

LIWEI LIN

James Marshall Wells Distinguished Professor, Department of Mechanical Engineering
Co-Director, Berkeley Sensor and Actuator Center
Interim Co-Director, Tsinghua Berkeley Shenzhen Institute
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University of California at Berkeley
Berkeley, CA 94720-1740
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<https://lwlin.me.berkeley.edu/>

EDUCATION

- Ph.D., Mechanical Engineering**, University of California, Berkeley, 1993
Major: Mechanical Design (computer-aided design, finite element analysis, dynamics and control),
silicon micromachining technologies applied to microsensors and microactuators
Minors: IC Devices and Applied Mathematics
Thesis Title: **Selective Encapsulations of MEMS: Micro Channels, Needles, Resonators and
Electromechanical Filters**
- M.S., Mechanical Engineering**, University of California, Berkeley, 1991
Major: Mechanical Design
Thesis Title: **Micro Bubble Powered Actuators**
- B.S., Power Mechanical Engineering**, National Tsing Hua University, Taiwan, 1986
Major: Power Mechanical Engineering

AWARDS/HONORS

- James Marshall Wells Academic Chair – 2017 ~ present
College of Engineering Outstanding Alumnus Award, National Tsing Hua University – 2013
Chancellor's Professor – 2006 ~ 2011
ASME Fellow – 2005
ASME Journal of Heat Transfer Best Paper Award – 1999
National Science Foundation CAREER Award - 1998
American Chinese Engineers Society Scholarship – 1986
Hsieh Feng-Jung Memorial Scholarship (Taiwan) – 1986
General Electrical International Company Scholarship (USA) – 1985
Hu Kuan-Hao Memorial Scholarship (Taiwan) – 1985
The Thoughts of Dr. Sun Yat-Sen Scholarship (Taiwan) – 1985
Taipei Fu Chien Province Countrymen Association Scholarship (Taiwan) – 1985
Fu Chien Provincial Government Scholarship (Taiwan) – 1985
The Thoughts of Dr. Sun Yat-Sen Scholarship (Taiwan) – 1985
Sun Ju-I Memorial Scholarship (Taiwan) – 1984
Mei I-Chi Memorial Scholarship (Taiwan) – 1984
Hsing Lung Consortium Scholarship (Taiwan) – 1984
Fu Chien Provincial Government Scholarship (Taiwan) – 1984
Hsieh Feng-Jung Memorial Scholarship (Taiwan) – 1984
Wang Shih-Chiang Memorial Scholarship (Taiwan) – 1983
Sun Cheng-Mo Memorial Scholarship (Taiwan) – 1983
Fu Chien Provincial Government Scholarship (Taiwan) – 1983

RESEARCH INTERESTS

MEMS (Microelectromechanical Systems); NEMS (Nanoelectromechanical Systems); Nanowires and Nanotubes; design and manufacturing of microsensors and microactuators; development of micromachining processes by silicon surface/bulk micromachining; micro molding process; mechanical issues in microelectromechanical systems (MEMS) including heat transfer, solid/fluid mechanics, dynamics and packaging.

MAJOR RESEARCH ACCOMPLISHMENTS (details at: <https://lwl.in.me.berkeley.edu/online.html>)

- 2022 Spark Award recipient for the Bakar Fellows Program for the “Soft Battery” project
- 2022 ““Gold Nanoparticle Based Plasmonic Sensing for the Detection of SARS-CoV-2 Nucleocapsid Proteins” is reported by UC Berkeley News.
- 2021 “Moisture-induced Autonomous Surface Potential Oscillations for Energy Harvesting” is published in Nature Communications and reported by UC Berkeley College of Engineering.
- 2021 “Electrostatic Footpads Enable Agile Insect-scale Soft Robots with Trajectory Control,” published by Science Robotics is reported by various news organizations, including BBC radio.
- 2020 Piezoelectric transducers and methods of making and using the same, (**US Patent, No. 10,864,553**)
- 2020 Sonic Transducer Having a Piezoelectric Diaphragm on a Frame, (**US Patent, No. 10,821,476 B2**)
- 2020 “Kirigami-inspired, highly stretchable micro-supercapacitor patches fabricated by laser conversion and cutting” is awarded as the outstanding paper of Microsystems & Nanoengineering (Nature Publishing Group)
- 2019 “Insect-scale fast moving and ultrarobust soft robot” is reported by Science, Scientific America, New Scientist, Sina News, South China Morning Post, and many others with Videos
- 2019 “Flexible Piezoelectret Actuator/Sensor Patch” is reported by EE News Europe, Soho and others
- 2018 “Jell-O based 2D metal carbides” is reported by UC Berkeley News and other news organizations
- 2018 “Human Pulse Diagnosis for Medical Assessments Using a Wearable Piezoelectret Sensing System” is reported by Sohu and other news organizations
- 2018 “Direct-laser-write Metal Carbide for Paper Electronics” is reported by Nature Photonics
- 2017 Fabrication of Enhanced Supercapacitors Using Atomic Layer Deposition of Metal Oxide on Nanostructures, (**US Patent, No. 9,805,880**)
- 2017 Best paper award for the paper “An AC Sensing Scheme for Minimal Baseline Drift and Fast Recovery on Graphene FET Gas Sensor,” at the 19th International Conference on Solid-State Sensors, Actuators and Microsystems - Transducers 2017, Kaohsiung, Taiwan, June 2017
- 2017 Best paper award for the paper “3D Printed Three-Flow Microfluidic Concentration Gradient Generator for Clinical E. Coli-Antibiotic Drug Screening” at the 2017 MEMS Conference at Las Vegas, Jan. 2017.
- 2016 Semiconductor Device and Method of Manufacturing the Same, (**US Patent No. 9,284,186 B2**)
- 2015 “3D Printed Smart Cap” is reported by many news organizations, including, Wall Street Journals, KGO 810 Radio, Daily California, EE Times, KCBS 740 Radio, Entrepreneur, Food Safety News, Inhabitat, Gizmag, and ABC7 news.
- 2014 “EE Times” on-chip inductors, March 2014.
- 2014 “Energy Harvesting Using Uniaxially Aligned Cardiomyocytes” is nominated as Outstanding Paper Award Finalists by the 27th Annual IEEE Micro Electro Mechanical Systems Conference, January 2014.
- 2014 “Carbon Sp²-Sp³ Technology: Graphen-on-Diamond Thin Film UV Detector” is nominated as Outstanding Paper Award Finalists by the 27th Annual IEEE Micro Electro Mechanical Systems Conference, January 2014.
- 2013 “Single-Layer Microfluidic Spring Diodes via Optofluidic Lithography” is nominated for outstanding poster presentation award Finalists in the 17th International Conference on Solid-State Sensors, Actuators and Microsystems, June 2013.
- 2013 “Controlled Delivery of Antiangiogenic Drug to Human Eye Tissue Using a MEMS Device” is one of the nominees for best paper award in the 26th IEEE Micro Electro Mechanical Systems Conference, January 2013.
- 2013 “Cells on Arrays of Microsprings: An Approach to Achieve Tri-Axial Control of Substrate Stiffness” is one of the nominees for best paper award in the 26th IEEE Micro Electro Mechanical Systems Conference, January 2013.
- 2012 Radiate Under-Bump Metallization Structure for Semiconductor Devices (**US Patent No. 8,294,264**)
- 2011 “Nanothermometers show first temperature response differences within living cells” has a press release from ACS - American Chemical Society, August 2011.
- 2011 “Continuous Flow Layer-by-Layer Microbead Functionalization via a Micropost Array Railing System” wins outstanding paper award in the 16th International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers’11), Beijing China, June 2011.

