

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

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.

Personal Statement on Recent Research/Professional Activity (2004-2012)

H-C Chang is a leader in electrokinetics, an important area in micro/nanofluidics. 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 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 3 Notre Dame patents and 6 provisional patents, mostly in electrokinetics. A startup, FCubed LLC, has licensed one of the patents and is developing the product at the Notre Dame Innovation Park. Since 2004, 11 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 and Johns Hopkins. Two of them (Jason Keith and Zilin Chen) now hold endowed chairs and three of them (Jayne Wu, Dmitry Kopelevich and Adrienne Minerick) 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) 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 2011-2012 academic year, the visitors include PhD students from Cheng Kung University, Taiwan (I-Fang Cheng) and Postech, Korea (Horim Lee), professors from HKUST (Weijia Wen), Chinese Academy of Science (Jianhua Qin), Swinburn, Australia (Paul Stoddart), Northwestern (Sandip Ghosal), Imperial (Richard Craster) and CNRS, France (Franck Plouraboue). Other than these visitors, his group collaborates with UC Davis on signal protein detection in immune cell cultures, the Ecks Institute of Global Health on dengue virus and TB biomarker detection, Harper Cancer Institute on microRNA cancer biomarker detection, Air Force Scientific Research Lab on fatigue biomarker detection, Army Research Lab on portable diagnostics, 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. 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.
- 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, Jiaotong 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.

Professional Activities

Organized the International Union of Theoretical and Applied Mechanics 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 Bandung, 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.
Advisory Committee, Second ASME Micro/Nanoscale Heat/Mass Transfer International Conference, Jiaotong 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 the 10 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 and 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 electro spraying 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 electro spray MS for proteomics to AC electro spray MS to genomics. AC electrospinning provides mechanically strong multi-fiber threads at high throughput and has several advantages over DC electrospun nanofibers.

Pending patents or disclosures:

1. Genetic nanobead assay (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 with this technology for recreational water pathogen detection.
2. Spiral Trap Bacteria Concentrator

A non-invasive surface acoustic wave and ionic wind device is used to generate a converging spiral flow within a micro-reservoir. The flow concentrates less than 100 bacteria in a 100 micro-liter sample to a 10-micron radius at the reservoir center to allow rapid detection by Raman or other laser detection techniques.

3. Nanoporous 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.

4. 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 regenerate biosensors and to enhance selectivity.

5. Dielectrophoretic/Plasmonic Conic Optical Fiber Array Sensors for Multi-Molecule Sensing

Rapid multi-target molecular detection is achieved with conic fiber arrays with metal or photo-conductive material coating. The molecular targets are attracted to the tips dielectrophoretically such the assay time is significantly decreased. Plasmonic focusing allows us to achieve single molecule resolution and 2-D imaging of the reflection spectrum for each fiber produces massively large multi-target detection. The endoscopic design requires no external light source or detector.

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. **(160 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.

Journal Publications and Book Chapters

(h factor: 44, > 6500 citations; <http://scholar.google.com/citations?user=suOG9xIAAAAJ>)

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 Colloid. 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", JCICChE, 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). (110 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). (114 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).
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). (48 citations).**
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). (64 citations)**
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). (113 citations)**
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). (64 citations)**
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). (34 citations)
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). (307 citations)**
77. **Kalliadasis, S. and Chang, H.-C., "Drop Formation during Coating of Vertical Fibers", Journal of Fluid Mechanics, **261**, 135-168 (1994). (65 citations)**
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). (61 citations)**
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). (31 citations)
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). (35 citations)
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).(50 citations)**
91. **Chang, H.-C., Demekhin, E. A. and Kalaidin, E. N., "Interaction Dynamics of Solitary Waves on a Falling Film", J. Fluid Mech., 294, 123-154 (1995). (51 citations)**
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). (41 citations)**
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). (37 citations)
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). (33 citations)

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). (100 citations)**
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). (73 citations)**
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). (34 Citations)
112. **Veretennikov, I., Indeikina, A. and Chang, H.-C., “Front Dynamics and Fingering of a Driven Contact Line”, J. Fluid Mech., 373, 81 (1998). (55 citations)**
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). (51 citations)**

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). (65 citations)**
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). (46 citations)**
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). (38 citations)
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). (34 citations)
 129. Keith, J. M., Chang, H.-C. and Leighton, D. T., “Designing a Fast-Iginiting 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). (43 citations)**
 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 11-1 , “The MEMS Handbook” Editor; M. Gadellhak , 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) (94 citations)**
 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). (47 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). (41 citations)**
 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). (94 citations)**
- 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). (74 citations)**
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). (37 citations)
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). (47 citations)**
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). (53 citations)**
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). (84 citations)**

