 2009.
Keynote Speaker, Biomedical Engineering Society 2004 Annual Symposium, Tainan, Taiwan, December, 2004.
Keynote Speaker, Indiana Biosensor Symposium, Indianapolis, April, 2005.
Keynote Lecturer, The Bianchi Session on Thin Films of Soft Matter, International Center for Mechanical Sciences, Udine, Italy, July 2005.
Keynote Lecturer, Annual Conference of the Society of the Korean Analytical Science and Technology, Mokpo, Korea, May, 2006.
Keynote Lecture, Advances in Microfluidics and Nanofluidics, Hong Kong, 2009; Singapore, 2011; Dalian, 2012; Notre Dame, 2013; Taipei, 2014; Beijing, 2015.
Keynote Lecturer, ACS Colloid and Interfacial Science Symposium, Columbia University, June 2009.
Keynote Lecture, ASME Mini/Micro/NanoChannels Conference, Pohang, Korea, June 2009.
Keynote Lecture, Asian-Pacific LabChip Conference, Shanghai, October 2009.
Invited Speaker, Workshop on Electrokinetics, IMA, University of Minnesota, Dec 2009.
Keynote Lecturer, Second ASME Micro/Nanoscale Heat/Mass Transfer International Conference, Jiaotung University, Shanghai, December 2009.
Plenary Lecture, Wave Phenomena IV, Edmonton, Canada, June 2010.
Invited Lecture, Phoresis Workshop, Pohang, Korea, September 2010.
Plenary Speaker, China-Japan-Korea Symposium on Analytical Chemistry, Wuhan, 2010.
Plenary Speaker, Electrokinetics Workshop, Haifa, Israel, December 2010.
Keynote Speaker, AMN-APLOC, Singapore, January, 2011.
Plenary Speaker, Electrokinetics Workshop, Imperial College, London, 2011.

Invited Speaker, Electrokinetics Symposium, APS-DFD Annual Meeting, Baltimore, November 2011.

Keynote Speaker, International Conference of Applied Science, Opening of Applied Science Division Building, Academia Sinica, Taiwan, October, 2013.

Keynote Speaker, Foundations of NanoScience, Snowbird, Utah, April, 2014.

Invited Lecturer, Dielectrophoresis 2014, London, July 2014.

Keynote Speaker, China-German Optical Medical Devices Conference, Suzhou, Sept 18-19, 2014.

Keynote Speaker, Taiwan Institute of Chemical Engineers Annual Meeting, Taoyuan, Taiwan, Dec 13, 2014.

Plenary Speaker, 7th WACBE World Congress on Bioengineering, Singapore, July 6, 2015.

Keynote and Plenary Lectures: Select Bioscience, Microfluidics Congress San Diego, September 2015, 2016 and 2017; March, Boston, 2017

Keynote Lecture, Bionics Center PhD Congress, Budapest, Hungary, November 2016.

Plenary Lecture, Advances in Pharmaceutical Advances, Wuhan, November 2017.

Distinguished Lecture, Mechanical Engineering, Boston University, 2018.

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Professional Activities

Organized the International Union of Theoretical and Applied Mechaics for Symposium on Nonlinear Wave Behavior in Multi-Phase Flow, July 1999, Notre Dame.

AIChE Chair of Area 10d (Applied Mathematics) 1994-1996.

Panelist, NSF/EPA Partnership for Environmental Research, 1995; NSF (CTS) 2001; 2005.

Advisory Council, Chemical Engineering Department, Princeton University, 1996 – 2000.

Scientific Committee for International Union of Theoretical and Applied Mechanics for Symposium on Nonlinear Singularities in Deformation and Flow, March, 1997 at Haifa, Israel.

Scientific Advisory Committee of CHISA Congress on Nonlinear Dynamics in Chemical and Bioengineering Processes, Prague, August 1998.

Technical advisor to the Mathematics Department, Institute of Technology at Bundung, Indonesia, 1997-98.

Organizing Committee, Annual Meeting of American Physical Society-Division of Fluid Dynamics, New Orleans, 1999.

Established the Center for Microfluidics and Medical Diagnostics at Notre Dame and founded start-up Microfluidics Applications Inc., 2003.

Steering Committee, Indiana Biosensor Symposium, 2005.

Steering Committee (founding member): Center for Advanced Diagnostics and Therapeutics, University of Notre Dame.

Founded MFA,LLC (2004).

Appointed Scientific Advisor of F Cubed, LLC (2008).

Organized and raised funds (US$60K) Advances in Microfluidics and Nanofluidics, Hong Kong, January 2009.

Raised funds (US$40K) and organized Advances in Microfluidics and Nanofluidics 2013, Notre Dame.

Advisory Committee, Second ASME Micro/Nanoscale Heat/Mass Transfer International Conference, Jiaotung University, Shanghai, December 2009

Founded the AIP Biosciences Horizons lecture series at Notre Dame 2018-?.

Expert witness: Irell-Manela BioRad vs 10xGenomics, 2017-2018.

Reviewer, Okinawa Institute of Science and Technology, July 2018.

Editorial Boards

Chief and Founding Editor: Biomicrofluidics, AIP, 2006-2018.

Editorial board: Membrane, 2011-Present

Associate Editor: SIAM Journal of Applied Math, 2000 – 2009

Advisory Board of Acta Mechanica, 2003-2005

International Journal of Bifurcation and Chaos in Applied Sciences and Engineering, 1990 - 1995

Patents

1. Process and Apparatus for Enhancing In-Tube Heat Transfer by Chaotic Mixing (with Mihir Sen), US Patent 5, 311, 932 (1994). Sequential twisting of a heating coil in two different planes enhances heat transfer by chaotic mixing action of inertial Dean vortices.

2. Fast-igniting Catalytic Converters with Bypass (with David Leighton), United States Letters Patent 6,428,754 (2002). A by-pass design reduces the heat load into a catalytic converter such that ignition occurs at the leading edge of the converter and the heat of reaction can be profitably used to lightoff the entire converter. With the bypass, the converter lights off in less than a minute compared to the10 minute light-off without the bypass.

3. Method and Apparatus for Rapid Particle Manipulation and Characterization(with Zachary Gagnon) US Patent 7,744,738. (2010). A serpentine wire design allows high-field dielectrophoretic trapping and manipulation of cells, molecules and other bioparticles. The field is significantly higher than that possible for disjoint electrode pairs to achieve much higher capture efficiency.

4. Methods and Apparatus to Capture and Release Microbe Particles Using Amino-functionalized Silica (with Zilin Chen , licensed to SMI LLC,

www.scientificmethods.com) US Patent 7,960,180 (2011). Silica beads with different functionalized surface groups can trap and release virus in different buffers due to proper tuning of double-layer effects. The technology can be used to clean water or concentrate pathogens for detection.

5. AC Electrospray, Ionization and Electrospinning (with Leslie Yeo, Shau-Chun Wang, Zach Gagnon and Dmitry Lastochkin) US Patent 8,267,914 (2012). A new high-frequency AC Electrospraying, droplet generation and electrospinning technology. The AC cone exihibits an 11 degree angle different from the 49 degrees DC Taylor cone and produces small electro-neutral drops. AC frequency minimizes field and current penetration and hence enhances molecular and cell viability. AC electrospinning provides mechanically strong multi-fiber threads at high throughput without the whipping instability of DC electrospinning, thus allowing high-throughput production.

6. Rapid Detection of Viable Bacteria System and Method (with Shramik Sengupta and Sachidevi Puttaswamy. Licensed to ImpeDx, www.impedx.com) US Patent 8635028 (2011). A rapid dielectrophoresis and impedance method for detecting bacteria viability by concentrating and sensing bubbles generated by the antibiotically screened bacteria.

7. Microfluidic Platforms for Multi-Target Detecton (with Jason Gordon, S. Senapati, Zach Gagnon and Sagnik Basuray. licensed to F Cubed, LLC, now Cubed Laboratories www.cubedlabs.com). US Patent 8771938 (2014). Molecular hybridization onto probe-functionalized nanostructures sensitively affects their polarizability and dielectrophoretic mobility, allowing rapid detection of hybridization events and multi-plex diagnostics on biochips. The large polarizability and induced field of carbon nanotubes is used to assemble them across electrodes and to rapidly trap analyte molecules from a flowing solution.

8. High-Frequency Alternating Current Electrospray Ion Source for Mass Spectrometry (with David Go, Nishant Chetwani, Catherine Cassou) US Patent 8,716, 675 (2014). AC electrospray is used for mass spectrometry applications. The microjet from AC spray, unlike DC spary, does not develop a plume that loses much of the analyte. Hence, AC spray can be used without a sheath flow. AC sprayed droplets are weakly charged and hence can achieve soft ionization. AC spray can also preferentially entrain low-mobility anions and offer a means of controlling the pH in the spray by tuning the frequency. Since the charge state of proteins is a function of pH, this offers a means of producing large and distinct charge/mass signals.

9. Microchamber Electrochemical Cell having a Nanoslot (with G. Yossifon, S. Basuray) US Patent 8,969,007 (2010). We use a nanoslot to achieve on-chip ionic strength and pH control and to concentrate nanoparticles or macromolecules for sensing

applications. The nanoparticles can be functionalized with probes such that their dielectrophoretic mobility change upon functionalization, thus achieving preferential trapping and quantification of hybridized nanoparticles.

10. Method and Apparatus for a nanopipette Biosensor (with Shoupeng Liu, S Senapati, Yunshan Wang and Yu Yan) US patent 9856518 (2014). Dancon, a nanopipette biosensor capable of detecting a small concentration of target molecules within a sample solution using optical detection methods. The biosensor includes a nanopipette that connects a nanocolloid reservoir containing a nanocolloid solution and a sample reservoir containing a sample solution, where the nanopipette is tapered at the end connected to the sample reservoir. The nanocolloid solution includes nanoparticles functionalized with probes specific to miRNA of the target molecules and reporters. During the detection process, the nanocolloids nanoparticles aggregate such that plasmonic hotspots are formed. These hotspots magnify the reporter signals produced when the probes hybridize with target molecules.

11. Integrated Membrane Sensor for Rapid Molecular Detection (with Zdenek Slouka, S. Senapati and Sunny Shah, licensed to AgenDx LLC www.agendxbio.com) US Patent 10,247,720 P01116. Charged molecules and ions can be concentrated a-million fold for easier detection by exploiting internal and external concentration polarization of nanoporous granule/membrane/nanoslot to electrophoretically and dielectrophoretically accumulate the analyte. Charge inversion uponhybridization is used to produce PN type surface junctions and amplify ion current signals for molecular detection.

Pending patents:

1. Chip Scale pH Actuation
   Using a bipolar nanoporous membrane, we are able to produce a very high field at the PN junction to break water directly with a DC field. By combining the protons and hydroxyle ions from different bipolar membranes, we can change pH rapidly and precisely with a large dynamic range of 2 to 10. A linear pH gradient can also be sustained on a chip to allow high-throughput continuous isoelectric focusing. Precise pH actuation allows us to regenerated biosensors and to enhance selectivity.

2. Silicon-Based Nanofluidic Ion Current Memristor. A Si-Silica transition allows us to build a memristor that operates dynamically with a periodic input.

Importantly, the memristor can operate in liquid, thus allowing the synthesis of an ionic circuit that could be used for biosensing and for communicating with cell communities and neuron networks.

3. AC Electrosprayed Droplets for Digital/Emulsion PCR. We spray water solutions in oil at a rate of one billion to one trillion droplets per hour and with a monodispersed droplet size that can be tuned between submicron to 50 microns. The microemulsion is best used for digital/emulsion PCR and can outperform the current flow-focusing droplet generation method by orders of magnitude in throughput with comparable size control. High-throughput nanoemulsion is also useful for drug encapsulation and delivery. (Preliminary option contract with Dolomite.)

4. A Shear-Enhanced CNT Nanoassembly Nanosensor Platform. We assemble single CNTs across parallel electrodes and estimate the number of CNTs from conductance measurements with single CNT resolution. A sandwich ELISA scheme for protein biomarkers, with antibodies on both the CNT and electrodes, then achieves sensitivity down to 100 copies of protein, roughly the number from a single tumor cell. We then use hydrodynamic shear and the large Stokes drag of the high aspect ratio of the CNT to achieve selectivity so that Her2, ER and PR proteins, breast cancer biomarker, can be differentiated from its isoforms with similar dissociation constants.

5. Ultra-Sensitive Multi-Target Lateral Flow Molecular Assay with Field-Induced Precipitation. We use the external concentration polarization (ion depletion) phenomenon of an on-chip ion-selective membrane to produce a local high field on a chip. The high field allows us to isolate exosomes and molecules from a cross flow. The high field also allows us to precipitate nanoparticles functionalized with probes and linked by the target molecules. The different electrophoretic mobilities of the precipitated nanoparticles and unlinked nanoparticles, amplified by the high electric field of the ion depletion front, also offers high selectivity such that mutations can be identified from a short RNA.

Press Highlights

- Physics News in 1992, “Chaotic Mixing in Fluid Flows”, pg 50, 1992.
- The Economists, “Science and Technology-Balancing Broomsticks”, pg. 95, June 25th, 1994.
- American Physical Society News, “Patterns on Falling Films”, pg. S 14, April 1995.
- Chemical Engineering Progress, “Catalytic Converter Features Quick Lightoff”, pg 15, May 2001.
- Indiana Business Magazine, “Biosensor Technology in Indiana”, March, 2005.

. Bioscience Technology, “Microfluidic Analyzers: Slow, Steady Progress”, October, 2005.
. **“**Einstein’s Tea Leaves” on former post-doc Leslie Yeo’s work at Notre Dame Discovery Channel (Jan 19, 2007), The Economists (Jan 20, 2007)
. “Channeling Microfluidic Devices into Point-of-Care Diagnostics”, Medical Product Manufacturing News, June 2010.
. “Fighting for Innovative HealthCare”, NBC-Notre Dame, national TV, 2010. https://www.nd.edu/fighting-for/2010/fighting-for-innovative-healthcare/
. Chicago Sun Times Nov 16, 2012 “Entering New Water with Tiny Chips” on startup F Cubed http://www.fcubed.biz/Entering-new-waters-via-tiny-chip
. Inside Indiana Business Aug 28, 2012 “Researchers Creating Tests for Safer Milk” http://www.insideindianabusiness.com/incubate-indiana.asp?ID=1984&Detail=True
. RuralTV July 31, 2012 “Milk Test” on Group’s Brucella detection technology
. NanDio wins $150,000 Cardinal Challenge for an Oral Cancer Diagnostic Device http://news.nd.edu/news/46393-notre-dame-team-wins-top-honors-in-20 cardinal-challenge/
. South Bend Tribune article about job markets at South Bend and the additional jobs F Cubed brought to South Bend : http://www.southbendtribune.com/app/economy/
. National Science Foundation Discovery Website about Group’s efforts on tech transfer : http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=133201&org=NSF

Publications

Books

"IUTAM Symposium on Nonlinear Waves in Multi-Phase Flow", Kluwer Academic Press, 2000.

"Complex Wave Dynamics on Thin Films" (with Evgeny A. Demekhin), Elsevier Scientific Press, 2002.

"Electrokinetically Driven Microfluidics and Nanofluidics" (with Leslie Yeo), Cambridge Univ Press (2009).

Journal Publications and Book Chapters

(H factor: 64, >13,000 total citations, ~800 citations/year ; Google Scholar)
Red: Over 100 citations

Fluid Mechanics: Phys Fluid (20 papers), PRE(16), Phys Rev Letter (14), JFM (13), JCIS (6) SIAM J App Math (3), Phil Trans Royal Soc (2), Annual Review of Fluid Mech (2)
Micro-Nanofluidics: Biomicrofluidics (24), JCP(12), Electrophoresis (11), Lab Chip (7), JPC(3) Adv Materials (2), ACSNano (2), Biosensors & Bioelectronics (4), Small (2), Analytical Chemistry (2), Annual Review of Analytical Chem (1)
Reaction Engineering/Control : Chem Eng Sci (25), AIChE J (9)

1. Oka, M., Chang, H.-C. and Gavalas, G. R., "Computer-Assisted Molecular Structure Construction for Coal-Derived Compounds," Fuel, 56 1 (1977).

