CURRICULUM VITAE
HSUEH-CHIA CHANG

Birthdate November 19, 1954 **Websites**: Group: www.nd.edu/~changlab

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

Professional Experience

2013-2016	Fellow, Notre Dame Institute for Asia and Asian Studies
2011	Distinguished Visiting Fellow, UK Royal Society of Engineering, Imperial College.
2010-Present	Adjunct Appointment, National Tsing Hua University
2010-Present	Chief Scientific Advisor, FCubed, LLC
2006-Present	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, University of 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
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
Founding and Chief Editor, Biomicrofluidics (2011 SCI Index 3.895), American Institute of Physics, Appointed 2006.
Distinguished Visiting Fellow Award, Royal Society of Engineering, UK, 2011.
1st Source Commercialization Award, Notre Dame, 2013.

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) to initiate Tech Transfer at Notre Dame. Five issued patents and five pending. Serve as the Chief Scientific Advisor of FCubed LLC http://fcubed.iviehost.com/, with 10 employees, which licensed three technologies and working with the Notre Dame Haiti Program. Won the Notre Dame 1st Source Commercialization Award from the 1st Source Bank of Indiana (2013) < http://www.insideindianabusiness.com/newsitem.asp?ID=59027>.

Served on Inaugural Steering Committee of the Advanced Diagnostics and Therapeutics Initiative at Notre Dame, a multi-million initiative at Notre Dame, and contributed to the hiring of 8 Research Professors and two senior faculty.

Founding and Current Chief Editor of Biomicrofluidics of the American Institute of Physics (2006-present). First AIP journal in medical/biological fields, first to be electronic only and first to be open-access. Founded an affiliated conference Advances in Microfluidics and Nanofluidics that has been held at Hong Kong, Singapore, Dalian, Notre Dame and Taipei (May, 2014).

Extensive collaboration and appointments in Asia and Europe : Courtesy appointment at National Cheng Kung and National Tsinghua in Taiwan, Distinguished Visiting Fellow at Imperial College, joint grants with collaborators in Israel, Taiwan, Australia, Czech Republic

Personal Statement on Recent Research/Professional Activity (2004-2014)

H-C Chang is a leader in electrokinetics, an important micro/nanofluidic technology for biochip and diagnostic applications. His approach combines insightful theoretical analysis with simple but creative experiments to uncover new electrokinetic phenomena or to verify speculated ones, among them AC cone spray/electrospinning, electrokinetic molecular assay, nanocolloid dielectrophoresis, monolayer enabled field dissociation of water, field-induced microvortices near ion-selective media, tip plasmonics etc. He is also able to apply and integrate these new phenomena into several new microfluidic technologies for biosensing, mass spectrometry and bioseparation. Chia is the coauthor of a seminal book on Electrokinetics and he is the founding editor of Biomicrofluidics, the first American Institute of Physics journal in biology and the first to be open-access. In four years, he has led the journal to an impact factor of 3.89, which ranks it among the highest in microfluidics and fluid mechanics journals. He is on the organization committee of several international microfluidic conferences, including Advanced Microfluidics and Nanofluidics, an annual Asian conference that he founded. Chia is the Director of the Center for Microfluidics and Medical Diagnostics at the University of Notre Dame, where he has initiated the first technology transfer efforts. He and his PhD and postdoc students are inventors

of 6 Notre Dame patents and 4 provisional patents. Three technologies have been licensed by startups. One startup FCubed LLC is located at Notre Dame and has a staff of 17. Since 2003, 14 PhD and post-doc students of the Chang laboratory have embarked on academic careers as tenure-track professors at Chemical Engineering, Mechanical Engineering, Electrical Engineering, Food Science, Chemistry departments at Mississippi State, Michigan Tech, Florida, IISci (India), UC San Diego, Rutgers, Chinese Acad of Sci., Tennessee, Monash (Australia), Wuhan (China), Missouri, Technion, Johns Hopkins and Oregon State. Two of them (Jason Keith and Zilin Chen) now hold endowed chairs and four of them (Jayne Wu, Dmitry Kopelevich, Adrienne Minerick and Zach Gagnon) were awarded the NSF Career Award and three are women. (Chia's first PhD student in 1984, M. Aluko, is an African American and is now the chair of the Chemical Engineering department at Howard University.) Several undergraduate students who worked in his lab. are currently at top graduate programs: Purdue, Texas, Johns Hopkins, Caltech, Wisconsin, UC San Diego and Minnesota. Chia is actively involved in local educational outreach: he has hosted local high-school students (A. Agarwal, Korey Chu, Alex Cao) and a local high-school teacher (Connie Biegel) via a RET supplement to his NSF grants. His lab has regular visitors from foreign and US institutions. During the 2013-2014 academic year, the visitors include PhD students from Chong Cheng University, Taiwan (Andrew Chang), Monterrey Tech, Mexico (Karla Gonzalez) and Peking University (Didi She and Hongtan Du), professors from Swinburn, Australia (Paul Stoddart), Moscow State (Evgeny Demekhin) and Imperial (Richard Craster). Other than these visitors, his group collaborates with the Food Science Department of Purdue University on Brucella detection in milk, the Ecks Institute of Global Health on dengue virus and TB biomarker detection, Harper Cancer Institute on oral cancer microRNA biomarker detection, Air Force Scientific Research Lab on fatigue biomarker detection, Army Research Lab on portable E. Coli detection, Monash on SAW mass spectrometry, Imperial College and Northwestern on non-equilibrium ion transport, Tsinghua National University and Academia Sinica on field stretching of DNA, Cheng Kung University on dielectrophoretic cell/molecule trapping/sorting and Peking University on Nanopore Sensing and Fabrication. The expertise of these collaborators in Medicine, Physics, Mathematics, Chemistry and Engineering, is synthesized into innovative electrokinetic devices at Chia's lab.