- 2010 Nanofiber Nanogenerator (**press coverage: LA Times, KRON4 TV, Science TV Channel, Science Magazine, US News and World Report, PC World, Sina.com ...**)
- 2010 Waveguide-based MEMS Tunable Filters and Phase Shifters (*US patent, No. 7,728,701*)
- 2009 Bonding a Non-Metal Body to a Metal Surface Using Inductive Heating (**US Patent, No. 7,452,800 B2**)
- 2008 Localized Synthesis and Self-assembly of Nanostructures (**US Patent, No. 7,311,776**)
- 2008 Microfabricated Vertical Comb Actuator Using Plastic Deformation (**US Patent, No. 7,342,346**)
- 2007 Quantum Dots as Tiny Thermometers (**Nanophotonics**)
- 2006 Near-field Electrospinning (**press coverage: Berkelyan, Nanotechnology now ...**)
- 2005 Microfabricated plastic 95-GHz rectangular waveguide and filter
ZnO nanowires based UV photodiodes
Silicon to steel bonding using rapid thermal annealing (**press coverage: Daily Californian ... US patent, No. 7,452,800**)
- 2004 A polypyrrole-carbon-nanotube (PPY-MWNT) nanocomposite glucose sensor
Batch-fabricated scanning micromirrors using localized plastic deformation of silicon (**US Patent, No. 7,342,346**)
- 2003 Localized synthesis of silicon nanowires and carbon nanotubes (**press coverage: San Francisco Chronicle Newspaper, Scientific American, Science NOW, Nanotechnology now ... US Patent No. 7,311,776**)
Batch processed torsional micro-mirrors using self-aligned plastic deformation (**US Patent No. 7,089,666**)
- 2002 Micromachined microbial fuel cells & photosynthetic electrochemical cells (**press coverage: COX newspapers, MIT Enterprise Technology Review, Wired News, Fuel Cell Today, Singapore Strait Times, Daily Californian ... US Patent No. 7,160,637**)
Water-powered micro drug delivery system
Wafer-level vacuum packaging process by RTP (Rapid Thermal Process) bonding
- 2001 Electrolyte based on-demand and disposable Microbattery
Vacuum packaging technology using localized aluminum/silicon-to glass bonding
Thermal bubble actuated micro nozzle-diffuser pump
- 2000 Batch transfer of LIGA microstructure by selective electroplating and bonding
Active frequency tuning by localized thermal stressing effects
- 1999 Creep behavior of polysilicon microstructures
Selective CVD bonding for MEMS packaging
- 1998 Localized silicon fusion, eutectic and solder bonding (**US Patents No. 6,232,150 & No. 6,436,853**)
Hot embossed plastic micropyramids for brightness enhancement (**press coverage: Institute of Physics, ABC science on line**)
- 1997 Cylindrical plastic lens array fabricated by a micro intrusion process
- 1996 Electro, thermal and elastic modeling for thermally driven microactuators
- 1995 A simulation program for sensitivity and linearity of micro pressure sensors
- 1994 Surface-micromachined pressure sensors (**US Patent No. 5,759,870**)
- 1993 Vacuum encapsulated lateral microresonators (**US Patent No. 5,589,082**)
IC-processed microneedles (**US Patents No. 5,591,139 & No. 5,855,801**)
- 1992 Microelectromechanical filters for signal processing (**US Patents No. 5,455,547 & No. 5,537,083**)
- 1991 Bubble formation phenomena on polysilicon resistors (**Best Paper Award – ASME J. of Heat Transfer**)
Microbubble powered actuators

EXPERIENCE

- 2021 ~ present, **Interim Co-Director**, Berkeley Sensor and Actuator Center
- 2017 ~ present, **James Marshall Academic Chair in Mechanical Engineering**
- 1999 ~ present, **Co-Director**, Berkeley Sensor and Actuator Center
- 2016~2020, **Co-Deputy Director**, Tsinghua Berkeley Shenzhen Institute
- 2006 ~ 2011, **Chancellor's Professor**
- 2006 ~ 2009, **Vice Chair**, Graduate Study, Mechanical Engineering, UC Berkeley
- 2004 ~ present, **Professor**, Department of Mechanical Engineering, UC Berkeley
- 2001 ~ 2004, **Associate Professor**, Department of Mechanical Engineering, UC Berkeley
- 1999 ~2001, **Assistant Professor**, Department of Mechanical Engineering, UC Berkeley

1996 ~ 1999, **Assistant Professor**, Mechanical Engineering, University of Michigan, Ann Arbor, MI
 1994 ~ 1996, **Associate Professor**, Institute of Applied Mechanics, National Taiwan University, Taipei, Taiwan.
 1993 ~ 1994, **Senior Research Scientist**, Microengineering R&D, BEI Electronics Inc., Fremont California USA. Conducting silicon microsensors and microactuators research by utilizing computer aided design (CAD) tools, surface and bulk micromachining processes and other IC (Integrated) processes.
 1989 ~ 1993, **Research Assistant**, working at BSAC (Berkeley Sensor and Actuator Center) and Berkeley Microfabrication Laboratory with extensive hands-on experiences in surface and bulk micromachining processes, LPCVD tubes, boron diffusion tube, EDP & KOH etching, plasma etching and other IC processing equipment.
 1986 ~ 1988, **Instructor**, Department of Mechanical Engineering, Chinese Military Academy, Taiwan (obligatory military service) in charge of Material and Fluid Mechanics courses and Mechanical Engineering Laboratories