2. Chang, H.-C. and Weinberg, W. H., "Modulated Molecular Beam Mass Spectrometry: A Generalized Expression for the 'Reaction Product Vector' for Linear Systems," J. Chem. Phys., 66, No. 9, 4176 (1977).

3. Chang, H.-C. and Weinberg, W. H., "An Analysis of Modulated Molecular Beam Mass Spectrometry Applied to Coupled Diffusion and Chemical Reaction," Surface Science, 65, 153 (1977).

4. Chang, H.-C. and Weinberg, W. H., "An Analysis of Modulated Molecular Beam Mass Spectrometry Applied to Nonlinear System," Surface Science, 72, 617 (1978).

5. Chang, H.-C. and Weinberg, W. H., "Modulated Molecular Beam Scattering from Solid Surfaces: the Pulse Testing Method of Analysis," Application of Surface Science, 3, 168 (1979).

6. Chang, H.-C. and Calo, J. M., "Exact Criteria for Uniqueness and Multiplicity via a Catastrophe Theory Approach," Chem. Eng. Sci., 34, 285 (1979).

7. Chang, H.-C. and Calo, J. M., "A Priori Estimation of Chemical Relaxation Oscillations Via a Singular Perturbation Technique," Chem. Eng. Commun., 3, 431 (1979).

8. Chang, H.-C. and Calo, J. M., "Regions of Multiplicity for Various Models of Chemical Reactors," Chem. Eng. Sci., 35, 264 (1980).

9. Chang, H.-C. and Calo, J. M., "Exact Universal Criteria for the Adiabatic Tubular Packed Bed Reactor," Chem. Eng. Sci., 35, 1611 (1980).

10. Chang, H.-C. and Aluko, M., "A Quasi-Steady State Analysis of the Dynamics of Two-Species Heterogeneous Catalytic Reactions," Chem. Eng. Sci., 36, 1611 (1981).

11. Chang, H.-C. and Calo, J. M., "Analysis of Radial Flow Packed Bed Reactors--How Are They Different?" in "Chemical Reactors", H. S. Fogler, ed., ACS Symposium Series, 168 (1981).

12. Chang, H.-C. "A Non-Fickian Model of Packed Bed Reactors," AIChE J., 28, 208 (1982).

13. Aluko, M., and Chang, H.-C., "Multiplicity, Uniqueness and Stability for an Exothermic Reaction in a Non-Adiabatic Bubble Column Reactor," Chem. Eng. J., 24, No. 2, 151 (1982).

14. Chang, H.-C., and Aluko, M., "Comment on the Model for Isothermal Oscillations of Ethylene Oxidation on Platinum," J. of Catal., 73, 198 (1982).

15. Chang, H.-C., "Multi-Scale Analysis of Effective Transport in Periodic Heterogeneous Media," Chem. Eng. Commun., 15, 83 (1983).

16. Chang, H.-C., Saucier, M. and Calo, J. M., "A Design Criterion for Radial Flow Fixed Bed Reactors," AIChE J., 29, 1039 (1983).

17. Chang, H.-C., "The Domain Model for Heterogeneous Catalysis," Chem. Eng. Sci., 38, 535 (1983).

18. Chang, H.-C., "Effective Diffusion and Conduction in Two-Phase Media - A Unified Approach," AIChE J., 29, 846 (1983).

19. Benzoni,J., and Chang, H.-C., "Effective Diffusion in Bidisperse Media - An Effective Medium Approach," Chem. Eng. Sci., 39, 161 (1984).

20. Chang, H.-C., and Aluko, M., "Multi-Scale Analysis of Exotic Dynamics in Surface Catalyzed Reactions - I. Justification and Preliminary Model Discrimination," Chem. Eng. Sci., 39, 37 (1984).

21. Aluko, M., and Chang, H.-C., "Multi-Scale Analysis of Exotic Dynamics in Surface Catalyzed Reactions - II. Quantitative Parameter Space Analysis of an Extended Langmuir-Hinshelwood Reaction Scheme," Chem. Eng. Sci., 39, 51 (1984).

22. Chen, L.-H., and Chang, H.-C., "Global Stabilization of a Biological Reactor by Linear Feedback Control," Chem. Eng. Comm., 27, 231 (1984).

23. Chang, H.-C. and Chen, L.-H., "Bifurcation Characteristics of Nonlinear Systems Under Conventional PID Control," Chem. Eng. Sci., 39, 1127 (1984).

24. Aluko, M., and Chang, H.-C., "PEFLOQ: An Algorithm for the Bifurcational Analysis of Periodic Solutions of Autonomous Systems," Comp. and Chem. Eng., 8, 355 (1984).

25. Chang, H.-C., "Several paths to Chaos in a Stiff CO Oxidation System" in "Frontiers in Chemical Reaction Engineering", L. K. Doraiswamy and R. A. Mashelkar, eds., Wiley Eastern Ltd. (1984).

26. McDermott, P., Bonvin, D., Mellichamp, D. and Chang, H.-C., "Eigenvalue Spectra and Modal Contributions for Counterflow Reactor Models," Chem. Eng. Comm., 31, 263 (1984).

27. McDermott, P., and Chang, H.-C., "On the Global Behavior of an Auto-Thermal Reactor Stabilized by Linear Feedback Control," Chem. Eng. Sci., 39, 1347 (1984).

28. Lahbabi, M. and Chang, H.-C., "High Reynolds Number flow Through Cubic Arrays of Spheres--Steady-State Solution and Transition to Turbulence, "Chem.Eng. Sci., 40, 435 (1985).

29. McDermott, P. E., Chang, H.-C. and Rinker, R. G., "Experimental Investigation of Controller-Induced Bifurcations in a Tubular Reactor," Chem. Eng. Sci., 40, 1355 (1985).

30. Chen, L.-H. and Chang, H.-C., "Nonlinear Stability of a Bubble Column Reactor," Chem. Eng. J., 3D(2), 103 (1985).

31. Chen, L.-H. and Chang, H.-C., "Global Effects of Controller Saturation on Closed-Loop Dynamics," Chem. Eng. Sci., 40, 2191 (1985).

32. Aluko, M. and Chang, H.-C., "The Stability and Oscillations of Carbon Monoxide Oxidation over Platinum Supported Catalyst: Effect of Butene," Chem. Eng. Sci., 40, 2389 (1985).

33. Aluko, M., and Chang, H.-C., "Dynamic Modelling of a Heterogeneously - Catalyzed system with Stiff Hopf Bifurcation," Chem. Eng. Sci., 41, 317 (1986).

34. Chang, H.-C., "Recent Developments in the Dynamics of Heterogeneous Catalytic Reactions," chapter in "Dynamics of Nonlinear Systems," Editor V. Hlavacek, Gordon and Breach Concepts in Chemical Engineering Series, (invited review) Chap. 3, 85 (1986).

35. Hwang, S.-H. and Chang, H.-C., "Process Dynamic Models for Heterogeneous Chemical Reactors - An Application of Dynamic Singularity Theory," Chem. Eng. Sci., 41, 953 (1986).

36. Chang, H.-C., "Nonlinear Waves on Liquid Film Surfaces, I. Flooding in vertical Tubes," Chem. Eng. Sci., 41, 2463 (1986).

37. Chen, L.-H. and Chang, H.-C., "Nonlinear Waves on Liquid Film Surfaces, II. Bifurcation Analyses of the Long-Wave Equations," Chem. Eng. Sci., 41, 2477 (1986).

38. Lahbabi, M. and Chang, H.-C., "Flow in Periodically Constricted Tubes: Transition to Inertial and Nonsteady Flows," Chem. Eng. Sci., 41, 2487 (1986).

39. Chang, H.-C., "Traveling Waves on Fluid Interfaces - Normal Form Analysis of the Kuramoto-Sivashinsky Equation," The Physics of Fluids, 29, 3142 (1986).

40. Chang, H.-C. and Chen, L.-H., "Growth of a Gas Bubble in a Viscous Fluid," The Physics of Fluids, 29, 3530 (1986).

41. Chang, H.-C., "Evolution of Nonlinear Waves on Vertically Falling Films – A Normal Form Analysis," Chem. Eng. Sci., 42, 515 (1987).

42. Hwang, S.-H. and Chang, H.-C., "Turbulent and Inertial Roll Waves in Inclined Film Flow", The Physics of Fluids, 30, 1259 (1987).

43. Hwang, S.-H. and Chang, H.-C., "A Theoretical Examination of Tuning Methods for Simple Regulators," Chem. Eng. Sci., 42, 2395 (1987).

44. Chen, L.-H. and Chang, H.-C., "Equilibrium Shapes of Liquid Bridges Under Gravity-Symmetry Breaking and Imperfect Bifurcations of Two-Dimensional Bridges," J. of Colloil. And Interface Sci., 120 377 (1987).

45. Saucier, M. F., Chang, H.-C. and Seborg, D. E., "Bifurcation Analysis of Multivariable Feedback Control System", Chem. Eng. Comm., 57, 215 (1987).

46. Ho, K. L. and Chang, H.-C., "On Nonlinear Doubly Diffusive Marangoni Instability", AIChE J., 34, 705 (1988).

47. Ratulowski, J. and Chang, H.-C., "Snap Off at Strong Constrictions: The Effect of Pore Geometry and Surfactant Concentration", Chap. 14 in "Surfactant-Based Mobility Control: Progress in Miscible-Flood Enhanced Oil Recovery", pg 282, D. H. Smith ed., American Chemical Society, DC (1988).

48. Lu, W. Q. and Chang, H.-C., "A Boundary Integral Study of Bubble Formation and Transport in Channels Filled with Viscous Fluid", J. Comp. Physics, 77, 340 (1988).

49. Boe, E., Hwang, S.-H. and Chang, H.-C., "Controller Tuning Based on Cross Over Information", JCIChE, 19, 359 (1988).

50. Boe, E. and Chang, H.-C., "Dynamics of Delayed Systems Under Feedback Control", Chem. Eng. Sci., 44, 1281 (1989).

51. Hwang, S.-H. and Chang, H.-C. "Non-Boussinesq Effects on Transitions in Hele-Shaw Convection", The Physics of Fluids, 1, 924 (1989).

52. Chang, H.-C., "Onset of Nonlinear Waves on Falling Films", The Physics of Fluids, 1, 1314 (1989). (73 citations)

53. Ratulowski, J. and Chang, H.-C., "Transport of Gas Bubbles in Capillaries", The Physics of Fluids, 1, 1642 (1989).

54. Ratulowski, J. and Chang, H.-C., "The Effect of Surfactant Transport on the Motion of Gas Bubbles in Capillaries", Journal of Fluid Mech., 210, 303 (1990).

55. Chang, H.-C., "Fundamental Process Control by D. M. Prett and C. E. Garcia" – Invited Review, American Scientist, 78, 74 (1990).

56. Cheng, M. and Chang, H. – C., "A Generalized Sideband Stability Theory via Center Manifold Projection", The Physics of Fluids, 2, 1364 (1990).

57. Chiao, S.-M. and Chang, H.-C., "Instability of a CEF Fluid in a Disc-and-Cylinder System", Journal of Non-Newtonian Fluid Mech., 36, 361 (1990).

58. Prokopiou, T., Cheng M. and Chang, H.-C.,"Integral Boundary Layer Theory of Finite-Amplitude Waves on Inclined Films", Journal of Fluid Mech., 222, 665 (1991).

59. Boe, E. and Chang, H.-C., "Transition to Chaos from a Two-Torus in a Delayed Feedback System", Int. J. of Bifurcation and Chaos, 1, 67 (1991), (Inaugural Issue).

60. Chen, C. C., Lahbabi, A., Chang, H.-C. and Kelly, R. E., "Spanwise Pairing of Finite-Amplitude Longitudinal Vortex Rolls in Inclined Free Convection Boundary Layers", Journal of Fluid Mech., 231, 73 (1991).

61. Cheng, M. and Chang, H.-C., "Long Waves on Inclined Films at High Reynolds Numbers", J of Fluid Mechanics, 222, 665-691 (1991).

62. Cheng, M. and Chang, H.-C., "Subharmonic Instability of Finite-Amplitude Monochromatic Waves", The Physics of Fluids, 4, 505 (1992).

63. Ghosh, S., Chang, H.-C and Sen, M., "Heat Transfer Enhancement due to Slender Recirculation and Chaotic Transport Between Counter – Rotating Eccentric Cylinder", Journal of Fluid Mech., 238, 119 (1992).

64. Chang, H.-C. and Sen, M., "Chaotic Mixing for Heat-Transfer Enhancement", pg 175-188 in "Applied Chaos", Editors J. H. Kim and J. Stringer, John Wiley (1992).

65. Cheng, M. and Chang, H.-C., "Stability of Axisymmetric Waves on Liquid Films Flowing Down a Vertical Column to Azimuthal and Streamwise Disturbance", Chem. Eng. Comm., 118, 327 (1992) (Special Issue in honor of S. G. Bankoff.)

66. Sangalli, M., Prokopiou, T., McCready, M. J. and Chang, H.-C., "Observed Transitions in Two-Phase Stratified Gas-Liquid Flow", Chem. Eng. Sci., 47, 3289 (1992).

67. Chen, C.-C. and Chang, H.-C., "Accelerated Disturbance Damping of an Unknown Distributed System by Nonlinear Dominant-Mode Feedback", AIChE J. 38, 1461 (1992).

68. Chen, C. C., Lahbabi, A., Chang, H.-C. and Kelly, R. E., "On the Subharmonic Instability of Finite-Amplitude Longitudinal Vortex Rolls in Inclined Free Convection Boundary Layers", pg 289-296 in "Ordered and Turbulent Patterns in Taylor-Couette Flow", Editors C. D. Andereck and F. Hayot, NATO ASI Series B: Phys. 297 (1992).

69. Chang, H.-C., "Flow of Gas Slugs Under Microgravity Conditions", pg 261 in "Hydromechanics and Heat/Mass Transfer in Microgravity", Gordon and Breach (1992).

70. Acharya, N., Sen, M. and Chang, H.-C., "Heat Transfer Enhancement in Coiled Tubes by Chaotic Mixing", International J. of Heat and Mass Transf. , 35, 2475-2489 (1992).

71. Chang, H.-C., Demekhin, E. A. and Kopelevich, D. I., "Nonlinear Evolution of Waves on a Falling Film", J. Fluid Mech., 250, 433-480 (1993).

72. Chang, H.-C., Demekhin, E. A. and Kopelevich, D. I., "Laminarizing Effects of Dispersion in an Active- Dissipative Nonlinear Medium', Physica D. , 63, 299-320 (1993).

73. Chen, C.-C., Wolf, E. E. and Chang, H.-C., "Low-Dimensional Spatio-Temporal Dynamics on Non-Uniform Catalytic Surfaces", J. Phy. Chem., 97, 1055 (1993).

74. Chang, H. – C., Demekhin, E. A. and Kopelevich, D. I., "Construction of Stationary Waves on a Falling Film", Computational Mech., 11, 313-322 (1993).

75. Indeikina, A. and Chang, H.-C., "Effective Diffusion in Time-Periodic Linear Planar Flow", The Physics of Fluids, A5, 2563-2566 (1993).

76. Chang, H.-C., "Wave Evolution on a Falling Film", Annual Review of Fluid Mechanics, 26, 103-136 (1994).

77. Kalliadasis, S. and Chang, H.-C., "Drop Formation during Coating of Vertical Fibers", Journal of Fluid Mechanics, 261, 135-168 (1994).

