CHUNG HOON LEE

Electrical and Computer Engineering
Marquette University
Engineering Hall, 207
Milwaukee, WI 53233

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phone +1 (414) 288 4460

EXPERTISE

Nanoscale devices, Thermal microfluidics, Molecular electronics, Micro-electromechanical systems (MEMS), Bio-MEMS, Ultrasonic actuators and sensors, and SPM/AFM probes

EDUCATION

Ph.D. — *1998–2002* — The University of Wisconsin, Madison
Electrical and Computer Engineering

B.S. — *Feb. 1998* — Dongguk University (South Korea)
Physics

ACADEMIC EXPERIENCE

Marquette University — *2015–present* — Associate Professor
Electrical and Computer Engineering
Milwaukee, WI

Marquette University — *2008–2015* — Assistant Professor
Electrical and Computer Engineering
Milwaukee, WI

California State University — *2006–2008* — Lecturer/Researcher
Electrical and Computer Engineering
Fresno, CA

Columbia University — *2005–2006* — Post-Doctoral Associate
Mechanical Engineering
New York, NY

Cornell University — *2002–2003* — Post-Doctoral Associate
Electrical and Computer Engineering
Ithaca, NY

University of Wisconsin — *1998–2002* — Research Assistant
Electrical and Computer Engineering
Madison, WI

WORK EXPERIENCE

Veeco Instruments — *2003–2005* — Scientist
AFM/SPM Probe R&D
Santa Barbara, CA

publications & presentations

at marquette

Refereed Journal Articles

B. Davaji and C.-H. Lee, "Thermal Measurement Techniques in Analytical Microfluidic Devices," Journal of Visualized Experiments (J. Vis. Exp.), 100, e52828, doi:10.3791/52828, 2015

B. Davaji, H. Bak, W.-J. Chang, and C.-H. Lee, "A novel on-chip 3D micromachined calorimeter with fully enclosed and suspended thin-film chamber for thermal characterization of liquid samples," Biomicrofluidics, 8, 034101, 2014

B. Davaji and C.-H. Lee, "A paper-based calorimetric microfluidics platform for bio-chemical sensing," Biosensors and Bioelectronics, 59, pp. 120–126, 2014

A. K. Vutha, B. Davaji, C.-H. Lee, G. M. Walker, "A microfluidic device for thermal particle detection," Microfluidics and Nanofluidics, DOI:10.1007/s10404-014-1369-z, 2014

J. H. Han, S. Radhakrishnan and C.-H Lee, "A novel batch-processing method for accurate crystallographic axis alignment," J. Micromech. Microeng., 23, 055017, 2013

J. H. Han, K. Song, S. Radhakrishnan, S. H. Oh, and C.-H Lee, "A suspended nanogap formed by field-induced atomically sharp tips," Appl. Phys. Lett., 101, 183106, 2012

C.-H. Lee, J. H. Han, S. C. Schneider, and F. Josse, "Suspended and localized single nanostructure growth across a nanogap by an electric field," Nanotechnology, 22, 405301, 2011

J. H. Han, N. Yoshimizu, C. Jiang, A. Lal, and C.-H Lee, "Electroluminescence from a suspended tip-synthesized nano ZnO dot," Appl. Phys. Lett., 98, 121113, 2011

C.-H. Lee, C. S. Ritz, M. Huang, M. W. Ziwisky, R. J. Blise, and M. G. Lagally, "Integrated freestanding single-crystal silicon nanowires: conductivity and surface treatment," Nanotechnology, 22, 055704, 2011

prior to marquette

P. G. Evans, P. Rugheimer, M. Lagally, C.-H. Lee, A. Lal, Y. Xiao, B. Lai, and Z. Cai, "Microfabricated strained substrates for Ge epitaxial growth," J. Appl. Phys., 97, 103501, 2005

C.-H. Lee, and A. Lal, "Single micro-droplet ejection using ultrasonic longitudinal mode of PZT/tapered-glass-capillary," IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, 51, pp. 1514–1522, 2004

at marquette

Refereed Conferences & Proceedings All International Presentations

B. Davaji, G. Biener, V. Raicu, C.-H. Lee, "In-vivo Single Cell Protein Interaction Investigation Using Microfluidic Platform," 18th International Conference on Solid State Sensors, Actuators and Microsystems, Transducers 2015, June 2015, Anchorage, Alaska, USA, pp. 1541-1544.