TEACHING

1999 ~ present

Department of Mechanical Engineering, University of California at Berkeley

Courses: Mechanical Behavior and Processing of Materials, MEC124
 Mechanical Engineering Design, ME102B
 Introduction to Microelectromechanical Systems, ME119
 Introduction of Nanotechnology and Science, ME 118, ME218N
 Microelectromechanical Systems, ME219
 Computer-Aided Mechanical Design, ME 128

1996 ~ 1999

Department of Mechanical Engineering and Applied Mechanics, The University of Michigan

Courses: Mechanical Design II, MEAM 350, Fall 1996
 Introduction to Microelectromechanical Systems, MEAM 599-09, Winter 1997
 Mechanical Design III, MEAM 450, Winter 1998
 Microelectromechanical Systems, MEAM 553, Winter 1998
 Mechanical Design III, MEMA 450 (course leader), Fall 1998
 Microelectromechanical Systems, MEAM 553, Winter, 1999

1994 ~ 1996

Institute of Applied Mechanics, National Taiwan University, Taipei, Taiwan.

Courses: Electronics Laboratory, Fall 1994
 Microelectromechanical Systems, Spring 1995
 Electronics Laboratory, Fall 1995
 Intermediate Dynamics, Spring 1996
 Microelectromechanical Systems, Spring 1996

1986 ~ 1988

Department of Mechanical Engineering, Chinese Military Academy, Taiwan

Courses: Fluid Mechanics, Material Mechanics, Mechanical Engineering Laboratories

THESES of GRADUATE STUDENTS

A. Master Students (Chair of the thesis)

1. Mu Chiao, **MS** (1996), "Electro, Thermal and Elastic Characterization of Suspended Micro Beams"
2. Huey-Chi Chu, **MS** (1996), "Design, Optimization and Fabrication of Surface Micromachined Pressure Sensors"
3. Shaio-Hong Lin, **MS** (1997), "Vertically Driven Microactuators by Electrothermal Buckling Effects,"
4. C. J. Chiu, **MS** (1997), "Silicon-Processed Plastic Micropyramids for Brightness Enhancement Applications"
5. W.H. Lee, **MS** (1997), "Process Optimization and Characterization for Micro Fresnel Zone Plates"
6. Jatan Shah, **MS** (1999), "The Creep Behavior of Polysilicon Microstructure"

7. Kwok-Siong Teh, **MS** (1999), "Time-dependent Buckling Phenomena of Polysilicon Micro Beams"
8. Todd Remtema, **MS** (1999), "Active Frequency Tuning for Microresonators by Localized Thermal Stressing Effects"
9. Delney Bystrom, **MS** (2002), "Residual Stress Analysis of Thermal Bonding Systems in MEMS Packaging"
10. Andrew Cao, **MS** (2002), "Selective Induction Heating and Bonding"
11. Firas Sammoura, **MS** (2002), "Water Activated Disposable and Long Shelf Life Microbatteries"
12. Ongi Englander, **MS** (2003), "Localized Synthesis of Silicon Nanowires"
13. Steve Ryder, **MS** (2003), "An Annular High Frequency Microresonator: Design, Characterization and Optimization"
14. Maggie Chau, **MS** (2003), "Nanostructure-Based Nanoactuator"
15. Dane Christensen, **MS** (2003), "Room Temperature Synthesized Carbon Nanotubes"
16. Lei Luo, **MS** (2005), "ZnO Nanowire Based Photodiodes"
17. Brian Sosnowchik, **MS** (2005), "Silicon to Steel Bonding Using Rapid Thermal Annealing"
18. Jonathan Ames, **MS** (2006), "Magnetic Shielding of Micromachined Gyroscopes Using Spin-Polarized Nuclei"
19. Chung Yeung (Mike) Cho, **MS** (2006), "Localized Growth of Multi-Walled Carbon Nanotubes via MEMS Resistive Heating"
20. Kedar Shah **MS** (2008), "Solder Reflow Bonding using Rapid Thermal Processing for MEMS Packaging"
21. Bernd Kamasi **MS** (2008), "Conductive Polymer Suitable for Electrospinning and Glucose Biosensor"
22. Armong Mahajerin **MS** (2008), "Flat Micro Heat Pipes for Cooling Applications"
23. Heather Chiamori **MS** (2008), "Thermal Resistive Carbon Nanotube Gas Sensors"
24. Koo-Hyun Nam **MS** (2008), "Hermetic Bonding for Optical Feed-through."
25. Ryan Sochol **MS** (2009), "Potential to Induce Unidirectional Cellular Migration Via Asymmetric Microtopographic Substrates"
26. Maggie (QianHe) Zhang **MS** (2009), "Improvement of Contact Resistance on Locally Synthesized CNTs by Electrical Breakdown"
27. Bin Zhang, **MS** (2010), "Multi-Scale MEMS/Package Shock Analysis"
28. Richard Winslow, **MS** (2011), "Controlled Growth and Deposition of Carbon Nanotubes via Continuous Wave Ar Laser"
29. Alina Kozinda, **MS** (2011), "Amorphous Silicon-Coated Carbon Nanotube Forest for Supercapacitor Applications"
30. SangHyun Kim, **MS** (2012), "Electrospun Nanofiber for Gas Sensors"
31. Sina Akhbari, **MS** (2014), "Highly Responsible Curved Aluminum Nitride Piezoelectric Micromachined Ultrasonic Transducers"
32. Xining Zang, **MS** (2014), "Graphene Synthesis via Droplet CVD and Its Photonic Application"
33. Yumeng Liu, **MS** (2014), "A Flexible Graphene FET Gas Sensor Using Polymer As Gate Dielectrics"
34. Emmeline Kao, **MS** (2015), "ALD Titanium Nitride Coated Carbon Nanotube Electrodes for Electrochemical Supercapacitors"
35. Kaiyuan Yao, **MS** (2015), "Piezoresistivity of AlGaIn/GaN High Electron Mobility Transistors and Strain Sensor Applications"
36. Eric Sweet, **MS** (2016), "3D Printing for Integrated Fluidic Components and Circuitry"
37. Ilbey Karakurt, **MS** (2017), "Surface Modification and Smoothing of 3D Printed Copper Surfaces"
38. Jacqueline Elwood, **MS** (2018), "Modification of PEDOT:PSS for 3D Printed Micro Fluidic Electrode Integration"
39. Dongwoo Shin, **MS** (2018), "Textile Supercapacitor for Wearable Energy Storage"
40. Neil Ramirez, **MS** (2019), "Piezoelectret Mechanocatalyst for Direct Water Splitting via Ultrasonication,"
41. Zhichun Shao, **MS** (2019), "Crumpled Graphene for Room Temperature Gas Sensing"