78. Acharya, N., Sen, M. and Chang, H.-C., "Thermal Entrance Length and Nusselt Numbers in Coiled Tubes", International J. of Heat and Mass Transf., 37, 336-340 (1994).

79. Kalliadasis, S. and Chang, H.-C., "Apparent Dynamic Contact Angle of an Advancing Gas-Liquid Meniscus", The Physics of Fluids, 6, (1), 12-23, (1994).

80. Qin, F., Wolf, E. E. and Chang, H.-C., "Controlling Spatio-Temporal Patterns on a Catalytic Wafer", Phys. Rev. Lett., 72, 1459-1462 (1994).

81. Chang, H.-C., Cheng, M., Demekhin, E. and Kopelevich, D. I., "Secondary and Tertiary Excitation of Three-Dimensional Patterns on a Falling Film", J. Fluid Mech., 270, 251-275 (1994).

82. Sangalli, M. and Chang, H.-C., "Complex Spatiotemporal Patterns in an Open-Flow Reactor", Phys. Rev. E., 49, 5207-5217 (1994).

83. Chang, H.-C., Review of "Chaotic and Fractal Dynamics: An Introduction for Applied Scientists and Engineers", by Francis C. Moon, AIChE J, 40, 1924-1925 (1994).

84. Chang, H.-C. and Sen, M., "Application of Chaotic Advection to Heat Transfer", Chaos, Solitons and Fractals, 4, 955-975 (1994).

85 Chiao, S.-M. and Chang, H.-C., "Perforation and Perforator Analysis –An Application of Filtration Theory," J. Chinese Inst. Chem. Eng., 25, 279-305 (1994).

86. Chang, H.-C., M. Cheng, E. Demekhin and E. N. Kalaidin, "Quasi-Stationary Wave Evolution on a Falling Film", pg 407-424 in "Nonlinear Instability of Nonparallel Flows", S. P. Lin, W. R. C. Phillips and D. T. Valentine (Eds.), Springer-Verlag, 1994.

87. M. Sen and Chang, H.-C., "Chaotic Particle Paths and Heat Transfer Enhancement in Internal Flows," pg 397-400, in "Towards the Harnessing of Chaos," M. Yamaguti (Eds.) Elsevir, 1994.

88. Leighton, D. T. and Chang, H.-C., "A Theory for Fast-Igniting Catalytic Converters", AIChE J , 41, 1898-1915 (1995).

89. Cheng, M. and Chang, H.-C., "Competition between Subharmonic and Sideband Secondary Instabilities on Falling Film", Phys. Fluid, 7, 34-54 (1995).

90. Balakotaiah, V. and Chang, H.-C., "Dispersion of Chemical Solutes in Chromatographs and Reactors", Phil. Trans of the Royal Society of London, A351, 39-75 (1995).

91. Chang, H.-C., Demekhin, E. A. and Kalaidin, E. N.,"Interaction Dynamics of Solitary Waves on a Falling Flim", J. Fluid Mech., 294, 123-154 (1995).

92. Sangalli, M., Gallagher, C. T., Leighton, D. T., Chang, H.-C. and McCready, M. J., "Finite-Amplitude Waves at the Interface between Fluids with Different Viscosity", Phys. Rev. Lett., 75, 77-80 (1995).

93. Chang, H.-C., Demekhin, E. A. and Kopelevich, D. I., "Stability of a Solitary Pulse Against Wave Packet Disturbances in an Active Medium," Phy. Rev. Lett., 75, 1747-1751 (1995).

94. Chang, H.-C. and Demekhin, E. A., "Repulsive Dynamics of Solitary Pulses, pg 24-41 in "Structure and Dynamics of Nonlinear Waves in Fluids", Adv. Series in Nonlinear Dynamics, Vol. 7, A. Mielke and K. Kirchgässner (Eds.), World Scientific (1995).

95. Chang, H.-C. and Demekhin, E. A., "Solitary Wave Formation and Dynamics on Falling Films", Adv. In Applied Mech., 32, 1-58 (1995).

96. McCready, M. J. and Chang, H.-C., "Formation of Large Disturbances on Sheared and Falling Liquid Films", Chem. Eng. Comm., 141, 347 (1996).
(Special Issue in Memory of A. E. Dukler).

97. Chang, H.-C., Demekhin, E. A. and Kalaidin, E., "Simulation of Noise-Driven Dynamics on a Falling Film", AIChE J., 42, 1553-1568 (1996).

98. Chang, H.-C., Demekhin, E. A. and Kalaidin, E., "Scalings, Self-Similarity and Statistics of Interfacial Turbulence on a Falling Film" pg 86-111 in "Advances in Multi-Phase Flow", Editors, Y. Y. Renardy, A. V. Coward, D. T. Papageorgiou and S. M. Sun, SIAM (1996).

99. Chang, H.-C., Demekhin, E. A., Kalaidin, E. and Ye, Y., "Coarsening Dynamics of Falling-Film Solitary Waves", Phys. Rev. E, 54, 1467-1478 (1996).

100. Chang, H-C., Demekhin, E. A. and Kopelevich, D. I. "Local Stability Theory of Solitary Pulses in an Active Medium", Physica D. , 97, 353-375 (1996).

101. Kalliadasis, S. and Chang, H.-C., "Effects of Wettability on Spreading Dynamics", IEC Res, Special Issue in Honor of E. Ruckenstein, 35, 2860 (1996).

102. Chang, H.-C., Demekhin, E.A, Kalaidin, E. and Y. Ye, "Scalings of Spatio-Temporal Dynamics on a Falling Film", Physica Scripta, 67, 67-72 (1996).

103. Bandyopadhyay, S., Miller, A. E., Chang, H.-C., Banerjee, G., Yuzhakov, V., Yue, D.-F., Ricker, R. E., Jones, J., Eastman, J. A., Baugher, E. and Chandrasekhav, M., "Electrochemically Assembled Quasi-Periodic Quantum Dot Arrays", Nanotechnology, 7, 360-372(1996).

104. Sawyer, D. R., Sen, M. and Chang, H.-C., "Effect of Interfacial Stretching on Bimolecular Chemical Reaction in Helical-Coil Reactors", Chem. Eng. J. 64, 129-142 (1996).

105. Indeikina, A., Veretennikov, I. and Chang, H.-C., "Drop Falloff from Pendent Rivulets", J. Fluid Mech. , 338, 173-201 (1997).

106. Sangalli, M., McCready, M. J. and Chang, H.-C., "Stabilization Mechanism of Short Waves in Stratified Gas-Liquid Flow", Phys. Fluids, 9, 919 (1997).

107. Chang, H.-C., Demekhin, E. A., Kopelevich, D. I. and Ye, Yi "Nonlinear Wavenumber Selection in Gradient-Flow Systems", Phys. Rev. E., 55, 2818 (1997).

108. Yuzhakov, V. V., Chang, H.-C. and Miller, A. E., "Pattern Formation during Electropolishing", Phys. Rev B, 56, 12608 (1997).

109. Chang, H.-C., Demekhin, E. A. and Kalaidin, E., "Generation and Suppression of Radiation by Solitary Pulses" Pgs 17-51 in "Differential Equations — Theory, Numerics and Applications", Editors E. van Groessen and E. Soewono, Kluwer (1997).

110. Orlychenko, O., Ye, Y. and Chang, H.-C., "Front Interaction on a Ring Electrode", Phys. Rev. E., 57, 5196 (1998).

111. Chang, H.-C., Demekhin, E. A. and Kalaidin, E., "Generation and Suppression of Radiation by Solitary Pulses", SIAM J. on Applied Math., 58, 1246 (1998).

112. Veretennikov, I., Indeikina, A. and Chang, H.-C., "Front Dynamics and Fingering of a Driven Contact Line", J. Fluid Mech., 373, 81 (1998).

113. Sawyers, D. R. , Sen, M. and Chang, H.-C., "Heat Transfer Enhancement in Three-Dimensional Corrugated Channel Flow", Int. J. of Heat and Mass Transf, 41, 3559 (1998).

114. Indeikina, A. and Chang, H.-C., "A Molecular Theory for Dynamic Contact Angles", pg 34-338 in "Nonlinear Singularities in Deformation and Flow", Editors: D. Durbin and J. R. A. Pearson, Kluwer (1999).

115. Chang, H.-C. and Demekhin, E. A., "Coalescence Cascade towards Drop Formation", J. Fluid Mech., 380, 233 (1999).

116. Keith, J. M. Leighton, D. T. and Chang, H.-C., "a New Design of Reverse-Flow Reactors With Enhanced Thermal Dispersion", Industrial & Eng. Chem. Res., 38, 667 (1999).

117. Yuzhakov, V. V. , Takhistov, P. V., Miller, A. E. and Chang, H.-C., "Pattern Selection During Electropolishing due to Double-Layer Effects", Chaos, 9, 62 (1999).

118. Chang, H.-C., Demekhin, E. A. and Kalaidin, E., "Iterated Stretching of Viscoelastic Jets", Phys. Fluids, 11, 1717 (1999).

119. Veretennikov, I., Agarwal, A., Indeikina, A. and Chang, H-.C., "Unusual Contact-line Dynamics of Thick Films and Drops", J. of Colloid and Interface Science, 215, 425 (1999).

120. Kopelevich, D. I. and Chang, H.-C., "Nonequilibrium Diffusion in Zeolites due to Deterministic Hamiltonian Chaos", Phys Rev. Lett., 83, 1590 (1999).

121. Ye Y. and Chang, H.-C., "A Spectral Theory for Fingering on a Prewetted Plane", Physics of Fluids, 11, 2494 (1999).

122. Chang, H.-C., Demekhin, E. A., Roberts, R. M. and Ye, Y. "Modulation Wave Dynamics of Kinematic Interfacial Waves", pgs 99-112 in "Fluid Dynamics at Interfaces", Editors: W Shyy and R. Narayanan, Cambridge (1999).

123. Robert, R. M., Ye, Y., Demekhin, E. A and Chang, H.-C., "Wave Dynamics in Two-Layer Couette Flow", Chemical Engineering Science, 55, 345 (2000).

124. Roberts, R. M. and Chang, H.-C., "Wave Enhanced Interfacial Transfer", Chemical Engineering Science, 55, 1127, (2000).

125. Arya, G., Maginn, E. J. and Chang, H.-C., "Efficient Viscosity Estimation from Molecular Dynamics Simulation via Momentum Impulse Relaxation", J. of Chem. Phys., 113, 2079, (2000).

126. Chang, H.-C., Demekhin, E. A. and Kalaidin, E., "Coherent Structures, Self-Similarity, and Universal Roll Wave Coarsening Dynamics", Phys. Of Fluids, 12, 2268 (2000).

127, Chang, H.-C., Demekhin, E. A. and Takhistov, P. V., "Circular Hydraulic Jumps

Triggered by Boundary Layer Separation", Journal of Colloid and Interface Science, 233, 329(2001).

128. Kopelevich, D. I. And Chang, H.-C., "Does lattice vibration drive diffusion in zeolite ?", Journal of Chemical Physics, 114, 3776(2001).

129 Keith, J. M., Chang, H.-C. and Leighton, D. T., "Designing a Fast-Igniting Catalytic Converter System", AIChE J, 47, 650(2001).

130 Arya, G., Maginn, E. J. and Chang, H.-C., "Effect of the Surface Energy Barrier on Sorbate Diffusion in AlPO4-5", J. Phys. Chem., 105, 2725(2001).

131 Acharya, N., Sen, M. and Chang. H.-C., "Analysis of heat transfer enhancement in coiled-tube heat exchangers", International J. of Heat and Mass Transfer, 44, 3189-3199(2001)

132 Chang, H.-C., "Bubble/Drop Transport in Microchannels" , pg 11-15 , "The MEMS Handbook" Editor; M. Gadelhak , CRC Press(2001).

133 Arya, G., Chang, H.-C. and Maginn, E. J., "A critical component of equilibrium, non-equilibrium and boundary-driven molecular dynamics techniques for studying transport in microporous material", J. of Chem Phys, 115, 8112 (2001)

134 Kopelevich, D. I. and Chang, H.-C., "Diffusion of inert gases in silica sodalite : importance of lattice flexibility", J. of Chem Phys., 115, 9519 (2001)

135. Thamida, S. K., Takhistov, P. V. and Chang, H.-C., "Fractal dewetting of a viscous Film Between Separating Parallel Plates", Phys of Fluids, 13, 2190(2001).

136 Takhistov, P., Indeikina A. and Chang, H.-C., "Electrokinetic displacement of air bubbles In microchannels", Phys of Fluids, 14, 1(2002).

137 Ben, Y. and Chang, H.-C., "A Spectral Theory for Miscible Fingering", Phys of Fluids ,14, 999(2002).

138 Thamida, S. and Chang, H.C., "Mechanism of Nanoporous Patterning During Anodization", Chaos, 12, 240(2002). (109 citations)

139 Pacheco-Vega, A., Franco, W. , Chang, H.-C. and Sen, M. "Nonlinear Analysis of Tilted Toroidal Thermosyphon Models", International Journal of Heat and Mass Transfer, 45,No. 7, 1379-1391 (2002).

140 Minerick, A., Ostafin, A. and Chang, H.-C., "Electrokinetic Transport of Red Blood Cells In Microcapillaries", J. of Electrophoresis, 23, 2165 (2002).

141 Indeikina, A. and Chang, H.-C., "Estimate of Turbulent Eddy Diffusivity by Exact Renormalization", SIAM J App Math , 63, 1(2002).

142 Ben, Y. and Chang, H.-C., "Nonlinear Smoluchowski Slip Velocity and Vortex Generation", J. Fluid Mech., 461, 229-238 (2002).

143 Ben, Y., Takhistov, P., Demekhin, E. A. and Chang, H.-C., "Miscible Fingering in Electrokinetic Flow" , J. of the Chinese Institute of Chemical Engineers ,Festschrift issue in honor of Dr. Norman Li , 33 , No. 1, 15 (2002).

144 Chang, H.-C., Demekhin, E. A. and Saprikin, S. S., "Noise-driven wave transitions on a Vertically falling film", J. Fluid Mech., 462, 255-284(2002).

145 Takhistov, P. and Chang, H.-C., "Complex Stain Morphology", IEC Res, Special Issue in Honor of W. R. Scholwalter , 41, 6256-6269(2002).

146 Veretennikov, I., Indeikina, A., Chang, H.-C., Marquez, M., Suib, S. L. and Giraldo, O., "Mechanism for Helical Gel Formation from Evaporation of Colloidal Solutions", Langmuir, 18, 8792-8798(2002).

147 Thamida, S. and Chang, H.-C., "Nonlinear Electrokinetic Ejection and Entrainment due to Polarization at Nearly Insulated Wedges", Phys Fluids, 14, 4315-4328(2002).

148. Takhistov, P., Duginova, K. and Chang, H.-C., "Electrokinetic Mixing Vortices due to Electrolyte Depletion at Microchannel Junctions", J. of Colloid and Interfacial Science, 263, 133-143 (2003).

149. Arya, G., Chang, H.-C. and Maginn, M. J., "Knudsen Diffusivity of a Hard Sphere in a Rough Slit Pore", Phys. Rev. Lett, 91, 026102-1 (2003).

150. Balakotaiah V. and Chang, H.-C., "Hyperbolic homogenized models for thermal and solutal dispersion", SIAM J. Applied Math., 63(4),1231-1258 (2003).

151. Arya, G., Chang, H.-C. and Maginn, E. J., "Molecular Simulations of Knudsen Wall Slips---Effect of Wall Morphology", Molecular Simulation , 29, 697-709 (2003).