T. Theiss, S. C. Schneider and C.-H. Lee, "Undergraduate Introduction to Micro-fabrication of Memristors," 121st Annual Conference & Exposition, 360 Degrees of Engineering Education, Indianapolis, IN, USA, paper ID 10406, 2014

B. Davaji, J. H. Han, and C.-H. Lee, "Microfabricated Calorimeter for Biosensing And Versatile Thermal Analysis," Advances in Microfluidics & Nanofluidics, AMN2013, Notre Dame, IN, USA, 2013

C.-H. Lee, "Fabrication and applications of Micro/Nanoscale devices," CMOS Emerging Technologies, Whistler, Canada, 2011 (invited talk)

J. H. Han, N. Yoshimizu, T. Cheng, M. Ziwisky, S. A. Bhave, A. Lal, and C.-H Lee, "Nano-electromechanical zero-dimensional freestanding nanogap actuator," Micro Electro Mechanical Systems (MEMS), 2011 IEEE 24th International Conference, Cancun, Mexico, pp. 1357-1360, 2011

T. J. Cheng, J. H. Han, M. Ziwisky, C.-H Lee, and S. A. Bhave, "6.4 GHz acoustic sensor for in-situ monitoring of AFM tip wear,"Micro Electro Mechanical Systems (MEMS), 2011 IEEE 24th International Conference, Cancun, Mexico, pp. 522-524, 2011

C. Jiang, N. Yoshimizu, J. H. Han, A. Lal, and C.-H Lee, "Electroluminescence from a freestanding integratable single ZNO dot," TRANSDUCERS, Beijing, China, 10.1109, 2011

C.-H Lee, C. S. Ritz, and M. G. Lagally, "Fabrication of and electrical measurements on integrated single-crystal silicon nanowires," 2008 MRS Fall Meeting, Boston, USA, 2008

C.-H. Lee, C. Ritz, and M. Lagally, "3-Dimensional Silicon-Germanium Quantum Dots on Freestanding Si Nanoribbon", Nanoelectronics Devices for Defense & Security conference, Crystal City, VA, 2007

prior to marquette

M. K. Araz, C.-H. Lee, and A. Lal, "Ultrasonic Separation in Microfluidic Capillaries," IEEE Ultrasonics, Ferroelectrics, and Frequency Control 50th Anniversary Joint Conference, Montréal, Canada, pp. 153–156, 2004

C.-H. Lee, H. Guo, S. Radhakrishnan, A. Lal, C. Szekely, T. A. McClelland, and A. P. Pisano, "A Batch Fabricated Rubidium-Vapor Resonance Cell for Chip-Scale Atomic Clocks," Proceedings of the Solid State Sensor and Actuator Workshop, Hilton Head Island, South Carolina, USA, pp. 23–26, 2004

P. G. Evans, P. P. Rugheimer, M. Roberts, and M. G. Lagally, C.-H. Lee, Y. Xiao, B. Lai, and Z. Cai, "Direct Synchrotron X-Ray Microdiffraction Measurements of Strain and Bending in Micromachined Silicon Devices," Proceedings of IMECE04, 2004 ASME International Mechanical Engineering Congress, Anaheim, California, USA, 2004

M. K. Araz, C.-H. Lee, and A. Lal, "Ultrasonic Separation in Microfluidic Capillaries," IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society Symposium, Hawaii, USA, pp. 1066–1069, 2003

C.-H. Lee, and A. Lal, "Ultrasonically Modified Meniscus for Microfluidic Delivery," IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society Symposium, Munich, Germany, 2002