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.
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.
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

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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

Editorial Boards

Chief and Founding Editor: Biomicrofluidics, an American Institute of Physics journal, 2006-present. (2010 Impact Factor: 3.895)

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

Process and Apparatus for Enhancing In-Tube Heat Transfer by Chaotic Mixing (with Mihir Sen), United States Letters Patent No. 5, 311, 932 (1994). Sequential twisting of a heating coil in two different planes enhance heat transfer by chaotic mixing action of inertial Dean vortices.

Fast-igniting Catalytic Converters with Bypass (with David Leighton), United States Letters Patent No. 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.

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.

Methods and Apparatus to Capture and Release Microbe Particles Using Amino-functionalized Silica (with Zilin Chen , being developed by SMI LLC, www.scientificmethods.com) US Patent 7,690,180 (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.

AC Electrospray, Ionization and Electrospinning (with Leslie Yeo, Shau-Chun Wang, Zach Gagnon and Dmitry Lastochkin) US Patent 8,267,914. We have discovered high-frequency AC electrospraying and electrospinning.
The AC cone assumes an 11 degree angle different from the 49 degrees DC Taylor cone. It retains the low mobility charged biomolecules without fragmenting them, and can produce negatively charged molecules. This AC soft-ionization technique for DNAs that may extend DC electrospray MS for proteomics to AC electrospray MS to genomics. AC electrospinning provides mechanically strong multi-fiber threads at high throughput and has several advantages over DC electrospunned nanofibers.

Rapid Detection of Viable Bacteria System and Method (with Shramik Sengupta and Sachidevi Puttaswamy, US Patent 8635028. Licensed to ImpeDx Diagnostics, https://gust.com/c/impedx_diagnostics)
An improved system and method is provided for detecting viable bacteria in a suspension sample. A sample of a suspension in which bacterial presence is suspected is collected from a source and a portion of the sample transferred to a microfluidic unit. A series of analysis signals at different frequencies are applied to the sample portion. An impedance is measured via a signal analyzer for the sample portion for each of the analysis signals to define an impedance data set. An initial bulk capacitance value is determined for a model circuit based on the impedance dataset. After a predetermined time period, a new bulk capacitance value is determined for on another portion of the sample. The difference between the new bulk capacitance and the initial bulk capacitance value is compared to a threshold value to determine if viable bacteria is present in the sample.

Genetic Nanobead Assay (with Jason Gordon, S. Senapati, Zach Gagnon and Sagnik Basuray, US Patent 8771938. licensed to F Cubed, LLC, www.fcubed.biz)
Molecular hybridization onto probe-functionalized nanocolloids sensitively affects their polarizability and dielectrophoretic mobility, thus allowing rapid detection of hybridization events and multi-plex diagnostics on portable diagnostic chips. We are currently negotiating with EPA to carry out an extensive testing project to replace their quantitative real-time PCR protocol.

Pending patents or disclosures from Chang lab :

1. Nanoporous Membrane Biosensor
   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. We also use charge inversion upon hybridization to produce PN type surface junctions and electroosmotic slip length variations to nonlinearly amplify ion current signals for molecular detection.
2. 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.
3. Hypersensitive Molecule Sensing by Dynamic Assembly of Nanoparticles in Conic Nanopore (DANCON)
   The DANCON Plasmonic Nano-biosensor is a sensitive (100 molecules, fM) Rapid (15 min) and yet low-cost molecular sensing platform for nucleic acid, protein and chemical sensing. It involves assembly of metallic nanoparticles into a submicron aggregate at the tip of a nanopipette. The target molecules hybridize onto probes functionalized on the nanoparticles. Hydrodynamic shear in the nanopipette are used to remove non-specific bound molecules. The detection method relies on SERS, fluorescence, FRET, absorption or other optical methods that are enhanced by the intense plasmonics on the nanocolloid assembly that are coupled to a low cost bulk light source by voltage actuated tuning of the nanocolloid spacing.