152. Kopelevich, D. I. and Chang, H.-C. "Nonthermal transport of small sorbates in zeolites: Chaotic dynamics and long jumps",J. Chem. Phys., 119, 4573 (2003).

153. Minerick, A., Chang, H.-C., Hoagland, T. M. and Olsen, C. R. "Dynamic Synchronization of Venous Pressure-Driven Cardiac Output in Rainbow Trouts", Am. J Physiol. Regul, Integr. And Comp. Physiology , 285, 889-896(2003)

154. Minerick, A., Takhistov, P., Zhou, R. and Chang, H.-C., "Manipulation and

Characterization of Red Blood Cells with AC Fields in Micro-Devices", Electrophoresis, 24, 3703 – 3717 (2003).

155. Kopelevich, D. I. and Chang, H.-C. "Nonequilibrium Transport in and on Condensed Matters: Effects of Lattice Vibration and Deterministic Chaos", Molecular Simulation, 30, 159-166 (2004).

156. Yeo, L., Lastochkin, D., Wang, S.-C. and Chang, H.-C., "A New ac Electrospray Mechanism by Maxwell-Wagner Polarization and Capillary Resonance", Phys Rev Lett, 92, 133902-133904 (2004).

157. Wang S. C., Lai, Y. W. , Ben, Y . and Chang, H.-C., "Microfluidic Mixing by dc and ac Nonlinear Electrokinetic Vortices", Ind. And Eng. Fund Res., 43, 2902-2911 (2004).

158. Ben, Y., Demekhin, E. A. and Chang, H.-C., "Superfast Nonlinear Electrokinetics and Electrophoresis", J oc Collid and Interface Sci., 276, 483-497 (2004).

159. Lastochkin, D., Zhou, R., Wang, P., Ben, Y. and Chang, H.-C., "Electrokinetic Micropump and Micromixer Design Based on AC Faradaic Polarization", J. of Applied Physics, 96, 1730 (2004).

160. Wu, J., Ben, Y., Battigelli, D. and Chang, H.-C., "Long-Range AC Electroosmotic Trapping and Detection of Bioparticles", Ind. Eng. Chem. Res., 44, 2815(2005).

161. Chen, Z., Wang, P. and Chang, H.-C., "An electro-osmotic micropump based on monolithic silica for micro-flow analyses and electro-sprays", Anal. Bioanal Chem, 382, 817(2005). (64 citations)

162. Yeo, L. Y., Gagnon, Z and Chang, H.-C., "AC Electrospray Biomaterials Synthesis", Biomaterials, 26, 6122-6128(2005).

163. Zhou, R. and Chang, H.-C., "Capillary Penetration Failure of Blood Suspensions", J of Colloid and Interface Science, 287, 647-656(2005).

164. Chen, Z., Chang, H.-C. and Hobo, T., "Application of Monolithic Silica for Microfluidic Analysis", Bunseki Kagaku (Japanese Anal. Chem.), 54(7), 583-592(2005).

165. Yeo, L. and Chang, H.-C., "Static and Spontaneous Electrowetting", Modern Phys Lett. B, 19, 549-569(2005). (48 citations)

166. Lastochkin, D. and Chang, H.-C., "A High-Frequency Electrospray by Gas Volume Charge", J. Applied Phys., 97, 123309 (2005).

167. Gagnon, Z. and Chang, H.-C., "Aligning fast alternating current electroosmotic flow fields and characteristic frequencies with dielectrophoretic traps to achieve rapid bacteria detection", Electrophoresis, 26, 3725-3737(2005).

168. Wu, J., Ben, Y. and Chang, H.-C., "Particle detection by electrical impedance spectroscopy with asymmetric-polarization ac electroosmotic trapping", Microlfuid. And Nanofluid., 1, 161-167(2005).

169. Wang, P., Chen, Z. and Chang, H.-C., "A New Electro-osmotic Pump Housed in Silica Monoliths", Sensors and Actuators, 113, 500 (2006).

170. Yeo, L. and Chang, H.-C., "Electrowetting Films on Parallel Line Electrodes", Phys. Rev E, 73, 011605-1, 011605-16 (2006). (51 citations)

171. Zhou, R., Gordon, J., Palmer, A. F. and Chang, H.-C., "Role of Eryrhrocyte Deformability during Capillary Wetting", Biotech. and Bioengineering, 93, 201 (2006).

172. Zhou, R., Wang, P. and Chang, H.-C., "Bacteria capture, concentration and detection by alternating current dielectrophoresis and self-assembly of dispersed single-wall carbon nanotubes", Electrophoresis, 27, 1376-1385 (2006).

173, Chang, H.-C., "Electrokinetics: A Viable Microfluidic Platform for Miniature Diagnostic Kits", Invited Review, Canadian J of Chemical Engineering, 84, 146 (2006)

174. Chen, Z., Hsu, F-C., Battigelli, D. and Chang, H.-C., "Capture and release of viruses using amino-fucntionalized silica particles", Anal. Chim. Acta, 569, 76-82(2006).

175. Sengupta, S., Battigelli, D. and Chang, H.-C., "A micro-scale multi-frequency reactance measurement technique to detect bacterial growth at low bio-particle concentrations",Lab-on-a-Chip, 6, 682-692 (2006).

176. Yeo, L. Y., Hou, D., Maheshwari, S. and Chang, H.-C., "Electrohydrodynamic surface micro-vortices for mixing and particle trapping", Appl. Phys. Lett., 88, 233512 (2006).

177. Wang, P., Maheshwari, S. and Chang, H-C, "Polyhedra formation and transient cone ejection of a resonant microdrop forced by an ac electric field", Phys Rev Lett, 96, 254502 (2006).

178. Hou, D. and Chang, H.-C., "Electrokinetic particle aggregation patterns in microvortices due to particle-field interaction", Phys. of Fluids, 18, 071702 (2006).

179. Yeo, L. Y., Hou, D., Maheshwari, S. and Chang, H.-C., "Electrohydrodynamic surface microvortices for mixing and particle trapping", App Phys Lett, 88, 233512(2006).

180. Wang, P., Chen, Z. and Chang, H.-C., "An integrated micropump and electrospray emitter system based on porous silica monoliths", Electrophoresis, 27, 3964 (2006).

181. Wang, S.-C., Chen, H.-P., Lee, C.-Y., Yu, C.-C. and Chang, H.-C., "AC Electro-osmotic Mixing Induced by Non-Contact External Electrodes", Biosensors and Bioelectronics, 22, 563(2006).

182. Maheshwari, S. and Chang, H.-C., "Anomalous conical menisci under an ac field-departure from the dc Taylor cone", App. Phys Lett., 89, 234103 (2006).

183. Chen, Z., Bogess, B. and Chang, H.-C., "Open-tubular Capillary Electrochromatography -Mass Spectrometry with Sheathless Nanoflow Electrospray Ionization for the Analysis of Amino Acids and Peptides", J of Mass Spectrometry, 42, 244-253 (2007).

184. Hou, D. , Maheshwari, D. and Chang, H.-C., "Rapid Bioparticle Concentration and Detection by Combining a Discharge Driven Vortex with Surface Enhanced Raman Scattering", Biomicrofluidics, 1, 014106 (2007).

185. Zhou, R., Chang, H.-C., Ptotempko, V., Kuno, K., Singh, P., Jena, D. and H. Xing, "CdSe Nanaowires with Illumination Enhanced Conductivity: Induced Dipoles, Dielectrophoretic Assembly and Field-Sensitive Assembly", J App Phys, 101, 073704(2007). (75 citations)

186. Cheng, I-F.,Chang, H.-C., Hou, D. and Chang, H.-C., "An Integrated Dielectrophoretic Chip for Continuous Bioparticle Filtering, Focusing, Trapping and Detecting", Biomicrofluidics, 1, 021503(2007).

187. Basuray, S. and Chang, H.-C., "Induced Dipoles and Dielectrophoresis of Nano-Colloids in Electrolytes", Phys Rev E., 75, 060501-060504(2007).

188. Maheshwari, S. and Chang, H.-C., "Effect of Bulk Charge and Momentum Relaxation Time Scales on Electrospraying", J. App. Phys., 102, 034902 (2007).

189. Wang, S.-C., Chen, H.-P. and Chang, H.-C., "AC Electro-osmotic Pumping Induced by Non-Contact External Electrodeds", Biomicrofluidics, 1, 034106 (2007).

190. Chang, H.-C., "Nanobead Electrokinetics: The Enabling Microfluidic Platform for Multi-Target Pathogen Detection", AIChE J., 53, 2486 (2007).

191. Gordon, J. E., Gagnon, Z. and Chang, H.-C., "Dielectrophoretic Discrimination of Bovine Red Blood Cell Starvation Age by Buffer Selection and Membrane Cross-linking", Biomicrofluidics, 1, 044102 (2007).

192. Maheshwari, S., Zhang, L., Y. Zhu and Chang, H.-C., " Coupling between Precipitation and Contact-line Dynamics: Multi-ring Stains and Stick-Slip Motion", Phys Rev Lett, 100, 044503 (2008).

193. Maheshwari, S. and Chang, H.-C., "Assembly of multi-stranded nanofiber threads through AC electrospinning", Advanced Materials, 21, 349 (2009).

194. Gagnon, Z., Gordon, J., Sengupta, S. and Chang, H.-C., "Bovine Red Blood Cell Starvation Age Discriminatin through a Glutaraldehyde Amplified Dielectrophoretic Approach with Buffer Selection and Membrane Cross-Linking", Electrophoresis, 29, 2272 (2008).

195. Zhang, L.; Maheshwari, S.; Chang, H.-C.; Zhu, Y., "Evaporative Self-assembly from Complex DNA-Colloid Suspensions", Langmuir, 24, 3911 (2008).

196. Wang, S.-C., Wei, H.-H., Chen, H.-P., Tsai, M.-H., Yu, C.-C, and Chang, H.-C., "Dynamic Superconcentration at Critical Point Double-layer Gates of Conducting Nanoporous Granules due to Asymmetric Tangential Fluxes" Biomicrofluidics, 2, 014012 (2008).

197. Kreft, J., Chen, Y.-L. and Chang, H.-C., "Conformation and Trapping Rate of DNA at a Convergent Stagnant Flow", Phys Rev E., 77, 030801(R) (2008).

198. Hou, D. and Chang, H.-C., "AC Field-Enhanced Protein Crystallization", Applied Phys Lett, 92, 223902 (2008)

199. Sengupta, S., Gordon, J. E. and Chang, H.-C., "Microfluidic Diagnostic Systems for the Rapid Detection and Quantification of Pathogens", Chap 9 of "Microfluidics for Biological Applications",Editors: W-C Tien and E. Finehout, Springer (2008).

200. Chang, H.-C., " Rapid and Portable Genetic Identification Kits for World Health Care Applications", Feature Article, Chinese American Chemical Society Communications, Summer Issue (2008).

201. Gagnon, Z. and Chang, H.-C., "Dielectrophoresis of Ionized Gas Micro-Bubbles: Double Dipole Reversal due to Double Layer Polarization", App Phys Lett. , 93, 224101(2008).

202. Gagnon, Z., Senapati, S. and Chang, H.-C., "Dielectrophoretic Detection and Quantification of Hybridized DNA Molecules on Nano-Genetic Beads", Electrophoresis , 29, 4808 (2008). (Fast track and cover feature).

203. Chetwani, N., Maheshwari, S. and Chang, H.-C., "Universal Cone Angle of ac Electrosprays due to net charge entrainment", Phys Rev Lett., 101, 204501 (2008).

204. Yossifon, G. and Chang, H.-C., "Selection of Nonequilibrium Overlimiting Currents:

Universal Depletion Layer Formation Dynamics and Vortex Instability", Phys Rev Lett., 101, 254501(2008).

205. Gagnon, Z. and Chang, H.-C., "Electrothermal ac electro-osmosis", App Phys Lett, 94, 024101 (2009).

206. Plouraboue, F. and Chang, H.-C.,"Symmetry Breaking and Electrostatic Attraction Between Two Identical Surfaces", Phys Rev E., 79, 041404 (2009).

207. Chang, H.-C. and Yossifon, G., "Understanding Electrokineitcs at the Nanoscale--a Perspective", Biomicrofluidics, 3, 012001 (2009).

208. Yossifon, G., Mushenheim, P., Chang, Y-C. and Chang, H.-C.,"Nonlinear Current-Voltage Characteristics of Nanochannels", Phys Rev E, 79, 046305 (2009).

209. S. Senapati, A. R. Mahon, J. Gordon, C. Nowak, S. Sengupta, T. H. W. Powell, J. Feder, D. M. Lodge and Chang, H.-C., "Rapid on-chip Genetic Detection Microfluidic Platform for Real World Applications", Biomicrofluidics, 3, 022407(2009)

210. Basuray, S. , Senapati, S., Ajian, A. , Mahon, A. R. and Chang, H.-C., "Shear and AC Field Enhanced Carbon Nanotube Impedance Assay for Rapid, Sensitive and Mismatch-Discriminating DNA Hybridization", ACS Nano, 3, 1823 (2009).

211. Cheng, X. and Chang, H.-C., "Universal Nanocolloid Deposition Patterns: Can you see the harmonics of a Taylor cone ?", New J of Physics, 11, 075023 (2009).

212. Yossifon, G., Chang, Y.-C. and Chang, H.-C., "Rectification, Gating Voltage and Interchannel Communication of Nanoslot Arrays due to Asymmetric Entrance Space Charge Polarization", Phys Rev Lett, 103, 154502(2009).

213. Cheng, X., Basuray, S., Senapati, S. and Chang, H.-C., "Identification and Separation of DNA-hybridized nanocolloids by Taylor cone harmonics", Electrophoresis, 30, 3236 (2009).

214. Berrouche, Y., Avenas, Y., Schaeffer, C., Chang, H.-C. and Wang, P., "Design of a Porous Electroosmotic Pump in Power Electronic Cooling", IEEE Trans on Industry Applications, 45, 2073 (2009).

215. Gagnon, Z., Mazur, J. and Chang, H.-C., "Glutaraldehyde Enhanced Dielectrophoretic Yeast Cell Separation", Biomicrofluidics, 3, 044108(2009).

216. Maheshwari, S. and Chang, H.-C."Assembly of multi-stranded nanofiber threads through ac electrospinning", Adv Mater., 21,349354(2009).

217. Cheng, I-F., Froude, V. E., Zhu, Y., Chang, H.-C. and Chang, H.-C., "A Continuous High- Throughput Bioparticle Sorter Based on 3D Traveling-Wave Dielectrophoresis", *Lab-on-a-Chip*, 9, 3193 (2009).

218. Gagnon, Z., Mazur, J. and Chang, H.-C., "Integrated AC Electrokinetic Cell Separation in a Closed-Loop Device", Lab-on-a-Chip, 10, 718-726 (2010).

219. Cheng, I.-F., S. Senapati, X. Cheng, S. Basuray, H-C Chang and H.-C. Chang, "A Rapid Field-Use Assay for Mismatch Number and Location of Hybridized DNAs", Lab-on-a-Chip,10, 828-831 (2010).

220. Gagnon, Z., Senapati, S., Chang, H-C., "Optimized DNA Hybridization Detection on Nanocolloidal Particles", Electrophoresis, 31, 666-671 (2010).

221. Basuray, S. and Chang, H.-C., "Designing a Sensitive and Quantifiable Nanocolloid Assay with Dielectrophoretic Cross-Over Frequency", Biomicrofluidics, 4, 013205 (2010).

222. Liu, S.-J., Wei, H.-H., Hwang, S.-H. and Chang, H.-C., "Dynamic Particle Trapping, Release and Sorting by Microvortices on a Substrate", Phys Rev E, 82, 026308 (2010).