42. Albert Lin, **MS** (2019), “A Machine Learning Approach to Evaluate Graphene FET Gas Sensor's Selectivity and Sensitivity Performances”
43. Fanping Sui, **MS** (2019), “Underwater Micro Swimmers Powered by A Single-Axis Magnetic System”
44. Peisheng He, **MS** (2020), “Self-heating, Highly-stretchable, Transparent, and Ion-conducting Hydrogel Electrolyte-based Microsupercapacitor for Flexible Electronics,”
45. Yu Long, **MS** (2020), “Moisture-induced Autonomous Surface Potential Oscillations for Energy Harvesting,”
46. Kamyar Behrouzi, **MS** (2021), “Gold Nanoparticle Based Plasmonic Sensing for the Detection of SARS-CoV-2 Nucleocapsid Proteins”
47. Heya Kaakeh, **MS** (2022), “A Low-Cost 2D Vibrotactile Array Research Platform for Exploring Haptic Feedback in AR/VR”

B. Master of Engineering Students (Chair of the thesis)

1. Jili Liu, **MEng** (2016), “Mini-actuator for Cell Phone Camera Module - Optical Image Stabilization: Spring Design”
2. Zheren Wu, **MEng** (2016), “Mini-actuator for Cell Phone Camera Module - Optical Image Stabilization: Electromagnetic Simulations”
3. Ye Yuan, **MEng** (2016), “Mini-actuator for Cell Phone Camera Module - Optical Image Stabilization: Mechanical Design and Prototype”
4. Chenmeng Wu, **MEng** (2016), “Mini-actuator for Cell Phone Camera Module - Optical Zoom: Stopper Design”
5. Xiangyu Liang, **MEng** (2016), “Mini-actuator for Cell Phone Camera Module - Optical Zoom: Optical Structure and Prototype”
6. Chao Lian, **MEng** (2016), “Mini-actuator for Cell Phone Camera Module - Optical Zoom: Electromagnetic Simulations”
7. Wenzuan Yu, **MEng** (2018), “Formaldehyde Detector”
8. Doreen (Dan) Yang, **MEng** (2018), “Formaldehyde Detector”
9. Linlin Cai, **MEng** (2018), “Formaldehyde Detector”
10. Jianming Shang, **MEng** (2018), “Portable Respiratory Monitoring Device - Graphene CO2 Sensor Simulation”
11. Boxue Zhang, **MEng** (2018), “Portable Respiratory Monitoring Device”
12. Xinhao Wang, **MEng** (2018), “Portable Respiratory Monitoring Device”
13. Hang Man Yip, **MEng** (2018), “Wearable Pulse Sensor”
14. Aparajita Naik, **MEng** (2018), “Wearable Pulse Sensor”
15. Dayou Wang, **MEng** (2018), “Wearable Pulse Sensor”
16. Xiaoyu Xu, **MEng** (2018), “An Ultrasonic Sensor Module for Smart Applications”
17. Zijun Cheng, **MEng** (2018), **MEng** (2018), “An Ultrasonic Sensor Module for Smart Applications”
18. Kian Ming Phua, **MEng** (2018), “An Ultrasonic Sensor Module for Smart Applications”
19. Zihe Bai, **MEng** (2018), “An Ultrasonic Sensor Module for Smart Applications”
20. Yuchuan Wang, **MEng** (2019), “A Pulse Detector for Alcohol Sobriety Test”
21. Xuechan Li, **MEng** (2019), “A Pulse Detector for Alcohol Sobriety Test”
22. Kai Li, **MEng** (2019), “A Pulse Detector for Alcohol Sobriety Test”
23. Ruiqi Guo, **MEng** (2019), “A Pulse Detector for Alcohol Sobriety Test”
24. Anna Jiang, **MEng** (2020), “A Pulse Detector for Traditional Chinese Medical Diagnostics”
25. Zack Hsu, **MEng** (2020), “A Pulse Detector for Traditional Chinese Medical Diagnostics”
26. Yuxuan Lan, **MEng** (2020), “A Pulse Detector for Traditional Chinese Medical Diagnostics”
27. Joseph Aharon, **MEng** (2022), “RoboAttic & Thermadrone”
28. Jialiang Yu, **MEng** (2022), “RX-Haptics: A Handheld Virtual Reality Controller to Enhance Spin, Orient and Touch Interactions”
29. Weiqi Gao, **MEng** (2022), “RX-Haptics: A Handheld Virtual Reality Controller to Enhance Spin, Orient and Touch Interactions”
30. Jiarong Li, **MEng** (2022), “RX-Haptics: A Handheld Virtual Reality Controller to Enhance Spin, Orient and Touch Interactions”
31. Yin Zhang, **MEng** (2022), “VibroPull: Wearable Haptic Array for Medical Application”

32. Tsu-Hou Hsu, **MEng** (2022), “VibroPull: Wearable Haptic Array for Medical Application”
33. Yekai Wu, **MEng** (2022), “VibroPull: Wearable Haptic Array for Medical Application”
34. Abigail S Shin, **MEng** (2022), “Doppler-Based Noninvasive Pulse Detector to Monitor Blood Pressure”
35. Zuyu Meng, **MEng** (2022), “Doppler-Based Noninvasive Pulse Detector to Monitor Blood Pressure”
36. Yaonan Qu, **MEng** (2022), “Doppler-Based Noninvasive Pulse Detector to Monitor Blood Pressure”
37. Yue Sun, **MEng** (2022), “Doppler-Based Noninvasive Pulse Detector to Monitor Blood Pressure”