C.-H. Lee, and A. Lal, "Low-Voltage High-Speed Ultrasonic Chromatography for Microfluidic Assays," Proceedings of the Solid State Sensor and Actuator Workshop, Hilton Head Island, South Carolina, USA, pp. 206–209, 2002

C.-H Lee, P. Rugheimer, A. Lal, and M. G. Lagally, "Controlled SiGe Quantum Dot growth on MEMS structures," 1st International Conference and School on Nanoscale Molecular Mechanics, Hawaii, USA, 2002

C.-H Lee, Y. Dong, and A. Lal, "A Glass-PZT Ultrasonic Microfluidics Platform," Proceedings of the μTAS 2001 Conference, Monterey, CA, USA, pp. 489–491, 2001

C.-H. Lee, and A. Lal, "Silicon Ultrasonic Horns for Thin Film Accelerated Stress Testing," IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society Symposium, Atlanta, USA, pp. 867–870, 2001

C.-H. Lee, and A. Lal, "Integrated Optical Longitudinal Strain Sensor on a Micromachined Silicon Longitudinal Mode Transducer," IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society Symposium, Lake Tahoe, USA, pp. 467–470, 1999

C.-H. Lee, and A. Lal, "Miniature Ultrasonic Transducers with Optical Strain Readout," Proceedings of SPIE, vol. 3878, pp. 238–244, Santa Clara, USA, 1999

C.-H. Lee, V. Kaajakari, and A. Lal, "Impact Testing of Silicon Micromachined Beams," Proceedings of SPIE, vol. 3875, pp. 80–86, Santa Clara, USA, 1999

PATENTS

Pending **US 62/123,576** (2014) · High Speed AFM Probes

Pending **US 14/230,876** (2014) · B. Davaji and C.-H. Lee, "Calorimetric microfluidic chemical sensor" (supported by Marquette University)

US 61,844,902 (2013) · A. K. Vutha, B. Davaji, C.-H. Lee, G. M. Walker, "Microfluidic systems and methods for thermal flow cytometry" (supported by Marquette University and North Carolina State University)

Awarded **US 8,062,535** (2011) · C.-H. Lee, "Video rate-enabling probes for atomic force microscopy"

US 7,108,137 (2006) · A. Lal and C.-H Lee, "Method and apparatus for separating particles by size"

US 6,923,790 (2005) · A. Lal and C.-H Lee, "Ultrasonically actuated needle pump system"

US 6,874,699 (2005) · B. J. Larson, C.-H Lee, A. Lal, and M. G. Lagally, "Methods and apparata for precisely dispensing microvolumes of fluids"

US 7,109,121 (2004) · A. Lal, and M. G. Lagally, C.-H Lee, P. Rugheimer, "Stress control of semiconductor microstructures for thin film growth"

EXTERNAL GRANTS AND CONTRACTS FUNDED

AT MARQUETTE

NSF I/UCRC *2015–2015* $50,000 (direct cost: $46,759)

Chung Hoon Lee (PI), "Micro-thermal devices for flow, pressure, and temperature measurements"

NSF I/UCRC *2014–2015* $49,268 (direct cost: $46,128)

Chung Hoon Lee (PI), "A disposable paper-based calorimetric

microfuidics platform for real-time lead ions and bio-chemical sensing in water"

NSF DUE — *2013–2015* $10,000 (direct cost: $6,644)

Amit Lal (PI, Cornell University), Chung Hoon Lee (Co-PI), and Three others (Various University as Co-PIs), "Modular Nanoengineering for the Future of Bits and Bytes"

DARPA MTO — *2008–2013* $282,800 (direct cost: $213,632)

Clif Pollock (PI, Cornell University), Chung Hoon Lee (Co-PI), Three other Co-PIs, "Nano-Optical Tether System for Precision Nanowires (Tip-based Nanofab)"