223. Yossifon, G., Mushenheim, P., Chang, Y.-C. and Chang, H.-C., "Eliminating the Limiting Current Phenomenon by Geometric Field Focusing into Nanopores and Nanoslots", Phys Rev E, 81, 046301 (2010).

224. Yossifon, G. and Chang, H.-C., "Changing Nanoslot Ion Flux with a Dynamic Nanocolloid Ion-selective filter: Secondary Overlimiting Currents due to Nanocolloid-Nanoslot Interaction", Phys Rev E, 81, 066317 (2010).

225. Yossifon, G., Mushenheim, P., Chang, Y.-C. and Chang, H.-C., "Controlling Nanoslot Overlimiting Current with the Depth of a Connecting Microchamber", EurophysLett, 90, 64004(2010).

226. Chetwani, N., Cassou, C. A., Go, D. B. and Chang, H.-C., "High-Frequency AC Electrospray Ionization for Mass Spectrometry of Biomolecules", J Am Soc Mass Spect, 21, 1852(2010).

227. Wang, S. C, Chang, H.-C. and Zhu, Y., "Hysteretic Conformation Transition of a Single Flexible Polyelectrolyte under Resonant ac Electric Polarization", Macromolecules , 43, 7402(2010).

228. Hsiao, P.-Y., Wei, Y.-F. and Chang, H.-C., "Unfolding Collapsed Polyelectrolytes in Alternating-Current Electric Fields" , Soft Matter, 7, 1207 (2011).

229. Yeo, L. Y., Chang, H.-C., Chan, P. P. Y. and Friend, J. R. , "Microfluidic Devices for Bioapplications", Small, 7, 12 (2011).

230. Mahon, A. R., Barnes, M. A., Senapati, S., Feder, J., Chang, H.-C. and Lodge, D. M., "Molecular Detection of Invasive Species in Heterogeneous Mixtures using a Carbon Nanotube Platform", PLOS One, 6, 17280 (2011).

231. Chetwani, N., Cassou, C. A., Go, D. B. and Chang, H.-C., "Frequency Dependence of Alternating Current Electrospray Ionization Mass Spectrometry", Anal. Chem., 83, 3017-3023(2011).

232. Ho, J., Tan, M. K., Go, D. B., Friend, J. R. and Chang, H.-C., "A Paper-Based Microfluidic Surfae Acoustic Wave Sample Delivery and Ionization Source for Rapid and Sensitive Ambient Mass Spectrometry", Anal. Chem., 83, 3260-3266(2011) (accelerated article).

233. Senapati, S., Basuray, S., Slouka, Z., Cheng, L.-J. and Chang, H.-C., "A Nanomembrane-Based Nucleic Acid Sensing Platform for Portable Diagnostics" , Topics in Current Chemistry, 304, , 153-169(2011).

234. Kuczenski, R. S., Chang, H.-C. and Revzin, A., "Dielectrophorestic Device for Continuous Sorting of Escherichia coli from blood cells", Biomicrofluidics, 5, 032005 (2011).

235. Cheng, L.-J. and Chang, H.-C., "Microscale pH Actuation by Splitting Water", Biomicrofluidics, 5, 046502 (2011).

236. Chang, H.-C., Yossifon, G. and Demekhin, E. A. , "Nanoscale Electrokinetics and Microvortices: How Microhydrodynamics Affects Nanofluidic Ion Flux", Annual Rev of Fluid Mech, 44, 401-426 (2012).

237. Revzin, A., Maverakis, E. and Chang, H.-C., "Biosensors for Immune Cell Analysis—A Perspective", Biomicrofluidics, 6, 021301 (2012).

238. Wang, Y., Tan, M. K., Go, D. and Chang, H.-C., "Electrospray Cone-Jet Breakup and Droplet Production for Electrolyte Solutions", Europhys Lett, 99, 64003 (2012).

239. Taller, D., Go, D. B. and Chang, H.-C., "Self-Similar Micron-size and Nanosize Drops of Liquid Generated by Surface Acoustic Waves", Phys Rev Lett, 109, 224301 (2012).

240. Chang, H.-C., Demekhin, E. A. and Shelistov, V. S., "Competition Between Dukhin's and Rubinstein's Electrokinetic Modes", Phys Rev E, 86, 046319(2012).

241. Conroy, D. T., Craster, R. V., Matar, O. K., Cheng, L.-J. and Chang, H.-C., "Non-Equilibrium Hysteresis and Wien Effect Water Dissociation at a Bipolar Membrane", Phys Rev E, 86, 056104 (2012).

242. Yan, Y., Wang, L., Xue, J., and Chang, H.-C., "Ion Current Rectification in Conic Nanopores: Nonequilibrium Ion Transport Biased by Ion Selectivity and Spatial Asymmetry", J Chem. Phys., 138, 044706 (2013).

243. Yan, Y., Qian, S., Wang, C., Xue, J. and Chang, H.-C., "Energy Conversion Efficiency of Nanofluidic Batteries : Hydrodynamic Slip and Access Resistance", J Phy Chem C, 117, 8050 (2013).

244. Wang, Y., Cheng, X. and Chang, H.-C., "Celebrating Singularities: Mathematics and Chemical Engineering", AIChE J, 59, 1830 (2013).

245. Wang, Y. , Plouraboue, F. and Chang, H.-C., "Broadband Converging Plasmon Resonance at a Conic Nanotip", Optics Express, 21, 6609(2013).

246. Taller, D., Go, D. N. and Chang, H.-C., "Modulated Exponential Films Generated by Surface Acoustic Waves and Their Role in Liquid Wicking and Aerosolization at a Pinned Drop", Physical Rev E, 87, 053004-6(2013).

247. Slouka, Z., Senapati, S., Yan, Y. and Chang, H.-C., "Charge Inversion, Water Splitting, and Vortex Suppression Due to DNA Sorption on Ion-Selective Membranes and Their Ion-Current Signatures", Langmuir, 29, 8275-83 (2013).

248. Liu, S., Yan, Y., Wang, Y., Senapati, S. and Chang, H.-C., "Plasmonic Hotspots of Dynamically Assembled Nanoparticles in Nanocapillaries: Towards a miRNA Profiling Platform", Biomicrofluidics, 7, 061102 (2013).

249. Hsiao-Ping Chen, Chia-Chun Tsai, Hung-Meng Lee, Shau-Chun Wang and Hsueh-Chia Chang, "Selective Dynamic Concentration of Peptides at Poles of Cation-Selective Nanoporous Granules", Biomicrofluidics, 7 , 044110 (2013).

250. Cheng, L.-J. and Chang, H.-C., "Switchable pH Actuators and 3D Integrated Salt Bridges as New Strategies for Reconfigurable Microfluidic Free-Flow Electrophoretic Separation", LabChip, 14, 979 (2014).

251. Wang, Y., T.-C. Chang, Stoddart, P. R. and Chang, H.-C., "Diffraction-Limited Ultrasensitive Molecular Nano-Arrays with Singular Nanocone Scattering", Biomicrofluidics, 8, 021101 (2014)

252. Senapati, S., Slouka, S., Shah, S. S., Behura, S. K., Shi, Z., Stack, S., Severson, D. W. and Chang, H.-C., "An Ion-Exchange Nanomembrane Sensor for Detection of Nucleic Acids Using a Surface Charge Inversion Phenomenon", Biosensors and Bioelectronics, 60, 92-100 (2014).

253. Slouka, Z., Senapati, S. and Chang, H.-C., "Microfluidic Systems with Ion-Selective Membranes", Annual Review of Analytical Chemistry, 7, 317-335 (2014).

254. O'Neil, P. F., Ben Azouz, A., Vazquez, M., Liu, J., Marczak, S., Slouka, Z., Chang, H.-C., Diamond, D. and Brabazon, D. "Advances in Three-Dimensional Rapid Prototyping of Microfluidic Devices for Biological Applications", Biomicrofluidics , 8, 052112 (2014).

255. Rajesh, S., Yan, Y., Chang, H.-C., Gao, H. and Phillip, W. A., "Mixed Mosaic Membranes Prepared by Layer-by-Layer Assembly", ACS Nano, 8(12), 12338-12445 (2014).

256. Taller, D., Richards K., Slouka, S., Senapati, S., Hill, R., Go, D. B. and Chang, H.-C.,"On-Chip Surface Acoustic Wave Lysis and ion-exchange membrane detection of exosomal RNA for pancreatic cancer study and diagnosis", LabChip , 15, 1656-1666 (2015) (Cover Article)

257. Sun, G., Slouka, Z. and Chang, H.-C., "Fluidic Based Ion Memristors and Ion Latches", Small, 11, 5206-5213(2015).

258. Slouka, Z., Senapati, S., Shah, S., Lawler, R., Shi, Z., Stack, S. and Chang, H.-C., "Integrated, DC Voltage-Driven Nucleic Acid Diagnostic Platform for Real Sample Analysis: Detection of Oral Cancer", Talanta, 145, 35-42 (2015).

259. Yan, Y., Schiffbauer, J. , Yossifon, G. and Chang, H.-C., "Universal Low-Frequency Asymptotes of Dynamic Nanopore Rectification: An Ionic Nanofluidic Inductor", J. Chem Phys, 143, 224705(2015).

260. Rosentsvit, L., Wang, W., Schiffbauer, J., Chang, H.-C. and Yossifon, G., "Ion Current Rectification in Funnel-Shaped NanoChannels: Hysteresis and Inversion Effects", J. Chem. Phys, 143, 224706(2015).

261. Sun, G., Senapati, S. and Chang, H.-C., "High-flux ionic diodes, ionic transistors and ionic amplifiers based on external ion concentration polarization by an ion exchange membrane: a new scalable ionic circuit platform", LabChip, 16, 1171 – 1177 (2016). (Cover Article).

262. Egatz-Gomez, A., Wang, C., Klacsmann, F., Pan, Z., Marczak, S., Wang, Y., Sun, G., Senapati, S. and Chang, H.-C., "Future Microfluidic and Nanofluidic Platforms for Nucleic Acid Biopsy in Precision Medicine", Biomicrofluidics, 10, 032902(2016).

263. Marczak, S., Senapati, S., Slouka, Z. and Chang, H.-C., "Induced Nanoparticle Aggregation for Short Nucleic Acid Quantification by Depletion Isotachophoresis", Biosensors and Bioelectronics, 86, 840-848(2016).

264. Pan, Z., Wang, C., Li, M. and Chang, H.-C., "Universal Scaling of Robust Thermal Hotspot and Ionic Current Enhancement by Focused Ohmic Heating in a Conic Nanopore, Physical Review Letters, 117, 134301(2016).

265. Shah, S. S., Senapati, S., Klacsmann, F., Miller, D. L. , Johnson, J. J., Chang, H.-C., Stack, M. S. , "Current Technologies and Recent Development in Screeing of HPV-Associated Cervical and Oropharyngeal Cancers", Cancers, 8, 85(2016)

266. Li, D., Wang, C., Sun, G., Senapati, S. and Chang, H.-C., "A Shear-Enhanced CNT-Assembly Nanosensor Platform for Ultra-Sensitive and Selective Protein Sensing", Biosensors and Bioelectronics, 97, 143(2017).

267. Sun, G., Pan, Z., Senapati, S. and Chang, H.-C., "Concentration-Gradient Stabilization with Segregated Counter-Ion and Co-Ion Paths: A Quasi-Stationary Depletion Front for Robust Molecular Isolation or Concentration", Physical Rev App, 7, 064024(2017).

268. Go, D., Atashbar, M. Z., Ramshani, Z. and Chang, H.-C., "Surface Acoustic Wave Devices for Chemical Sensing and Microfluidics: a Review and Perspective", Analytical Methods, 9, 412(2017).

269. Marczak, S., Smith, E., Senapati, S. and Chang, H.-C. " Selectivity enhancements in gel-based DNA-nanoparticle assays by membrane-induced isotachophoresis: thermodynamics versus kinetics". Electrophoresis, 38: 2592 (2017).

270. Sensales, S., Peng, Z. and Chang, H.-C. , "Kinetic theory for DNA melting with vibration entropy", J Chem Phys, 147, 135101 (2017).

271. Marczak, S., Richards, K., Ramshani, Z., Smith, E., Senapati, S., Go, D. B. and Chang, H.-C., "Simulateneous isolation and preconcentration of exosomes by ion concentration polarization", Electrophoresis, 39, 2029 (2018).

272. Pan, Z., Men, Y., Senapati, S. and Chang, H.-C. , "Immersed AC Electrospray (iACE) for monodispersed aqueous droplet generation", Biomicrofluidics, 12, 044113(2018)(Editor's Pick).

273. Sensale, S., Peng, Z. and Chang, H.-C., "Acceleration of DNA melting kinetics using alternating electric fields", J of Chem Phys, 149, 085102 (2018).

274. Ghosal, S., Sherwood, J. and Chang, H.-C., "Solid-State nanopore hydrodynamics and transport", Biomicrofluidics, 13, 011301 (2019).

Invited Seminars (Over 180)

"A Singular Perturbation Analysis of the Dynamics of Two-Species Heterogeneous Catalytic Reactions," University of California at Davis, 1980.

"Quasi-Steady-State Analysis of Heterogeneous Catalytic Systems," University of Houston, 1980.

"Multi-Scale Analysis of Global Dynamics in Heterogeneous Catalytic Systems," University of Southern California, 1982.

"The Nonlinear Effects of Stabilizing an Unstable Reactor by Linear Feedback Control," Notre Dame, 1983.

"Nonlinear Dynamic Behavior in Chemical Systems," Texas A & M, 1983.

"High Reynolds Number Flow Through Cubic Arrays of Spheres," University of California, San Diego, 1983.

"Transport in periodic Arrays of Spheres and Cylinders," University of Houston, 1984.

"Bifurcations of a Falling Liquid Film," University of Wisconsin, 1984,

"Evolution on Nonlinear Waves on Falling Films - A Normal Analysis," University of Massachusetts, 1985.

"Effective Conductivity and Diffusivity in Two-Phase Media," Michigan State University, 1985.

"Nonlinear Interfacial Instability," Schlumberger-Doll, Ridgefield, Connecticut, 1985.

"Modelling of Flow in Permeable Media," Gordon Research Conference, New Hampshire, 1986.

"A Galerkin/Spectral Analysis of Flow Transition in Several Model Systems," Princeton University, 1986.

"Nonlinear Dynamics of Systems Under PID Control," University of Texas, Austin, 1986.

"Design of PID Controllers for Nonlinear Systems-A Model Independent Method Based on Bifurcation Theory," Caltech, 1986.

"Flow Transition in Porous Media," University of Notre Dame, 1987.

"PID Control of Nonlinear Systems," University of Pennsylvania, 1987.

"Tuning of PI Controllers for Unknown Systems," East China Institute of Chemical Technology, 1987.

"Nonlinear Waves on Falling Films," East China Institute of Chemical Technology, 1987.

"Flow Transition in Porous Media, "Academia Sinica, 1988.

"Bubble Transport in Capillaries", Colburn Lectureship, University of Delaware, 1988.

"General Dynamic Properties of Nonlinear Systems under PI Control", National Taiwan University, 1988.

"Bubble Transport in Capillaries", National Taiwan University, 1988.

"Nonlinear Dynamics of Systems Under Feedback Control", Illinois Institute of Technology, 1989.

"The Marangoni Effect on the Transport of Bubbles in Capillaries", Engineering Science and Applied Math Dept., Northwestern University, 1990.

"Apparent Viscosity of Bubble Trains in Capillaries", Rheology Seminar, University of Wisconsin, 1990.

"A Generalized Sideband Stability Theory", Aerospace Engineering and Mechanics Dept., University of Minnesota, 1990.

"Selection of Periodic Patterns in Unbounded Domains", Institute of Theoretical Chemistry, University of Tubingen, Germany, 1990.

"Selection of Periodic Patterns in Unbounded Domains", Institute of Paper Science and Technology, Georgia Institute of Technology, 1990.