C. PhD Students (Chair of the Dissertation), - Current Affiliation

1. Yu-Ting Cheng, **PhD** (2000), “Localized Heating and Bonding Technique for MEMS Post-Packaging” (Co-Chair: Khalil Najafi) – Professor, Electronics department, National Chiao Tung University, HsinChu, Taiwan.
2. Jr-Hung Tsai, **PhD** (2001), “Thermal Bubble Actuated Nozzle-Diffuser Micro Pump” – Research Engineer, Abbott Laboratories, California.
3. Li-Wei Pan, **PhD** (2001), “Selective Electroplating and Bonding for the Integration of Microstructures” – Research Engineer, Perkin Elmer OptoElectronics, California.
4. Daphne Joachime, **PhD** (2001), “Selective Deposition of Polycrystalline Silicon for Tuning Microelectromechanical Resonators: Experiment and Simulation” – Research Engineer, Sandia National Lab.
5. Mu Chiao, **PhD** (2002), “MEMS Packaging by Rapid Thermal Processing” – Professor, University of British Columbia, Canada.
6. Yu-Chuan Su, **PhD** (2003), “Micro Osmotic Drug Delivery System” – Professor, Department of Engineering Science, National Tsing-Hua University, HsinChu, Taiwan
7. JongBaeg Kim, **PhD** (2004), “Silicon Processed Microstructures Using Self-Aligned Plastic Deformation” – Professor, Yonsei University, Seoul, South Korea.
8. Kowk-Siong Teh, **PhD** (2004), “Electrosynthesized Nanocomposite for Microelectromechanical Systems” – Professor, San Francisco State University.
9. Andrew Cao, **PhD** (2004), “Electromagnetic Effects in MEMS Applications: Actuator, Relay and Packaging,” – Formfactor, California
10. Kien-Bang Lam, **PhD** (2005), “MEMS Microbial and Photosynthetic Fuel Cells,” Proteus Biomedical, California
11. Ongi Englander, **PhD** (2005), “Synthesis, Assembly and Integration of Silicon Nanowires”, ExxonMobile
12. Dane Christensen, **PhD** (2005), “Localized Synthesis, Assembly and Application of Carbon Nanotubes,” National Renewable Energy Laboratory.
13. Firas Sammoura, **PhD** (2006), “Micromachined Plastic Millimeter-wave Radar Components,” Google Inc.
14. Sha Li, **PhD** (2006), “On-Chip Cryopreservation and DNA Transformation of Cells,” – Formfactor Inc.
15. Lei Luo, **PhD** (2007), “Synthesis, Integration and Application of ZnO Nanowires”
16. Brian Sosnowchik **PhD** (2008), “Rapid Synthesis of One-Dimensional Nanostructures via Induction Heating” – Keysight Inc.
17. Mike (Yiin-Kuen) Fuh, **PhD** (2009), “Micro Molding of Polymeric Antennas and Energy Harvesters” – Professor, National Central University, Taiwan.
18. Ryan (JuiMing) Yang, **PhD** (2009), “Thermal Imaging of Single Living Cells Using Semiconductor Quantum Dots” – Apple Inc.
19. Chieh Chang **PhD** (2009), “Direct-Write Piezoelectric Nanogenerator by Near-Field Electrospinning”
20. Peter Yang **PhD** (2010), “Two-Dimensional, Individually-Addressable Nanostructure Arrays” – Sandia National Laboratory
21. Erika Parra, **PhD** (2010), “Microfluidic Microbial Fuel Cells for Microstructure Interrogation”

22. Koo-Hyun Nam, **PhD** (2010), “Planar Total Internal Reflection Biofouling Sensors”
23. Ryan Sochol, **PhD** (2011), “Micropost Arrays to Advance Cell Handling” – Assistant Professor, University of Maryland
24. Qin Zhou, **PhD** (2011), “Micro Chemical Vapor Deposition for the Synthesis of Nanostructures” – Assistant Professor, University of Nebraska
25. Yingqi Jiang, **PhD** (2011), “Micro Chemical Vapor Deposition for the Synthesis of Nanostructures” – Analog Devices Inc.
26. Adrienne Higa, **PhD** (2012), “Cellular Mechanotransduction via Microfabricated Post Arrays” – Berkeley Light Inc.
27. Armon Mahajerin, **PhD** (2012), “Thin Film Encapsulation Methods for Large Area MEMS Packaging”
28. Jiyoung Chang, **PhD** (2012), “Electrospun Direct-write Multi-functional Nanofibers” – Assistant Professor, University of Utah
29. Heather Chiamori, **PhD** (2012), “Nanomaterial Synthesis and Integration for Sensor And Energy Applications” – Postdoc, Stanford University
30. Kevin Limkraisiri, **PhD** (2013), “Copper Oxide by Thermal Oxidation for Electrochemical Cells and Gas Sensors” – Maxim Inc.
31. Kosuke Iwai, **PhD** (2014), “Droplet-Based Microfluidic Systems: Finger-Powered Pumps, Reactors, and Magnetic Capsules” – Postdoc, Lawrence Berkeley National Laboratory
32. Alina Kozinda, **PhD** (2014), “Carbon Nanotube Films for Energy Storage Applications” – Exponent Inc.
33. Kisik Koh, **PhD** (2015), “Magnetic Nano Particles and Thin Films for High Frequency Micro Inductors” – Intel Inc.
34. Roseanne Warren, **PhD** (2015), “High Energy Density Metal Oxide and Conducting Polymer Supercapacitors” – Assistant Professor, University of Utah
35. Sina Akhbari, **PhD** (2016), “Curved and Bimorph Piezoelectric Micromachined Ultrasonic Transducers (PMUT)” – Invensense Inc.
36. Shiqian Shao, **PhD** (2016), “Integrated 4H-Silicon Carbide Diodes and Bridge Circuits for Harsh Environment Applications” (co-advisor: Albert Pisano) – SanDisk Inc.
37. Gordon Hoople, **PhD** (2016), “Gel-Seq: An Approach for Simultaneously Sequencing the Genome and Transcriptome in Small Populations of Cells” (Co-advisor: Professor Pisano) – Assistant Professor, University of San Diego
38. Casey Glick, **PhD** (2017), “Microfluidic Circuitry via Additive Manufacturing” – Oculus Inc.
39. Levent Beker, **PhD** (2017), “Sensing and Harvesting Pressure Fluctuations in Harsh Environments” (co-advisor: Albert Pisano) – Assistant Professor, Koc University, Turkey
40. Hyun Sung Park, **PhD** (2017), “Metal Oxides for Solid State Electronics: Transparent Electrodes, Photoanodes and Transistors” – Samsung Electronics Inc.
41. Xining Zang, **PhD** (2017), “Synthesis and Assembly of 2D Materials for Sensing and Clean Energy Applications,” – Assistant Professor, Tsinghua University
42. Yumeng Liu, **PhD** (2017), “Room Temperature Gas Sensing using Graphene FET,” Apple
43. Emmeline Kao, **PhD** (2018), “Atomically Thin Processing of High Surface Area Nanomaterials for Electrochemical Energy Devices,” – Assistant Professor, McGill University
44. Caiwei Shen, **PhD** (2018), “Flexible Supercapacitors Based on Micro/Nanofibers,” – Assistant Professor, University of Massachusetts, Dartmouth
45. Ben Eovino, **PhD** (2018), “Ring-shaped and Dual-electrode Bimorph Piezoelectric Micromachined Ultrasonic Transducers,” – Chirp Microsystems
46. Xiaoyue Jiang, **PhD** (2018), “Piezoelectric Micromachined Ultrasonic Transducers for Ultrasonic Fingerprint Sensors” (Co-advisor: Professor David Horsley) – Invensense
47. Kaiyuan Yao, **PhD** (2019), “Exciton Dominated Optical Properties of Atomically Thin Semiconductors” (Co-advisor, Professor Jim Schuck)
48. Yichuan Wu, **PhD** (2019), “Insect-scale Multifunctional Soft Robot” (Co-advisor, Professor Xiaohao Wang)
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317. Liwei Lin (Invited Paper), "Micro-Mechanics in MEMS Development," *1998 International Conference on Mechatronic Technology*, pp. 167-172, Nov. 30 - Dec. 2, 1998, Hsin-Chu, Taiwan.
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322. Liwei Lin (invited paper) "Engineering Mechanics Issues in MEMS," *Proceedings of the ASCE 12th Engineering Mechanics Conference*, pp. 44-47, La Jolla, CA, May, 17-20, 1998.