NSF I/UCRC — *2010–2012* $85,000 (direct cost: $81,818)

Chung Hoon Lee (PI), "Micro-Calorimeter for Real-Time Water Quality Monitoring"

DoD Air Force — *2011–2012* $75,000 (direct cost: $64,934)

Agiltron Inc. (PI) and Chung Hoon Lee (Co-PI), "Germanium Quantum Dot-Silicon Nanowire Superlattices for Thermoelectric Applications"

DARPA MTO — *2010–2011* $133,561 (direct cost: $94,141)

Chung Hoon Lee (PI), "Nano-DSC Array for Sensor Applications"

DOE NREL — *2009–2010* $100,000 (direct cost: $100,000)

Chung Hoon Lee (PI) and Dave Klemer (Co-PI at UWM), "Ultra Efficient Si/SiGe Nanowire Thermoelectric Materials for Converting Waste Heat to Electrical Energy"

DARPA MTO — *2008–2009* $289,571 (direct cost: $274,201)

Chung Hoon Lee (PI) and Krish Krishnan (Co-PI, California State University at Fresno), "An absolute temperature sensors"

prior to marquette

Asylum Research Inc. — *2007–2008* $11,000 (direct cost: $11,000)

Chung Hoon Lee (PI), "SPM/AFM Probe developments and commercialization"

internal grants & contracts funded

Marquette Innovation and Entrepreneurship Fund — *2015–2018* $338,000, pending

Chung Hoon Lee (PI), Co-PIs: Dr. Kyuil Kim, and Hector Cavazos, "Development of advanced scanning probes for nanoscale imaging and manipulation (Marquette based start-up Company)"

COE Research Equipment Award — *2015–2016* $120,000

Chung Hoon Lee (PI), Co-PIs: Dr. Fabien J. Josse, Dr. John Borg, Dr. Raymond A. Fournelle, Dr. Casey Allen, Dr. James A. Rice, "Raman Spectroscope and Atomic Force Microscope"

COE Research Equipment Award — *2014–2015* $250,000

Chung Hoon Lee (PI), Fabien Josse (Co-PI), and James Richie (Co-PI), "Atomic Force Microscope, Raman spectroscopy, and MSA-500 Micro System Analyzers"

RRG — *2012–2013* $6,000

Chung Hoon Lee (PI), "A ubiquitous Platform for atomically-defined fabrication of Nanoscale Devices"

Way Klingler Young Scholar Awards — *2012–2013* $32,000

Chung Hoon Lee (PI), "A novel platform for electrical/optical investigation of isolated single molecules"

honors and awards

Awards

- 2014 · The William and Nancy Stemper Edowed Faculty Scholars Fund (Marquette University)
- 2014 · IEEE Poster Competition (Milwaukee Section) 1st & 2nd place
- 2013 · Way Klingler Young Scholar Awards (Marquette University)
- 2013 · IEEE Poster Competition (Milwaukee Section) 2nd place
- 2012 · Regular Research Grant (RRG) Awards (Marquette University)
- 2007 · Claude Laval Jr. Award for Innovative Technology and Research
- 2007 · Won 2nd and 3rd place at the 5th 10K Business plan competition (California State University, Fresno)
- 2006 · Coleman Fellowship
- 2003 · Winner, Poster presentation Graduate Research Symposium (Cornell University)
- 2002 · IEEE UFFC symposium, Winner of the student paper competition
- 2002 · Winner at the G. Steven Burrill technology business plan) and Tong prototype competition (UW-Madison Engineering and Business school
- 2002 · Third place at the Red Venture Fund competition for Engineering and Business plan (Cornell University)

current membership in professional organizations

Memberships

IEEE, ASME, Sigma Xi, HKN

graduate student advising (ms. & ph.d.)

Current

Benyamin Davaji (Ph.D.)

Mohamad Ali Malakoutian (Ph.D.)

Tsenguun Byambadorj (MS.)

Graduated

Jun Hyun Han (Ph.D., 2013) now at Intel Inc.