"Displacement of Liquid by Air Bubbles in Capillaries - the Marangoni Effect", Clarkson University, 1990.

"Displacement of Liquids by Air Bubbles in Capillaries - the Marangoni Effect", MIT, 1991.

"Bifurcation of a Torus in a Delayed Feedback System", Institute of Control Science, USSR Academy of Science, Moscow, 1991.

"Heat Transfer Enhancement by Chaotic Mixing", Argonne National Laboratory, 1991.

"Transition and Pattern Formation in Multi-Phase Channel Flow," Chemical Engineering Dept., Cornell University, 1991.

"Interfacial Patterns and Invariant Manifolds", Applied Math. Group, Cornell University, 1991.

"Spatial Patterns in Two-Phase Flow", Chemical Engineering Department, University of Iowa, 1992.

"Pattern Formation in Multi-Phase Flow", Mathematics Department, Virginia Tech, 1992.

"Interfacial Wave Dynamics on Thin Films", James and Catherine Pattern Seminar, University of Colorado, Boulder, 1992.

"Interfacial Wave Dynamics", West Virginia University, 1992.

"Surface-Tension Driven Flow", West Virginia University, 1992.

"Spatio-Temporal Chaos and Control on a Catalytic Wafer",National Taiwan Institute of Technology, Taipei, December 22, 1992.

"Heat Transfer Enhancement by Chaotic Mixing", National Taiwan University, Taipei, December 22, 1992.

"Heat Transfer Enhancement by Chaotic Mixing", National Tsing Hua University, Hsinchu, December 23, 1992.

"Interfacial Chaos", Tunghai University, Taichung, December 23, 1992.

"Instabilities in Free Convection Near a Heated Plane", Chemical Engineering Department, National Cheng Kung University, Tainan, December 26, 1992.

"Displacement of Liquid by Air Bubbles in Capillaries", Chemical Engineering Department, National Cheng Kung University, Tainan, December 28, 1992.

"Heat-Transfer Enhancement by Chaotic Mixing", Aeronautical Department, National Cheng Kung University, Tainan, December 29, 1992.

"Spatio-Temporal Chaos and Control on a Catalytic Wafer", Chemical Engineering Department, National Cheng Kung University, Tainan, December 30, 1992.

"Interfacial Chaos", Mechanical Engineering Department, National Cheng Kung University, Tainan, December 31, 1992.

"Wave Evolution on a Falling Film," Department of Applied Mathematics and Theoretical Physics, Cambridge University, October 22, 1993.

"Wave Evolution on a Falling Film," Prague Institute of Chemical Technology, October 26, 1993.

"Wave Evolution on a Falling Film", Department of Mathematics, University of Birmingham, November 19, 1993.

"Self-similar Solutions in Interfacial Dynamics", Chemical Engineering Department, Carnegie-Mellon, January 25, 1994.

"Interaction Dynamics of Solitary Waves on a Falling Film", Complex Fluid Seminar Series, Princeton University, Sept. 26, 1994.

"Waves on a Falling Film", Levich Institute of Hydrodynamics, City College of New York, Sept. 27, 1994.

"Wave Dynamics on a Falling Film", University of Missouri-Rolla, March 29, 1995.

"Wave Evolution on a Falling Film", Spatially Extended Conference on Complex Dynamics in Spatially Extended Systems, Niels Bohr Institute, Denmark, Sept. 26, 1995.

"Wave Dynamics on a Falling Film", University of Wisconsin, January 24, 1996

"Self-Similarity in Interfacial Dynamics", Physics Department, University of Chicago, April 15, 1996.

"Falling Film Dynamics,", Mathematics Department, University of Alabama, May 1, 1996.

"A Description of Film Wave Dynamics by Coherent Structure Theory", Applied Mathematics Department, Northwestern University, May 12, 1997.

"Pattern Formation During Electropolishing", Fritz-Haber-Institut der Marx-Planck-Gesellscaft, Berlin, July 21, 1997.

"Drop Formation in Viscoelastic Jets", Department of Mathematical Sciences, Indiana/Purdue University, Indianapolis, October 15, 1997.

"Drop Formation and Pinchoff in Viscoelastic Jets", Mech. Eng. Dept., Arizona State University, November 21, 1997.

"Wave Dynamics on Thin Films", "Pattern Formation in Corrosion and Electropolishing" and "Breakup of Viscoelastic Jets", Mathematics and Engineering Departments, Institute of Technology at Bundung, Indonesia, January 7-9, 1998.

"Wave Dynamics on a Falling Film", Mech. Eng. Dept., MIT, February 27, 1998.

"Modulation Instability of Kinematic Interfacial Waves", Mech. Eng. Dept., UCLA, May 14, 1998.

"Wave Dynamics on a Falling, Film", Chem. Eng. Dept., UCLA, May 15, 1998.

"Homogenization and Scaling Theories for Molecular Transport in Zeolites", Chem. Eng. Dept., University of Naples, June 16, 1998.

"Arnold Diffusion in Zeolite Crystals", Aerospace and Mechanical Engineering Dept., University of Notre Dame, Aug. 31, 1999.

"Nanoscale Pattern Formation During Electrode Dissolution", Chemical Engineering Dept., University of Florida, Oct. 18, 1999.

"Nanoscale Pattern Formation During Electrode Dissolution", Chemical Engineering Dept., University of Houston, November 19, 1999.

"Fast-Igniting Catalytic Converters", Chemical Engineering Dept., Iowa State, March 2, 2000.

"Nanoscale Pattern Formation", Fritz-Haber-Institut der Marx-Planck-Gesellscaft, Berlin, June 16, 2000.

"Fast-Igniting Catalytic Converters", Department of Mathematics, University of Minnesota, Minneapolis, September 7, 2000; Nonlinear Dynamics Seminar Series, Applied Math Program, Princeton University, October 23, 2000.

"Fast-Igniting Catalytic Converters",Department of Mathematics, New Jersey Institute of Technology, Newark, November 3, 2000.

“Fast-Igniting Catalytic Converters”, Mathematics Department,Chinese Normal University, Taipei, Taiwan, December 27, 2000.

“Microdevices and Nanoporous Materials”, College of Engineering, Yuan Ze University, Taiwan, December 28, 2000.

"Microfluidics", Chemical Engineering, National Taiwan University, Dec 18, Chung Cheng University, Dec 20, Cheng Kung University, Dec 22, Changan Hospital and University, Dec 24, Taiwan, 2001.

"Microfluidics", Chemical Engineering, Natioal Seoul University, January 8, KAIST, January 10, KIST, January 11, Korea, 2002.

" Wave Dynamics on Thin Films", Department of Mathematics, Penn State, February, 2002.

"Electrokinetic Microfluidics", Stanley Corrsin Hydrodynamics Lecture, Johns Hopkins University, March 7, 2002.

"Electrokinetic Microfluidics", University of Wisconsin, April 9, 2002.

"Nonlinear Electrokinetic Phenomena and their Microfluidic Applications", Mechanical Engineering Dept, Louisiana State University, September 18, 2002.

"Bioparticle Separation and Detection with Micro-Devices", Academia Sinica, Taipei, Taiwan, December 26, 2002.

"Miniature Medical Diagnostic Kits", National Nano-Device Laboratory, Hsin-Chu, Taiwan, December 27, 2002.

"Application of Electrokinetics to Micro-Fluidic Devices", Carnegie-Mellon, Feb 18, 2003.

"Engineering Double Layers to Control Electro-Dissolution Processes", Ashland Research Laboratory, Columbus, Ohio, April 16, 2003.

"Nano-scale Dissolution Patterns During Electropolishing and Anodization", Argonne National Laboratory, Material Science Division, May 1, 2003.

"Nonlinear Electrokinetics and Microfluidic Devices", Workshop on Complex Fluids, Argonne National Laboratory, July 28 to 31, 2003.

"Application of Electrokinetics in Micro-fluidic Devices", University of Minnesota, Oct 7, 2003.

"Application of Electrokinetics in Micro-fluidic Devices", Michigan Tech, Oct 23, 2003.

"Application of Electrokinetics in Micro-fluidic Devices", Tsinghua University, Dec 18, 2003.

"Application of Electrokinetics in Micro-fluidic Devices", National Taiwan University, Dec 24, 2003.

"Application of Electrokinetics in Micro-fluidic Devices", Center of Bioengineering and Mechanical Engineering Department, University of Missouri, April 6, 2004.

"Non-equilibrium Electrokinetics", Department of Aerospace and Mechanical Engineering, University of Notre Dame, Sept 28, 2004.

"AC Electrokinetic Devices", Department of Bioengineering, Rice University, December 11, 2004.

"Microfludic Designs for Miniature Medical Diagnostic Kits', Keynote Lecture, (Taiwan) Biomedical Engineering Society Annual Symposium, Tainan, Taiwan, December 18, 2004.

"Electrorkinetic Microdevices", Department of Chemical Engineering, Cheng-Kung University, Tainan, Taiwan, Dec 20, 2004.

"Miniature Blood Diagnostic Kits", Department of Biomedical Engineering, Cheng-Kung University, Tainan, Taiwan, Dec 21, 2004.

"Microfludic Designs for Miniature Medical Diagnostic Kits', College of Engineering Honor Lecture, Chong-Cheng University, Chia-Yi, Taiwan, Dec 24, 2004.

"Microfluidic Technology fro Rapid Diagnostic Kits", Bioengineering Department, Rice University, January 31, 2005.

"Rapid Diagnostic Kits for Cancer Detection", Han-Mo Koo Memorial Seminar, Van Andel Research Intitute, Grand Rapids, Feb 9, 2005.

"Microfluidic Technology fro Rapid Diagnostic Kits". Chemical Engineering Department, University of Alberta, March 17, 2005.

"Microfluidic Technology for Rapid Diagnostic Kits", Invited Speakers, Biosensor Symposium, Indianapolis, April 6, 2005.

"Microfluidic Technology for Rapid Diagnostic Kits", Chemical Engineering Depart,ment, University of Houston, April 15, 2005.

"Microfluidic Technology for Rapid Diagnostic Kits", Chemical Engineering Depart,ment, Tsinghua University, Beijing, May 12, 2005.

"Thin Films of Soft Matter", The Bianchi Session, International Center for Mechanical Sciences, Udine, Italy, July 18 to 22, 2005.

"Designing DC and AC Electrokineitc Devices for Miniature Diagnostic Kits", Chemical Engineering, Univ. of Mass, Amherst, Oct 6, 2005.

"Manipulating Nanobeads and Nanorods with Micro-Electrodes to Capture, Detect and Identify Virus/Bacteria", International Symposium on Nano Bioengineering, Chung-Li. Taiwan, Dec 15-16, 2005.

"AC Electrokinetics due to Double Layer Charging", Exxon-Mobil and Levich Institute, October 23 and 24, 2006.

"Directed Assembly of Colloids by AC Electrokinetics", NSF-NSC US/Taiwan Workshop on Soft Materials, Taipei, Jan 4-6, 2007.

"Dielectrophoresis: Double-Layer Effects", Invited Speaker, Material Research Society, San Francisco, April 13, 2007.

"Dielectrophoresis of Nano-Colloids---a New Microfluidic Platform for Biomedical Diagnostic Kits", Monash University, University of Queensalnd and Melbourne University, Australia, May 21-29, 2007.

"Dielectrophoresis of Nano-Colloids", Sandia National Lab., September 24; Bioengineering Department, UC Davis, September 25, 2007.

"Dielectrophoresis of Nano-Colloids", Chemical Engineering, Caltech, Oct, 18, 2007.

"Dielectrophoresis of Nano-Colloids", HKUST, Hong Kong, January, 2008; Academia Sinica, National Taiwan University, Cheng Kung University, Central University, Taiwan, March, 2009.

"Dielectrophoresis of Nano-Colloids", Chemical Engineering, Princeton, April 23, 2008.

"AC Electrospray", Kavli Institute of Physics, Beijing, June, 2008.

"Understanding Eletrokinetics at the Nanoscale", Mechanical Engineering department, University of Houston, February 2009.

"Understanding Electrokinetics at the Nanoscale", SEAS, University of Pennsylvania, April, 2009.

"Understanding Electrokinetics at the Nanoscale", Chinese Academy of Science, Applied Science Insitute, Shanghai, July 2009.

Keynote Lecturer, ACS Colloid and Interfacial Science Symposium, Columbia University, June 2009.

Keynote Lecture, ASME Mini/Micro/NanoChannels Conference, Pohang, Korea, June 2009.

Keynote Lecture, Asian-Pacific LabChip Conference, Shanghai, October 2009.

Invited Speaker, Workshop on Electrokinetics, IMA, University of Minnesota, Dec 2009.

Keynote Lecturer, Second ASME Micro/Nanoscale Heat/Mass Transfer International Conference, Jiaotung University, Shanghai, December 2009.

Invited Speaker, Electrokinetics Conference, Banff, February 2010.

"Rapid Label-Free Molecular Detection by Electrokinetics", EPA, Cincinnati, April 2010.

"Nanofluidics", Academia Sinica, Taiwan, June, 2010; National Tsing-Hua University, June, 2010. National Cheng Kung University, June, 2010.

"Vortices and Instabilities at the Micro/Nanoscale", Plenary Lecture, Wave Phenomena IV, Banff, Canada, June 2010.

"Polaritons at Geometric Singularities", Invited Speaker, Phoresis Workshop, Pohang, Korea, August 2010.

"Nanoporous Membrane Sensors for Portable Nucleic Acid Detection", Plenary Speaker, Chinese-Japan-Korea Analytical Chemistry Conference, Wuhan, October 2010.

"Polaritons at Geometric Singularities", Plenary Speaker, Electrokinetics Workshop, Haifa, Israel, December 2010.

"A new Nucleic Acid Detection Platform based on Nanoporous Membranes", Plenary Speaker, AMN-APLOC, Singapore, January, 2011.

"A Nanofluidic Platform for Cancer Biomarker Detection", Nano-Air Force Workshop, Seattle, March, 2011.

"Micro and Nanofluidics for Mass Spectrometry and Biosensing", Mechanical Engineering Department, University of Louisville, March, 2011.

"Polaritons and Geometric Singularities", Nanofluidics Colloquim, Physics department, Universitait Twente, June 2011.

"Electrokinetic Biochips", Chemical Engineering, Imperial College, June 2011.

"Electrokinetic Biosensors", Mechanical Engineering, University College, London, June 2011.

"Non-Equilibrium Nanofluidics: Rectification, Overlimiting Current and MicroVortex Instability", Engineering, Brown University, September 2011.

"Rectification, Hysteresis and Oscillations in Nanofluidics", Invited Speaker, Electrokinetics Symposium, APS-DFD Annual Meeting, Baltimore, November 2011.

"Microvortex Turbulence Driven by Non-Equilibrium Ion Flux through Ion-Selective Media", Fluid Seminar, Stanford University, January, 2012.

"Nanoporous Membrane Sensor", Plenary Lecture, Advances in Microfluidics and Nanofluidics, Dalian, China, May, 2012.

"Low-Cost Membrane Sensors for Portable Diagnostics", Marine Environmental Sensing Center, Dublin City University, Aug 30, 2012.

"Anomalous Phenomena at Geometric Singularities", Physics Department, University of Missouri, September 17, 2012

"Ion Rectifiers, Capacitors and Inductors", Mechanical Science and Engineering, University of Illinois, Urbana, September 18, 2012.

"Electrokinetic Technologies for Portable Diagnostic Devices", Chemical Engineering. Ohio State University, November 15, 2012.

"Next-Generation Molecular Diagnostics", Bionics Innovation Center, Pazmany P. Catholic University, Budapest, September 17, 2013.

"Field-Use Nucleic Acid Sensors", Bioengineering, University of Texas, El Paso, October 11, 2013.