323. Liwei Lin and Weijie Yun, "MEMS Pressure Sensors for Aerospace Applications," *Digests of IEEE Aerospace Conference*, CD ROM, MEMS workshop, paper No. 2, pp. 1-8, Aspen, Mar. 22-27, 1998.
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OTHER CONFERENCE OR SYMPOSIUM PRESENTATIONS

1. Liwei Lin (Invited), "Intelligent Piezoelectret Sensor/Actuator for Human Machine Interfaces," International Symposium on Intelligent Microsystems, Harbin, China, July 29-30, 2019.
2. Liwei Lin (Plenary Speaker), "MEMS-based Ultrasonic and Gas Sensors," 2019 International Conference on Smart Sensors, Hsin-Chu, Taiwan, June 3-4, 2019.
3. Liwei Lin (Keynote Speaker), "Three-dimensional Microelectronics for in situ Monitoring of Milk Spoilage," 2019 International Symposium on Circuits and Systems, Electronics for Better Quality Foods, Sapporo, Japan, May 2019.
4. Liwei Lin (Invited), "Micro and Nano Fabrication for Advanced Manufacturing," 2018 International Conference on Frontiers of Design and Manufacturing, Jinan, China, August, 2018.
5. Liwei Lin (Invited), "Laser-Induced Molybdenum Carbide-Graphene Composites for 3D Foldable Paper Electronics," MEMS Manufacturing 2018, Santa Clara, August, 2018.
6. Liwei Lin (Invited), "Micro/Nano Manufacturing for Sensing and Energy Applications," Microsystems and Nanoengineering Summit 2018, Beijing, China, July 2018.
7. Liwei Lin (Keynote), "Micro and Nano Manufacturing for Energy Applications," 2018 International Conference on Nano/Micro Engineered and Molecular Systems (NEMS), Singapore, April, 2018.
8. Liwei Lin (Keynote), "Micro and Nano Manufacturing for Sensing and Energy Applications," 2017 International Workshop on Innovation and Commercialization of Micro & Nanotechnology (ICMAN), Chongqing, China, November, 2017.
9. Liwei Lin (Invited), "Synthesis and Applications of Graphene in MEMS-based Systems," 2017 Midea Global Technology Strategy Symposium, Guangdong, China, May, 2017.
10. Liwei Lin (Keynote), "Micro and Nano Manufacturing for Sensing and Energy Applications," 2017 World Congress on Micro and Nano Manufacturing, Kaohsiung, Taiwan, March, 2017.
11. Liwei Lin (Invited), "3D-Printed Microelectronics for Passive Wireless Sensors," 2016 IDTechEx, Santa Clara, November 2016
12. Liwei Lin (Invited), "Nanostructures for Sensing and Energy Applications," 2nd International Conference NanoFIS 2016 - Integrated Functional nano Systems, Graz, Austria, June, 2016.
13. Liwei Lin (Invited), "Nanostructures for Sensing and Energy Applications," 2015 SITRI-BSAC Commercialization Conference, Shanghai, China, August, 2015.
14. Liwei Lin (Invited), "New sensor technologies for Smart Cities," Technology, Culture, and Dream Forum for the 30th Year of Postdoc System in Tsinghua University, Shenzhen, China, December, 2015.
15. Liwei Lin (Invited), "Nano to Macro: Opportunities and Challenges in Scalable Integration," ASME 2015 International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems and ASME 2015 13th International Conference on Nanochannels, Microchannels, and Minichannels (InterPACK2015 & ICNMM2015), San Francisco, July, 2015.
16. Liwei Lin (Invited), "Nanostructures for Sensing and Energy Applications," The Global Sensor Summit, Wuxi, China, September 24-25, 2014.
17. Liwei Lin (Keynote), "Highly Responsive Micromachined Piezoelectric Ultrasonic Transducers," US-Korea Conference (UKC 2014), San Francisco, August, 2014.
18. Liwei Lin (Invited), "Synthesis and Applications of Graphene in MEMS-based Systems," Microsystems & Nanoengineering Summit 2014, Beijing, August, 2014.
19. Liwei Lin (Invited), "Micro Mechanical Methods for Biology (M3B)," 2013 Annual Meeting of the Xiamen Microelectromechanical Society Meeting, Xiamen, China, December, 2013.
20. Liwei Lin (Invited), "Nanostructures for Sensing and Energy Applications," The Third International Conference on Manipulation, Manufacturing and Measurement on the Nanoscale, 3M Nano" Suzhou, China, August 26-30, 2013.
21. Liwei Lin (Invited), "Electrospun Piezoelectric Nanogenerators," 449th conference of XSSC on the frontier of Piezotronics and Nanogenerators, Beijing, China, December, 2012.
22. Liwei Lin (Invited), "Integration of Nanostructures with Microsystems," 2012 MRS Spring Meeting, San Francisco, April, 2012.