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 Electro spray Mechanism by Maxwell-Wagner Polarization and Capillary Resonance”, Phys Rev Lett, **92**, 133902-133904 (2004). (49 citations)**
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). (34 citations)
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). (36 citations)
- 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). (97 citations)**
- 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). (79 citations)**
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). (38 citations)
- 162. Yeo, L. Y., Gagnon, Z and Chang, H.-C., “AC Electro spray Biomaterials Synthesis”, Biomaterials, **26**, 6122-6128(2005).(65 citations)**
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).
166. Lastochkin, D. and Chang, H.-C., “A High-Frequency Electro spray 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). (54 citations)
168. Wu, J., Ben, Y. and Chang, H.-C., “Particle detection by electrical impedance spectroscopy with asymmetric-polarization ac electroosmotic trapping”, Microfluid. And Nanofluid., **1**, 161-167(2005).(60 citations)
169. Wang, P., Chen, Z. and Chang, H.-C., “A New Electro-osmotic Pump Housed in Silica Monoliths”, Sensors and Actuators, **113**, 500 (2006). (93 citations)
170. Yeo, L. and Chang, H.-C., “Electrowetting Films on Parallel Line Electrodes”, Phys. Rev E, **73**, 011605-1, 011605-16 (2006).
171. Zhou, R., Gordon, J., Palmer, A. F. and Chang, H.-C., “Role of Erythrocyte 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). (46 citations)
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-functionalized 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).
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). (99 citations)**
187. Basuray, S. and Chang, H.-C., “Induced Dipoles and Dielectrophoresis of Nano-Colloids in Electrolytes”, Phys Rev E., 75, 060501-060504(2007). (35 citations)
188. Maheshwari, S. and Chang, H.-C., “Effect of Bulk Charge and Momentum Relaxation Time Scales on Electro spraying”, 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 Electrodes”, 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). (37 citations)
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 Discrimination 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). (30 citations)
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 Electrospays 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 Electrokinetics 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., Ajjan, 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).
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 Surface 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., "Dielectrophoretic 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).

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-Gesellschaft, 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-Gesellschaft, 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, National 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.

“Microfluidic Designs for Miniature Medical Diagnostic Kits”, Keynote Lecture, (Taiwan) Biomedical Engineering Society Annual Symposium, Tainan, Taiwan, December 18, 2004.

“Electrokinetic 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.

“Microfluidic Designs for Miniature Medical Diagnostic Kits”, College of Engineering Honor Lecture, Chong-Cheng University, Chia-Yi, Taiwan, Dec 24, 2004.

“Microfluidic Technology for Rapid Diagnostic Kits”, Bioengineering Department, Rice University, January 31, 2005.

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

“Microfluidic Technology for 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 Department, University of Houston, April 15, 2005.

“Microfluidic Technology for Rapid Diagnostic Kits”, Chemical Engineering Department, 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 Electrokinetic 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 Queensland 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 Electro spray”, Kavli Institute of Physics, Beijing, June, 2008.

“Understanding Electrokinetics 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 Institute, 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, Jiaotong 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.

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 Diagnostic 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”, Scientific 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 Oropharyngeal Cancers”, Walther Cancer Institute, 2012-2014, \$200,000 (with S. Stack)

Graduate Students Supervised (12 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: **Assistant Research Professor, Chemistry and Biochemistry Department, Notre Dame.**

A. Indeikina, Ph.D., 1998, "Averaging over Multiple and Continuous Scales". Current 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-Organization 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: **Assistant Professor, NanoEngineering, University of California, San Diego.**

A. Minerick, Ph. D. 2003, "Medical Diagnostic Microfluidics and Physiological Blood Flow Dynamics", Current position: **Associate Professor, Chemical Engineering, Mississippi State (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 Concentration 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).**

Sagnik Basuray, Ph.D. 2011, "Dielectrophoresis and Its Application to Biomedical Diagnostic Platforms". Notre Dame Saheen Best Engineering PhD Awardee. Current position: Research Scientist, Roche Diagnostics.

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 (2013)

Yu Yan (2014)

Daniel Taller (2014) [joint with David Go]

Post-Docs and Research Professors Supervised

W. Q. Lu, 1984-1986, Current position: Researcher at Chinese Academy of Science, Beijing.

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: **Assistant 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: ?

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.**

S. Senapati, 2007-2013. (Research Professor)

Larry Li-Jing Cheng, 2010-2013 (Research Professor)

Sunny Shah, 2011-2013 (Senior Scientist)

Zdenek Slouka, 2012-2014 (Postdoc)

Undergraduates Supervised

<u>Name</u>	<u>Year</u>	<u>Undergrad. University</u>	<u>Subject</u>	<u>Graduate School</u>
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	Physiological 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.
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	
Christine Rusting	2011-12	Notre Dame	Nanoporous Membrane Sensor	Industry
Andrew Ayoob	2011- 12	Notre Dame	Proteomic Mass Spectrometry	Harvard
Nick Rodriguez	2011-	Notre Dame	Membrane Sensor	
Dario Mazza	2012	Imperial College		
Mark Sonderman	2012	Notre Dame	Membrane Sensor	
Nicholar Schmeidler	2012	Notre Dame	Membrane Sensor	
Sara Dale	2012	Notre Dame	Surface Acoustic Wave Mass Spect	
Nicole McMahon	2012	Notre Dame	Membrane Sensor	