"Next-Generation of Diagnostic Devices", Bionics Center, Budapest, Hungary, Sept 17, 2013.

"Next Generation Molecular Diagnostics", Suzhou Institute of Biomedical Engingeering and Technology, Oct 23, 2013.

"Next Generation Molecular Diagnostics", Plenary Talk, International Conference of Applied Science, Academia Sinica, Taiwan, Oct 25, 2013.

"Nanoporous Membrane Biosensor", Mechanical Engineering Department, Clemson University, Nov 21, 2013.

"Nanoparticle Assembly for Plasmonic Biosensing", Foundations of Nano Science, Snowbird, Utah.

"Membrane Microfluidics", Advances in Microfluidics and Nanofluidics, Academia Sinica, Taipei, May 24-26, 2014.

"Membrane Microfluidics", Dielectrophoresis 2014, Institute of Physics, London, July 14-16, 2014.

"Ultra-Sensitive Biosensing with Nanopore Ion-Currents and Nanoparticle Plasmonics" Keynote Speaker, China-German Optical Medical Devices Conference, Suzhou, Sept 18-19, 2014.

"Next-Generation Point-of-Care Diagnostics", Workshop on Bionics, Bionics Center, Pazamany Peter Catholic University Budapest, Oct 21-23, 2014.

"Next-Generation Point-of-Care Diagnostics", Keynote Lecture, Taiwan Institute of Chemical Engineers Meeting, Taoyuan, Taiwan, Dec 13, 2014.

"Next-Generation Point-of-Care Diagnostics", Applied Sciences Division, Academia Sinica, Taiwan, Feb 6, 2015.

"Next-Generation Point-of-Care Diagnostics", University of Chile, Santiago, Chile, March 9, 2015. Catholic University, Santiago, Chile, March 11, 2015.

"Next-Generation Point-of-Care Diagnostics", Plenary Speaker, 7th WACBE World Congress on Bioengineering, Singapore, July 6, 2015.

"Portable Nucleic Acid Sensors", Bioselect Microfluidic Congress, San Diego, Sept 2015.

"Nucleic Acid Assay: How to beat Thermodynamic Equilibrium", Bioengineering Department, University of California, San Diego, September 30, 2015.

"Integrated Membrane Sensor", Plenary Speaker, Annual Meeting of American Electrophoresis Society, Salt Lake City, November 2015.

"Ionic Circuits", Electrical Engineering Department, University of Utah, November 5, 2015.

“Next-Generation Point-of-Care Diagnostics”, Chemical Engineering Department, National University of Singapore, January 2016; IMRE, ASTAR, Singapore, January 2016.

“Membrane Microfluidics for miRNA Profiling”, Mechanical Engineering, University of Pittsburg, March 2016.

“A Billion-Droplet Digital PCR Platform”, Keynote lecture, Microfluidics Congress, San Diego, September 2016.

“Ionic Circuits for Molecular Analysis”, Keynote lecture, Bionics Center PhD Congress, Budapest, Hungary, November 2016.

“Ionic Circuits for Molecular Diagnostics”, Physics of Microfluidics, Israel, January 2017.

"Nanotechnology for Exosome and miRNA Isolation/Quantification," Notre Dame Harper Cancer Institute-USC Norris Cancer Center retreat, University of Southern California, February 9, 2017.

“Biochips for Short Nucleic Acid Quantification Based on Nonlinear Ionic Circuitries with Perm-Selective Membranes”, Mechanical Engineering, University of Alberta, April 2017.

"Biochips for Short Nucleic Acid Quantification Based on Ion-Selective Nanoporous Membranes and Nanopores," Materials Week, Ohio State University, May, 2017.

"Nanopore Translocation and Unbiased miRNA Profiling," Plenary Talk, AMN-ISMN-APCBM-ANZNMF conference, Tasmania, Australia June 29, 2017

“Nanopore Quantification of miRNA”, Plenary Talk, Microfluidics Congress, San Diego, October 2, 2017.

“Towards quantification of large-library biomarkers for personalized medicine”, Plenary Talk, Advances in Pharmaceutical Analysis, Wuhan, November 18, 2017.

“Nanopore miRNA profiling Technology”, Plenary Talk, Microfluidics Workshop, Chinese Academy of Science, Institute of Modern Physics, Lanzhou, June 13, 2018.

“Biosensors based on nonlinear ionic circuits, Distinguished lecture, Department of Mechanical Engineering, Boston University, September 14, 2018.

"PCR-Free MicroRNA Quantification Based on Ion-Selective Nanoporous Membranes and Nanopores", Plenary talk, 10th Annual Lab-on-a-Chip and Microfluidics Congress, San Diego, October 1, 2018.

"Electrokinetics and Plasmonics at NanoScale Singularities", Invited Talk, TIX Conference, Haifa, Israel, December 4, 2018.

"Electrokinetics and Plasmonics at NanoScale Singularities: Designing Next-Generation Molecular Diagnostics", Okinawa Institute of Science & Technolog, Okinawa, December 20, 2018.

"High-yield Isolation and Quantification of Exosomes and Exosomal miRNA", International Molecular Medicine Tri-Conference, San Francisco, March 11, 2019.

Funded Research (Over $20 Million)

NSF, DOE, DOD, NASA, NIH, USDA, IBM, ExxonMobil, Far Eastern, Schlumberger, Naval Medical Lab, Air Force Office of Research, Army Corp of Engineering, DTRA, ACS-PRF, Great Lakes Conservation Agency, Welch Foundation, Walter Cancer Foundation, Gas Research Institute, TAPPI, Bayer Diagnostics, US-Israel BSF.

"Perturbation Analysis of Heterogeneous Catalytic Dynamics," NSF, 1981-1984, $50,000.

"Analysis of Transient Behavior in Chemical Engineering," ACS-PRF, 1981-1983, $10,000.

"Transport in Porous Media - Steady and Dynamic Behaviors in Inertial and Turbulent Regions," ACS-PRF, 1984-1986, $33,000.

"Washing and Plugging Mechanism in Formation Damage," Schlumberger Well Service, 1985-1986, $20,000.

"Application of Nonlinear Techniques to Control and Fluid Dynamics - PYI Award," NSF, 1985-1990, $500,000. (REU Supplement: $15,000)

"Enhanced Oil Recovery Consortium," 1985-1987, $95,000/year from industrial sponsors, $50,000/year from state funds. PI: H. Deans (With E. Claridge).

"Dynamic Modeling of CO Oxidation on Platinum," The Robert A. Welch Foundation, 1986-1987, $60,000.

"High Reynolds Number Flow in Porous Media," ACS-PRF, 1986-1988, $35,000.

"Dielectric Breakdown Due to Electrothermal Instability," Jesse M. Jones Faculty Research Fund, 1988-1989, $10,000.

"Stability of Core-Annular Flow in Lubricated Transport of Oil", ACS-PRF, 1988-1990, $40,000. (With M. J. McCready.)

"Enhancement of Heat Transfer by Chaotic Mixing", Gas Research Institute, 1990-1993, $300,000 (With M. Sen).

"Nonlinear Dynamics and Control of Complex Patterns", NSF, 1991-1994, $200,000.

"Hydrodynamic Instability of Forming", TAPPI, 1992, $40,000.

"Wave Dynamics on Falling Films and Its Effects on Heat/Mass Transfer", DOE, 1992-1995, $185,000.

"Thermal Front Propagation of Fast Igniting Catalytic Converters", 1992-1995, NSF, $250,000 (With E. E. Wolf). (REU Supplement: $15,000)

"Study of disturbances in fluid-fluid flows in open and closed systems", NASA, 1992-1995, $300,000 (with M. J. McCready and D. T. Leighton).

"Fundamental Processes of Atomization in Fluid-Fluid Flows", NASA, 1996-2000, $520,000, (with M. J. McCready and D. T. Leighton).

"Nonlinear Dynamics and Control," NSF, 1996-1999, $170,000. (REU Supplement: $20,000)

"When are Hexagons Preferred," Faculty Research Program, 1997, $7,500.
"Electrochemical Self-Organization," NSF, 1997-2000, $220,000, (with A. E. Miller).

"Molecular Design of Lubricants", Mobil Foundation, 1998-2000, $30,000 (with E. J. Maginn).

"Wave-Enhanced Heat and Mass Transfer", NSF, 1998-2000, $160,000 (with M. J. McCready and K. T. Yang). (REU Supplement: $5,000)

"Electrokinetic Flow Design for Micro-Laboratories on a Chip", NSF, 1999-2002, $400,000 (with D. T. Leighton).

"Self-Assembly During Evaporation of Colloidal Solutions", Kraft Food, 1999-2002, $65,000.

“Effects of Local Interfacial and Flow Dynamics on Foam Drying and Coarsening”, NSF, 2001-2003, $488,000(with J. Glazier).

“Colloidal Microfluidics for Diagnostic Kits”, Bayer Diagnostics, 2001, $5,000.

“Microcirculation Anomalies in Microgravity Blood Flow”, NASA, 2001-2005, $400,000 (with A. Ostafin).

“Fuel Cell Research”, Army, 2003-2006, $1,600,000 (PI: P. J. McGinn), 10 PI’s with $290,000 towards microfluidics research (with D. T. Leighton and M. J. McCready).

“Micro-Fuel Cells”, 21st Century Fund, State of Indiana, 2004-2006, $1,000,000 (PI: P. J. McGinn). Microfluidics share (with D. T. Leighton and M. J. McCready): $300,000.

“Center for Microfluidics and Medical Diagnostics”, University of Notre Dame, 2003-2007. $400,000.

"Electromagnetically Controlled Self-Assembly of Nano and Micro Collloids for Miniature Medical Diagnotic Kits", Notre Dame-Argonne Frontiers in Material Science Grant, 2003-2005, $200,000 (with I. Aronson).

"Faradaic Micro-fluidic Devices for Complex Fluids", NSF, 2005-2007, $100,000.

"Protein Micropump", SHOT Inc., 2005-2007, $48,000.

"Silica Beads for Rapid and Reversible Virus and Bacteria Trapping", Scientiflc Methods Inc., 2005, $20,000. (EPA-SBIR Phase I).

"Risk assessment and management of the Great Lakes species", Great Lakes Protection Fund, 2006-2009, $1,090,000, PI: D. Lodge (with J. Feder).

"Developing and Applying a Portable Real-Time Genetic Probe for Detecting Aquatic Invasive Species in Ship's Ballast, Great Lake Protection Fund, 2007-2010, $805,000, PI: D. Lodge (with J. Feder).

"Microfilters for Nano-Aerosol Filtration", Defense Threat Reduction Agency, 2008-2011, $652,217 (with Y. Zhu).

"Collaborative Research: Development of a Biofluid Transport, Separation and Molecular Analysis System using Microfluidics and a Miniature Mass Spectrometer",National Science Foundation, 2009-2011, $1,500,000, PI: P. W Bohn (with G. Cooke and Z. Ou-yang) joint Purdue-ND project.

"Novel malaria vaccine targets linked to nutrient and lipid import". Gates Foundation Phase 1, 2009-2010, $100,000 PI: K. Haldar (with C. McDowell).

"Novel Microsystems for Manipulation and Analysis of Immune Cells," National Science Foundation, 2009-2013, $2,000,000, PI: A. Revzin (with J. Van der Water and T. Pan).

"Dielectrophoresis of Nanocolloids: A New Technique for Capturing Biomolecules and Biomarkers", United States-Israel Binational Science Foundation, 2010-2014, $156,975 (with G. Yossifon and M. Touvia).

"A Nanomembrane-Based Nucleic Acid Sensing Platform", National Science Foundation, 2011-2014, $325,000 (with L.-J. Cheng)

"Nanofluidic Pre-concentration Devices for Enhancing the Detection Sensitivity and Selectivity of Biomarkers for Human Performance Monitoring", Air Force Office of Scientific Research, 2011-2014, $200,000, PI:N. Swami.

"A Rapid and High-Throughput Pathogen RNA Detection System for Dairy Products", US Department of Agriculture, 2012-2016, $500,000 (with A. Ramachandran, R.

Vanapalli, L-J Cheng and S. Senapati.)

"Miniature Biosensor Unit for RNA detection of E coli", US Army Corp of Engineers, 2012-2013, $110,000 (with S. Senapati and S. Shah).

"Nanomembrane-Based Nucleic Acid Sensing for Simultaneous Papillomavirus (HPV) HPV-induced microRNAs in Oropharygeal Cancers", Walther Cancer Institute, 2012-2014, $200,000 (with S. Stack)

"Develop a Multi-target Sensor to Detect Dengue Serotypes from Infected Mosquitoes", National Institute of Health, 2014-2017, $418,000 (PI: S. Senapati)

"Next-Generation Medical Diagnostic Devices: Phase 1", Far Eastern, 2015-2016, $200,000.

"Dielectrophoretic Assembly of Carbon Nanotubes for Next Generation FET Chips", IBM, 2015-1016, $150,000 (+$67,000 ND Matching).

"Development of a non-PCR RNA-Based Integrated Biosensing Platform for Detection of all four Dengue Virus Serotypes", Naval Medical Research Center, 2016, $66,000.

"A Solid State Nanopore miRNA Quantification Technology", National Institute of Health, 2016-2019, $600,000 (with Senapati).

"An Integrated Microfluidics Platform for Rapid and Sensitive Exosome RNA Detection" , National Institute of Health, 2016-2018, $425,000 (with D. Go, S. Senapati and R. Hill).

"Next-Generation Medical Diagnostic Devices: Phase 2", Far Eastern, 2016-2018, $600,000.

"Thermal Evaporation around Optically Excited Functionalized Nanoparticles", National Science Foundation, 2017-2020, $350,000 (PI: Tengfei Luo).

"The impact of Nanostructure Geometry on Photo-Thermal Evaporation Processes", CASIS (Center for the Advancement of Science in Space), 2017-2021, $420,000 (PI: Tengfei Luo).

"SemiSynBio: CardiacMuscle-Cell-Based Couple Oscillator Network", 2018-2020, $1,125,000 NSF and $375,000 SRC (PI: P Zorlutuna)

"miRNA-based Detection of Reperfusion Injury for Therapy Management in Myocardial Infarction", National Institute of Health R01, 2018-2022, $1,635,000 (PI: Zorlutuna)

“An Automated High-Throughput Multiplexed Detection Platform for Real-Time Monitoring of Protein Fingerprints in Cell Media”, Advanced Regenerative Manufacturing Initiative, 2019-2011, $1,327,442.

Graduate Students Supervised (43 total, 35 PhDs, 16 Academics in Bold)

I.) University of California, Santa Barbara

M. Aluko, Ph.D., 1983, "Multiple-Time-Scale Analysis of Heterogeneous Catalytic Reaction Systems". Current position: **Vice-Chancellor (President), Federal University, Otuoke, Bayelsa State, Nigeria**.

V. Ravindran, M. S., 1984, "Mathematical Modelling of a Cycling Zone Extraction Process".

A. Lahbabi, Ph.D., 1985, "Solution of Navier-Stokes Equation in Periodic Media". Current position: **Professor at Ecole Nationale de L'Industrie, Morocco**.

II.) University of Houston

R. Srinivasan, M. S., 1986, "Application of Spectral Methods to Asymmetric Bifurcation
of Flow Fields in Symmetric Closed Domains".

S.-S. Ni, M. S., 1986, "Bubble Flow in Capillary Tubes".

S.-H. Hwang, Ph.D., 1987, "Control of Nonlinear Systems - An Application of Dynamic Singularity Theory". Current position: **Professor at National Cheng Kung University, Taiwan**.

E. Boe, Ph.D., 1988, "The Dynamics and Control of Nonlinear Systems Possessing a Large Time Delay". Current position: Vice-President of Research at Pavilion.