23. Liwei Lin (Keynote), "MEMS Packaging Challenges and Opportunities," 2012 China Semiconductor Technology International Conference, Shanghai, China, March 18-19, 2012.
24. Liwei Lin (Invited), "Polymeric Microstructures for Drug-Delivery Applications," International Workshop on Biomedical Micro- and Nanodevices, King Abdullah University of Science and Technology, Saudi Arabia, February 25, 2012.
25. Liwei Lin (Invited), "Nanogenerator for Electric Clothing," 2nd Nanotoday Conference, Hawaii, Dec. 11-15, 2011.
26. Liwei Lin (Invited), "Electrospun Nanofibers as Nanogenerators for Electric Clothing," The 4th International Conference on One-dimensional Nanomaterials (ICON 2011), Peking, China, Dec. 7-9, 2011.
27. Liwei Lin (Keynote), "MEMS Packaging: Challenges and Opportunities," International Workshop on Packaging and System Level Integration of Micro Systems, Bangalore, India, Sep. 29-30, 2011.
28. Liwei Lin (Invited), "Single Crystal TiO₂ Nanoswords for Energy and MEMS Applications," ICMAT 2011, International Conference on Materials and Advanced Technologies, Singapore, June 27-July 1, 2011.
29. Liwei Lin (Invited), "Nanostructures for Sensing/Energy Applications and Sensor Development in BSAC," IntelliSense Workshop, Nanjing, China, June 11, 2011.
30. Jiyoung Chang, Chen Yang, Bin Zhang and Liwei Lin (Invited), "MEMS Performance Challenges - Packaging and Shock Tests," Micro- and Nanotechnology Sensors, Systems, and Applications III, SPIE Defense, Security + Sensing 2011, Orlando, Florida, April, 2011.
31. Qin Zhou and Liwei Lin, "Direct Synthesis, Assembly and Integration of Graphene via Micro CVD," 2011 NSF CMMI Grantee Conference, January, Atlanta, GA 2011.
32. Liwei Lin (Invited), "Nanogenerator for Electric Clothing," 2010 International Photonics and Optoelectronics Meetings, Wuhan, China, November 3-5, 2010.
33. Liwei Lin (Invited), "Nanogenerator for Electric Clothing," 2010 Emerging Information and Technology Conference (EITC), August 23-24, Stanford, USA, 2010
34. Liwei Lin (Invited), "Nanogenerator in Electric Clothing for Energy Harvesting," MicroNano 2010, Tokyo, July 28-30, Japan, 2010.
35. Liwei Lin (Invited), "MEMS Packaging Technologies and Applications," IEEE VLSI-DAT Symposium, Hsin-Chu, Taiwan, April 25-29, 2010.
36. Liwei Lin (Invited), "MEMS/NEMS Technologies for Information Devices," Proceedings of the 2009 JSME-IIP/ASME-ISPS Joint Conference on Micromechatronics for Information and Precision Equipment (MIPE2009), pp. 5-9, Tsukuba, Japan, June 17-20, 2009.
37. Liwei Lin (Invited), "Bio Nano Fuel Cells," 2008 Emerging Information and Technology Conference (EITC), June 26-27, Tainan, Taiwan, 2008.
38. Liwei Lin (Invited), "Integration of Nanostructures with Microsystems," ICMAT 2007, International Conference on Materials and Advanced Technologies, July 1-6, Singapore, 2007.
39. Liwei Lin (Invited) "Bio Nano Fuel Cells," 4th USA-Korea Joint Symposium on MEMS and BioSystems Technology, Berkeley, November 2006.
40. Liwei Lin (Invited), "Integration of Nanostructures with Microsystems," 2006 International Conference on Nanotechnology and advanced Materials," Hong Kong, Nov. 1-3, 2006.
41. Liwei Lin (Invited), "Bioelectric PEM Fuel Cells," NSF Workshop: Emerging Opportunities of Nanoscience to Energy Conversion and Storage" Arlington, VI, November 2005.
42. Liwei Lin (Invited), "Synthesis, Assembly and Integration of Nanowires/Nanotubes," 7th China Micro/Nano Systems Workshop, Dalian, China, August 13-17, 2005.
43. Liwei Lin (Invited), "Bioelectric PEM Fuel Cells," 3rd Korea-USA Joint Symposium on MEMS and Biosystems Technology, pp. 105-117, KAIST, Daejeon, Korea, June 9-11, 2005.
44. Liwei Lin, (Invited Keynote), "Synthesis, Assembly and Integration of Nanowires/Nanotubes," "Proceedings of the Third Symposium on Intelligent Human Sensing," IHSS2005, pp. 1, March 3, 2005, Toyohashi, Japan.
45. Liwei Lin and J.C. Chiao, "Integrated Manufacturing for Millimeterwave Sensing Systems," Proceedings of 2005 NSF Design & Manufacturing Research Conference, CD ROM, Scottsdale, Arizona, Jan. 3-6, 2005.

46. Liwei Lin (Invited), "Bioelectric PEM Fuel Cells," International PEM Fuel Cell Conference, Hsin-Chu, Oct. 14-15, 2004.
47. Liwei Lin (Invited), "Packaging Issues of MEMS Devices," Converging Technologies: MEMS and Wafer Level Packaging, MEPTEC Q2 Technical Symposium and Exhibits, Santa Clara, CA, May, 2004.
48. Liwei Lin (Invited), "MEMS Batteries," Electric Power in Vivo Workshop and Symposium, USC, Los Angeles, February, 2004.
49. Liwei Lin (Invited), "Nano/MEMS Technologies and Their Impacts on Aerospace Future Outlook," *Aerospace Forum in Celebration of Human Centennial Power Flight*, Tainan, Taiwan, December 22, 2003.
50. Liwei Lin (Invited), "From MEMS to Nanotechnology," *Chinese Institute of Engineers, Mechanics and Material Technology Group Dinner Seminar*, Santa Clara, Nov. 7, 2003.
51. Liwei Lin (Invited), "Thermal Bonding Processes for MEMS Packaging Applications," *2003 TMS Annual Meeting & Exhibition*, San Diego, California, March 2-6, 2003.
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56. Liwei Lin (Invited), "Packaging Issues of MEMS Devices," *Pb-free Solder for Electronic, Optical, and MEMS Packaging Manufacturing*, Los Angeles, CA, September 5-6, 2002.
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59. Liwei Lin (Keynote), "Microscale Phase Change Devices," *2002 US-Japan Nanotherm Seminar, Nanoscale Thermal Science and Engineering*, Berkeley, CA, June 24-26, 2002.
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PROFESSIONAL SERVICES