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. **(225 citations)**

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

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" publicity blitz 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.
. Chicago Sun Times Nov 16, 2012 "Entering New Water with Tiny Chips" www.suntimes.com/photos/galleries/index.html?story=16390289
. 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" http://myruraltv.com/?q=news/farm-management/dc-bureau-milk-test
. Business team wins $150,000 Cardinal Challenge for an Oral Cancer Diagnostic Device http://news.nd.edu/news/46393-notre-dame-team-wins-top-honors-in-2014-cardinal-challenge/

Journal Publications and Book Chapters
(h factor: 52, > 9000 citations; Google Scholar)

1. Oka, M., Chang, H.-C. and Gavalas, G. R., "Computer-Assisted Molecular Structure Construction for Coal-Derived Compounds," Fuel, 56 1 (1977). (35 citations)

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). (48 citations)**

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). (48 citations)**

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). (36 citations)

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). (61 citations)**

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). (46 citations).**

38. **Lahbabi, M. and Chang, H.-C., "Flow in Periodically Constricted Tubes: Transition to Inertial and Nonsteady Flows," Chem. Eng. Sci., 41, 2487 (1986). (45 citations)**

39. **Chang, H.-C., "Traveling Waves on Fluid Interfaces - Normal Form Analysis of the Kuramoto-Sivashinsky Equation," The Physics of Fluids, 29, 3142 (1986). (68 citations)**

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). (40 citations)**

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). (36 citations)

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). (52 citations)**

53. **Ratulowski, J. and Chang, H.-C., "Transport of Gas Bubbles in Capillaries", The Physics of Fluids, 1, 1642 (1989). (143 Citations)**

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). (148 Citations)**

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). (48 citations)**

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). (57 citations)**

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).

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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). (32 citations)

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). (27 citations)

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. 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).

217. 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).

218. 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).

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

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

221. 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).

222. 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).

223. 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).

224. 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).

225. 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).

226. 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).

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

228. **Yeo, L. Y., Chang, H.-C., Chan, P. P. Y. and Friend, J. R. , "Microfluidic Devices for Bioapplications", Small, 7, 12 (2011). (121 citations)**

229. 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).

230. 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).

231. 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).

232. 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).

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

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

235. 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).

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

237. 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).

238. 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).

239. 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).

240. 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).

241. 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).

242. 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).

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

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

245. 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).

246. 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).

247. 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).

248. 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).

249. 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)

250. 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)

251. 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).

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

Invited Seminars (Over 100)

"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

Funded Research (Over $10 Million)

"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, 2012-2015, $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, 2014-2016, $228,000 (PI: S. Senapati)

Graduate Students Supervised (15 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 postion: **Assistant Research Professor, Chemistry and Biochemistry Department, Notre Dame.**

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 Director, Swalm School of Chemical 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, NanoEngineering, Unversity of California, San Diego.**

A. Minerick, Ph. D. 2003, "Medical Diagnostic Microfluidics and Physiological Blood Flow Dynamics", Current position: **Associate Professor, Chemical Engineering, Michigan Tech (2007 NSF Career Awardee).**

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: **Assistant Professor, Chemical Engineering, Johns Hopkins University, 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: unknown.

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

Current PhD Students and Expected Graduation Dates

Yunshan Wang (2014)
Yu Yan (2014)
Daniel Taller (2014) [joint with David Go]
Gongchen Sun (2016)
Steve Marczak (2016)
Xiaoyu Ma (2017)
David Kuo (2017)

Post-Docs and Research Professors Supervised (14 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: **Associate 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: **Associate 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: **Assistant Professor, Bioengineering Department, University of Missouri, Columbia**.

G. Yossifon, 2007-2009. Current position: **Assistant 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. Current position: **Assistant 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**.

Current Postdocs, Senior Scientists and Research Professors

S. Senapati, 2007-2014 (Research Professor)

Sunny Shah, 2011-2015 (Senior Scientist)

Zdenek Slouka, 2012-2014 (Postdoc)

Ana Egatz-Gomez, 2013-2016 (Senior Scientist)

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	?
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	?
Robin Lawler	2013	Notre Dame	Membrane Sensor	
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	Industry
Karla Gonzalez	2013	Monterey Tec.	AC Electrospinning	Notre Dame
Andrew Chang	2013	Chung Cheng	Integrated Chip	
Katelin Hansen	2014	Notre Dame	Membrane Sensor	
David Schipper	2014	Notre Dame	RT-PCR with Conductance Sensors	
Yurui Qu	2014	Zhejiang Univ	Positive Gain Nanoparticles	
Jia Chloe Gao	2014	Fudan	Membrane Sensors	
Ruben de Jesus Medina	2014	Monterrey Tech	Upconversion Nanoparticles	

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