J. Ratulowski, Ph.D., 1988, "Mathematical Modeling of the Mechanisms of Bubble Transport in Single Capillaries". Current position: Director of Flow Characterization, Schlumberger Well Service.

S.-M. F. Chiao, Ph.D., 1988, "Viscoelastic Flow in a Cylinder with a Rotating Lid - A Galerkin/Spectral Formulation". Current position: **Professor at Tung Hai University, Taiwan.**

III.) University of Notre Dame

A. K. Singh, M. S., 1990, "The Stability of Rimming Flows".

S. Ghosh, M.S., 1991, "Chaotic Enhancement of Heat Transfer", Current position: Group leader of fuel cell program at United Technologies.

T. Prokopiou, Ph.D., 1992, "Nonlinear Waves on Liquid Interfaces". [Joint with M. J. McCready]. Current position: Owner of Gnomon consulting firm..

C. C. Chen, Ph.D., 1992, "Pattern Formation and Control". Current position: **Professor and Chair of Chemical Engineering at Chong-Cheng University, Taiwan.**

M. Cheng, Ph.D., 1994, "Sideband and Subharmonic Instabilities of Finite-Amplitude Monochromatic Waves". Current position: Researcher at Chevron Research.

C. K. Cheng, M.S., 1994, "Study of Wave Evolution in Gas-Sheared Films and Falling Liquid Films Using Optical Imaging".

S. Kalliadasis Ph.D., 1994, "Self-Similar Interfacial and Wetting Dynamics". Current position: **Professor of Fluid Mechanics, Chemical Engineering Department, Imperial College, England**.

M. Sangalli, Ph.D., 1995, [Joint with M. J. McCready],"A Study of Weakly Nonlinear Waves in Stratified Fluid-Fluid Flows and Distributed Reactors". Current position: Senior Research Engineer at UOP.

I. Veretennikov, Ph.D., 1997, "Experimental Study of Contact-Line Dynamics". Current position: Research Engineer, Bruker USA.

A. Indeikina, Ph.D., 1998, "Averaging over Multiple and Continuous Scales".
Curent Position: Mother and housewife.

R. Roberts, Ph.D., 1998, [Joint with M. J. McCready], "Interfacial Wave Behavior and Mass Transfer of Multi-Fluid Flows". Current position: Researcher at Chevron.

Y. Ye, Ph.D., 1998, "Instabilities of Thin-Film Waves and Fronts". Current position: Research Engineer at DuPont.

V. V. Yuzhakov, Ph.D., 1999, [Joint with A. E. Miller],"Electrochemical Self-Organizaiton of Ordered Nanoscale Structures". Current position: Manager, Bayer Diagnostics.

P. Takhistov, M.S., 1999, "Experimental Study of Electro-Hydrodynamic Phenomena". Current position: **Associate Professor at Food Science Dept, Rutgers University.**

J. Keith, Ph.D., 2000 [Joint with D. T. Leighton], "Novel Reactor Design for Pollution Reduction". Shaheen Awardee for best Notre Dame PhD. Notre Dame Saheen Best Engineering PhD Awardee. Current position: **Deavenport Professor and Dean of Engineering, Mississippi State.**

K. Duginova, M. S., 2002, “Suspensions in Micro-Channels”.

D. Kopelevich Ph.D. 2002, “Transport in Nano-materials due to Thermal Noise and Deterministic Dynamics”. Current position: **Associate Professor, Chemical Engineering, University of Florida (2007 NSF Career Awardee).**

S. Thamida, Ph. D. 2002, “Instability Mechanisms in Micro-Fluidics and Nano-Materials”. Current position: **Assistant Professor, Chemical Engineering, National Institute of Technology, Warangal, India**.

G. Arya, Ph. D. 2003 (joint with E. J. Maginn), “Molecular Simulation of Transport in Nanoporous Material”, Current position: **Associate Professor, Mechanical Engineering, Duke University.**

A. Minerick, Ph. D. 2003, “Medical Diagnostic Microfluidics and Physiological Blood Flow Dynamics”, Current position: **Professor and Associate Dean, Chemical Engineering, Michigan Tech (2007 NSF Career Awardee), member of National Academy for the Advancement of Science.**

Y. Ben, PhD. 2004, “Nonlinear Electrokinetic Phenomena in MicroDevices”, Current position: **Assistant Professor, Chinese Academy of Science, Beijing**.

R. Zhou, Ph. D. 2006, “Microfluidics of Micro- and Nano-Colloidal Suspensions: Designing Future Miniature Diagnostic Devices”. Current position: Research Engineer, Rohm and Haas.

P. Wang, Ph. D. 2007, “Electrokinetic Pumping and Spraying at Micro- and Nano-Scales”. Current position: Research Engineer, Chevron.

D. S. Hou, Ph. D., 2008, “Designing Microfluidic Components for Analyte Concentratoin and Identification Using AC Electrokinetics”. Current position: Research Engineer, Merck.

S. Maheshwari, Ph. D., 2008, “Anomalous Microfluidic Behavior Near Singular Interfaces”. Current Position: Research Engineer, Silverbrook Research, Sydney.

Zachary Gagnon, Ph. D., 2009, “Integrated AC Electrokinetics: Fundamental Design and Analysis for Portable Cellular and Molecular Diagnostics”. Shaheen Awardee for best Notre Dame PhD. Notre Dame Saheen Best Engineering PhD Awardee. Current Position: **Associate Professor, Chemical Engineering, Texas A & M, 2014 NSF Career Awardee**.

Sagnik Basuray, Ph.D. 2011, “Dielectrophoresis and Its Application to Biomedical Diagnostic Platforms”. Notre Dame Saheen Best Engineering PhD Awardee. Current

position: **Assistant Professor, Chemical Engineering, New Jersey Institute of Technology.**

Xinguang Cheng, Ph. D. 2011, “Singular Harmonics near a Taylor cone”. Current position: Analyst, Kemper Corp.

Nishant Chetwani, Ph. D. 2011, “AC Electrospray at Interfacial Singularities”. Current position: Research Engineer, Intel.

Yunshan Wang, Ph. D. 2014, “Novel Optical Biosensors: Singular Intensity Amplification and Molecular Trapping Enhancement at Nanoscales”. Current position**: Assistant Professor, Chemical Engineering, University of Utah.**

Daniel Taller, Ph.D. 2015 [joint with David Go], “Surface Acoustic Wave Microfluidics: Droplets, Pinned Liquid Films and Biodetection”. Current position: Livermore National Lab.

Yu Yan, PhD. 2015. “Non-Equilibrium Ion Transport in Nanofluidic Devices”. Current position: Research Engineer, Google.

Gongchen Sun. 2017. “Nonlinear Ionic Circuits and Ionic Memristors for Integrated Liquid Biopsy Chips”, Current position: postdoc, Georgia Tech.

Steven Marczak, 2017. “Beyond Equilibrium: Using Ion Concentration Polarization to Enhance the Detection and Selectivity of Nucleic Acids and the Isolation of Exosomes”, Current position: Researcher, Defense Intelligence Agency.

Current PhD Students and Expected Graduation Dates

Zehao Pan (2019) (BS: Mechanical Engineering, Tsinghua)
Diya Li (2019) (BS: Chemical Engineering, U Penn)
Sebastian Sensale (2020) (BS: Math, Uruguay)
Chenguang Zhang (2021) (BS: MicroElectronics, Peking University)
Vivek (2022) (BS: Chemical Engineering, IIT)
Stuart Ryan Blood (2023) [joint with Pinar Zorlutuna] (BS Chemical Engineering, Kentucky)

Post-Docs and Research Professors Supervised (24 total, 15 academics in bold)

W. Q. Lu, 1984-1986, Current position: **Research Fellow, Institute of Mechanics, Chinese Academy of Science, Beijing. (Retired)**.

L.-H. Chen, 1984-1990, Current position: **Professor, East China University of Chemical Technology, China. (Retired)**

Eugene Kalaidin, 1996-1999, Current position: **Professor and Chair, Department of Applied Mathematics, Kuban State University, Russia.**

P. Takhisotv, 2000-2002, Current position: **Associate Professor, Food Science Dept, Rutgers University.**

J. Wu, 2003-2004: Current position: **Professor, Electrical Engineering, University of Tennessee. (2005 NSF Career Awardee.)**

E. A. Demekhin, 1994-2004. Current position: **Professor, Krasnodar University, Russia**.

D. Lastochkin, 2003-2005. Current position: Post-doc at University of Notre Dame.

L. Yeo, 2003-2005: Current position: **Professor, Mechanical Engineering, Royal Melbourne Institute of Technology, Australia (2007 Young Tall Poppy Award for Top Young Australian Academic).**

Z. Chen, 2004-2007. Current position: **Luojia Chair Professor, Associate Dean, Pharmaceutical College, Wuhan University, China.**

S. Sengupta, 2005-2007 Current position: **Associate Professor, Bioengineering Department, University of Missouri, Columbia**.

G. Yossifon, 2007-2009. Current position: **Associate Professor, Mechanical Engineering Department, Technion University, Israel.**

R. Kuczinski, 2009-2010. Current position: Research Engineer, Genentech

Ming Kwan Tan, 2010-2011. Current position: **Assistant Professor, Mechanical Engineering, Swinburne University, Sarawak, Malaysia**.

Jenny Ho, 2010. Current position: Start-up, Singapore.

Z. Slouka, 2009-2011, 2012-2014. Current position: **Associate Professor, Chemical Engineering, Prague Institute of Technology, Czech Republic**.

Larry Li-Jing Cheng, 2010-2013 (Research Professor) Current position: **Assistant Professor, Electrical Engineering, Oregon State.**

Shoupeng Liu, 2013-2014 (Postdoc) Current position: **Associate Fellow, Souzhou Institute of Biomedical Engineering and Technology, Chinese Academy of Science**.

Yongfan Men, 2014-16 (Postdoc) Current position: **Assistant Professor, Shenzhen Institute of Advanced Technology, Chinese Academy of Science, Shenzhen, China.**

Jarrod Schiffbauer, 2016-17 (Postdoc) Current position: **Assistant Professor, Colorado Mesa**

Sunny Shah, 2010-2017 (Postdoc, Research Scientist) Current position**: Project Manager, Endotronix.**

Current Postdocs, Senior Scientists and Research Professors

S. Senapati, 2007-Present (Research Professor)
Ceming Wang, 2015-Present (PostDoc)
Zeinab Ramshani, 2016-Present (Postdoc)
Ze Yin, 2017-Present (Postdoc)

Undergraduate Researchers and Visiting Students

Name	Year	Undergrad. University	Subject	Graduate School
Tanto Hartono	1988-89	Notre Dame	Chaotic Dynamics of a Surge Tank	Caltech
Grace Su	1991-92	Michigan	Falling Film Wave Dynamics	UCLA
See-Eng Pham	1993-95	Cornell	Colloidal Rheology	Princeton
Abhishek Agarwal	1995-97	Purdue	Rivulet Dynamics	Wisconsin (EE)
Carolina Wu	1997-99	Notre Dame	Fractal Dewetting	Cornell
Kathy Wu	1997-98	Stanford	Corrosion Dynamics	Industry
Eric Sherer	1997-00	Caltech	Crystallization Patterns, Corrosion Dynamics and Fast Igniting Catalytic Converters	Purdue
Alison Weltner	1999-01	Notre Dame	Physiodogical Dynamics of a Fish, DNA Sequencing with Wavelets	Industry
Justin Burt	2001-02	Notre Dame	Microfluidics for Diagnostic Kits	Texas
Kim Hatley	2004-05	Notre Dame	Biotissue for Drug Encapsulation	Industry
Andy Downard	2004-05	Notre Dame	Microfluidics and Tech Transfer	Caltech

Mike Coogan	2005-06	Notre Dame	Bacteria Detection	Industry
WenTao Luo	2005-06	Notre Dame	Microfluidics	Industry
Korey Chu	2005-08	Notre Dame	Microfluidics	Industry
Donny Putra	2006-07	Notre Dame	CNT Sensors	Hopkins
Andy Aijia	2007-08	Notre Dame	CNT Impedance	UCLA
Patrick Kuscik	2008-09	Notre Dame	Genetic Diagnostics	Med School
Peter Musheheimer	2008-10	Notre Dame	Nanoslot Electrokinetics	Wisconsin
Bryan Caufield	2008-09	Notre Dame	Genetic Diagnostics	Industry
Lauren Floccare	2008- 09	Notre Dame	Nanocolloid DEP	Industry
Yunshan Wang	2008	Peking Univ	Nanofabrication	Notre Dame
Thomas Hagan	2009-10	Notre Dame	Nanocolloid Impedance	UC San Diego
Andrew Loza	2009-10	Notre Dame	RNA Sensing	Washington U. Med School
Andrew Chapouros	2009-11	Notre Dame	DNA Sensing	Industry
David Riehm	2009-11	Notre Dame	Solar Cells	Minnesota
Paul Scheel	2010-11	Notre Dame	Protein Sensing	Northwestern Medical Sch.
Truong Pham	2011-12	Notre Dame	Photoconductive Sensing	Minnesota
Christine Rusting	2011-12	Notre Dame	Nanoporous Membrane Sensor	Industry
Andrew Ayoob	2011-12	Notre Dame	Proteomic Mass Spectrometry	Harvard
Nick Rodriguez	2011- 12	Notre Dame	Membrane Sensor	Northwestern
Dario Mazza	2012	Imperial	Photoconductive Sensing	Imperial
Mark Sonderman	2012	Notre Dame	Membrane Sensor	Industry
Nicholas Schmeidler	2012	Notre Dame	Membrane Sensor	Industry
Sara Dale	2012	Notre Dame	Surface Acoustic Wave Mass Spect	Industry
Nicole McMillan	2012	Notre Dame	Membrane Sensor	Industry
Annie Shepherd	2013	Notre Dame	Membrane Sensor	Industry
Robin Lawler	2013	Notre Dame	Membrane Sensor	Georgia Tech
Chris Walker	2013	Notre Dame	Membrane Sensor	North Carolina State
Hongtan Du	2013	Peking Univ.	Nanofunnel Agglutination	Peking Univ
Didi She	2013	Peking Univ.	Si Cone Plasmonics	Univ of Penn
Bihan Zhu	2013	Notre Dame	Nanocone Array	Cornell
Karla Gonzalez	2013	Monterey Tec.	AC Electrospinning	Notre Dame
Andrew Chang	2013	Chung Cheng	Integrated Chip	Post Doc
Katelin Hansen	2014	Notre Dame	Membrane Sensor	Industry
David Schipper	2014	Notre Dame	RT-PCR with Conductance Sensors	Industry
Yurui Qu	2014	Zhejiang Univ	Positive Gain Nanoparticles	Zhejiang
Jia Chloe Gao	2014	Fudan	Membrane Sensors	UC Berkeley
Franklin Mejia	2014	Monterrey Tech	Upconversion Nanoparticles	Notre Dame
Rose Dorfler	2014-16	Notre Dame	Endotoxin Detection	Fulbright
				Carnegie-Mellon
Paul O'Neil	2015	Dublin City U	3D Chip Fabrication	DCU
Flora Kleicmann	2015-16	Eotvos, Hungary	miRNA Separation	Pazmony Catholic
Elaine Smith	2016-17	Notre Dame	depletion nanoparticle assay	Industry
Olivia Frasher	2017-	Notre Dame	membrane sensor	

Ellen Cathill	2017	UC Dublin	transdermal microneedle array	UCDublin

High-School Interns

Name	Year	High School	Subject	College/Graduate School
Ashok Agarwal	1998-99	Elkhart	Wetting	Purdue (BS) Wisconsin (PhD)
Alex Cao	2012-2013	Penn	PCR Chip	Notre Dame (BS)
Raymond Han	2012	Adams	Fuel Cells	University of Chicago