Jiang Chen (MS., 2012) now at Elutions Inc.

Robert Blise (MS., 2011) now at Dematic Inc.

Hyejeong Bak (MS. 2014) now at Creation Technology Inc.

STUDENT COMMITTEE PARTICIPATION (MS. & PH.D. GRADUATES)

Ph.D

ARNOLD MENSAH-BROWN (DR. FABIEN JOSSE) (2010)

JINJIN ZHANG (DR. FABIEN JOSSE) (2013)

TAO CAI (DR. FABIEN JOSSE) (2013)

TIFFANY CHENG (DR. SUNIL BHAVE, CORNELL UNIVERSITY) (2013)

MOHAMAD SOTOUDEGAN (DR. STEPHEN HEINRICH) (2014)

MS.

JOHN VITALE (DR. JAMES RICHIE) (2012)

LOGAN BERENS (DR. JAMES RICHIE) (2012)

ROBERT LENISA (DR. FABIEN JOSSE) (2013)

TIAN NEWMAN (DR. FABIEN JOSSE) (2013)

MEGHNA SAIKIA (DR. SHRI JOSHI) (2013)

MICHAEL MCCARTHY (DR. FABIEN JOSSE) (2014)

JUDE COOMPSON (DR. FABIEN JOSSE) (2014)

UNDERGRADUATE STUDENT PROJECTS

Memristor

TREVOR THIESS, RANDY NEU, JOHN LANGMYER, DEREK SCHWAB, BRITTNEY RODRIGUEZ, CARLOS PENA, AND VINCENZO ALBERICO (2012)

KELLEN CAREY, STEVEN CELMER, CURTIS BADER, RUINAN ZHANG IVAN CARTAGENA COLON, KYLE LEARY, LUCAS RUTOWSKI, (2014 - PRESENT)

MICHAEL BACHMANN (MEMRISTOR APPLICATIONS), (2015 - PRESENT)

Senior design

HOME-BREWED SCANNING TUNNELING MICROSCOPE (STM), TEAM: TREVOR THIESS, ALEXANDER HODGES, AND JOHN JAEGER (2014 - 2015)

COURSES TAUGHT

Undergraduate

ELEN 4430, PHYSICAL PRINCIPLES SOLID STATE DEVICES

ELEN 4490, DEVELOPMENTS IN DEVICES

EECE 4410, INTEGRATED MICROELECTRONIC CIRCUITS

ENEN 3030, ANALOG ELECTRONICS

EECE 3010, ELECTRONIC DEVICES & APPLICATIONS

EECE 168, TOPICS IN ELECTRICAL ENGINEERING

EECE 168, TOPICS IN ELECTRICAL ENGINEERING

Graduate

ELEN 5490, DEVELOPMENTS IN DEVICES

EECE 5410, INTEGRATED MICROELECTRONIC CIRCUITS

EECE 264, MICROELECTROMECHANICAL SYSTEMS

EECE 6953, SEMINAR IN ELECTRICAL & COMPUTER ENGINEERING

EECE 6995, Ind Study in Electrical & Computer Engineering

EECE 9994, Master Thesis

MEEN 9999, Doctoral Dissertation

university service activities

Committee participation

EECE Graduate Committee (2008-present)

EECE Open House Coordinator (2012-present)

EECE Graduate Ph.D. WQE and MS Comprehensive exam coordinator (2012-present)

Faculty search committee (Mechanical Engineering) (2011)

Lafferty endowed chair search committee (Electrical Engineering) (2012)

Robert C. Greenheck Chair in Design and Manufacturing (Mechanical Engineering) (2014)

Undergraduate Academic Adviser

Advise 10 to 30 students per semester

professional service activities

Journal Reviewer

Biosensors and Bioelectronics

Lab on a Chip

IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control

ACS Applied Materials & Interfaces

Analytical Chemistry

IEEE Transactions on Industrial Electronics

Mechatronics

August 5, 2015