Journal

Subject Editor, IEEE/ASME Journal of Microelectromechanical Systems, 2003~present
 North and South America Editor, Sensors and Actuators A - Physical, 2004~2018
 Editorial Board, Nature Microsystems and Nanoengineering , 2015~present
 Associate Editor, ASME Journal of Micro- and Nano-Manufacturing, 2012~2015
 Editorial Board, Mechatronics, 2004~2008
 Journal Reviewer: Science, IEEE/ASME Journal of Microelectromechanical Systems, Sensors and Actuators, Journal of Micromechanics and Microengineering, Nanotechnology, Nanoletters, ASME Journal of Dynamic Systems, Measurement and Control, ASME Journal of Heat Transfer, International Journal of Heat and Mass Transfer, Proceedings of IEEE, Applied Mechanics Reviews, Microscale Thermophysical Engineering, Polymer Engineering and Science, IEEE Journal of Solid-State Circuits, Journal of Intelligent Material Systems and Structures, IEEE Transactions of Components, Packaging, and Manufacturing Technology, Sensors and Materials, Biomedical Microdevices, ASME Transactions, Journal of Computing

and Information Science in Engineering, IEEE/ASME Journal of Mechatronics, ASME Journal of Mechanical Design

Society

International Steering Committee, 2019-2025, International Conference on Solid-State Sensors, Actuators and Microsystems

General co-Chair, IEEE MEMS Conference, January, 2011, Cancun, Mexico

Technical Program Committee Chair, IEEE-NEMS 2010, January 20-23, 2010, Xiamen, China

Executive Program Committee, 16th International Conference on Solid-State Sensors, Actuators and Microsystems June 5-9, 2011, Beijing, China

Founding Chair, Executive Committee, MEMS Division of the ASME, 2004 ~ 2005

Chair, Executive Committee, MEMS Sub-Division of the ASME, 2003 ~ 2004

Vice Chair, Executive Committee, MEMS Sub-Division of the ASME, 1998 ~ 2003

Chair, Committee on Establishing a new MEMS Technical Division in ASME, 1997 ~ 1998

Chair, MEMS panel in the DSC Division of the ASME, 1997 ~ 1999.

Vice Chair, ASME MEMS panel in the DSC division, 1996~1997

Coordinator, 1997, 1998 and 1999 Joint Call for Paper and Proceedings for ASME IMECE

MEMS Symposia, Anaheim, CA (including Dynamic System and Control Division, Heat

Transfer Division, Fluids Engineering Division, Applied Mechanics Division, Bioengineering

Division, and Manufacturing Engineering Division), Nov. 1997 ~ Nov. 1999

Organizer,

2000 Mechatronics 2000 Conference invited MEMS session, Georgia, Sep. 2000

1998 Joint Call for Paper and Proceedings for ASME IMECE MEMS Symposia, Anaheim, CA (including Dynamic System and Control Division, Heat Transfer Division, Fluids Engineering Division, Applied Mechanics Division, Bioengineering Division, and Manufacturing Engineering Division)

1998 ASME IMECE MEMS Symposium, Anaheim, CA

1997 ASME IMECE MEMS Symposium, Dallas, Texas

1996 Taipei MEMS Exhibition, Taipei, Taiwan

1995 MEMS Short Course, "Monolithic Surface-Micromachined Inertial Sensor," by Prof. Boser and Prof. Howe (UC Berkeley), Hsin-Chu, Taiwan

Program Committee

2011 16th International Conference on Solid-State Sensors, Actuators and Microsystems June 5-9, 2011, Beijing, China

2011 24th IEEE Micro Electro Mechanical Systems Conference, Cancun Mexico, Jan. 2010

2010 23th IEEE Micro Electro Mechanical Systems Conference, Hong Kong, Jan. 2010

2009 22th IEEE Micro Electro Mechanical Systems Conference, Italy, Jan. 2009

2006 19th IEEE Micro Electro Mechanical Systems Conference, Turkey, Jan. 2006

2005 18th IEEE Micro Electro Mechanical Systems Conference, Miami, Florida, Jan.30-Feb.3

2004 Smart Sensors, Actuators and MEMS II conference, SPIE's Second International Symposium on Microtechnologies for the New Millennium 2005, Seville, Spain, 9 to 11, May 2005

2004 IEEE Sensors Conference, Vienna, Austria, October 24-27, 2004

2004 7th International Conference on Solid-State and Integrated-Circuit Technology (ICSICT'04), Beijing, China, Oct. 18-21, 2004

2001 International Conference on Solid-State Sensors and Actuators, Munich, Germany, June

2000 International Symposium on Smart Structures and Microsystems, HongKong, October 2000

2000 Mechatronics 2000 Conference, Atlanta, Georgia, Sep. 2000

2001 ASME IMECE MEMS Symposium, New York, NY, Nov. 2001

2000 ASME IMECE MEMS Symposium, Orlando, FL, Nov. 2000

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1998 ASME IMECE MEMS Symposium, Anaheim, CA, Nov. 1998

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Proposal Reviewer: NSF, Nanyang Technological University (Singapore),

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Industrial Experiences

1. 1995-1996, EG&G, consultant for MEMS device design and analysis
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5. 2008-2009, Senodia Technologies Inc., consultant for MEMS device development
6. 2009-2012, Samsung, consultant for MEMS device development
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8. 2010, Weitz & Luxenberg, P.C., expert witness in a biomedical device packaging damages case
9. 2013, Quinn Emanuel Urquhart & Sullivan, LLP, expert witness in a microelectronics packaging patent litigation case
10. 2013, Quswami Inc., consultant for packaging design and analysis
11. 2014, Shaub & Williams LLP, expert witness in a patent litigation suit
12. 2014, Wong, Cabello, Lutsch, Rutherford & Brucculeri, LLP, expert witness in a patent litigation case
13. 2015, OrthoSensor, consultant for sensor design and analysis.