YOUNG SHIK SHIN
CURRICULUM VITAE

Adjunct Assistant Professor
Department of Molecular and Medical Pharmacology
David Geffen School of Medicine at UCLA

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EDUCATIONS

3/2011	**California Institute of Technology (CA, USA)** Ph.D. of Bioengineering Research Advisor: Dr. James R. Heath Dissertation: Platforms to Study Biology at Small Scale: from DNAs to Single Cells
6/2006	**California Institute of Technology (CA, USA)** Master of Bioengineering
2/2004	**Seoul National University (Seoul, Korea)** Master of School of Mechanical and Aerospace Engineering Research Advisor: Dr. Dong-Chul Han and Dr. Jun Keun Chang Thesis: Electromanipulation of Mammalian Cells within Microchip
2/2002	**Seoul National University (Seoul, Korea)** Bachelor of School of Mechanical and Aerospace Engineering Honor Graduate (Cum laude)

EXPERIENCE

9/2013 – Present	**Adjunct Assistant Professor,** Department of Molecular and Medical Pharmacology, David Geffen School of Medicine at UCLA
5/2011 – 8/2013	**Postdoctoral Fellow,** Joint appointment with Prof. James R. Heath (Chemistry, Caltech) and Paul S. Mischel (Molecular and Medical Pharmacology, UCLA, currently UCSD)
3/2009 – Present	**Board of Scientific Advisor / Founding Member,** NanoIVD, Inc
3/2002 – 7/2004	**Researcher**, Digital Bio Technology Co. (Mar. 2002- July 2004)

HONORS AND AWARDS

2014	KSEA (Korean-American Scientists and Engineers Association) Young Investigator Grant
2012	Bronze Medal, Human-Tech Thesis Prize 2012, sponsored by Samsung Electronics
2011	Second Prize, Art of Science Competition 2011, Caltech
2011	Silver Medal, Human-Tech Thesis Prize 2011, sponsored by Samsung Electronics
2004 – 2007	Samsung Scholarship, Samsung Scholarship Foundation
2004	Best M.S. Thesis Prize, School of Mechanical and Aerospace Engineering Seoul National University
2004	The grand prize in Metric Contents Contest 2004, Mechanical Engineering & Technology Research Information Center, Korea
1996 – 2002	SNU Tuition Scholarship (six terms in 1996-2002), Seoul National University

ACTIVITIES

10/2013 – Present	KOSEN Expert, Korea Institute of Science and Technology Information
6/2006 – 6/2007	Vice president of Caltech Korean Graduate Students Association
8/1997 – 8/1998	Alumni president of Seoul Institute of Science Education program

PUBLICATIONS

JOURNAL ARTICLES

20. Wei Wei*, **Young Shik Shin***, Tomoo Matsutani, Kenta Masui, Huijun Yang, Yuchao Gu, Herrmann Ken, Kiwook Hwang, Bruno Bonetti, Rajesh Chopra, C. David James, Webster K. Cavenee, Timothy F. Cloughesy, Paul S. Mischel, James R. Heath and Beatrice Gini*, "Single Cell Phosphoproteomics identifies adaptive network dynamics of mTOR inhibitor resistance and defines effective combination therapy in glioblastoma", submitted (*: equal contribution)

19. Jing Yu, Jing Zhou, Alex Sutherland, Wei Wei, **Young Shik Shin**, Min Xue, and James R. Heath, "Microfluidics-Based Single-Cell Functional Proteomics for Fundamental and Applied Biomedical Applications", Annu. Rev. Anal. Chem., Vol. 7, pp. 275-295. PMID: 24896308

18. Wei Wei, **Young Shik Shin**, Chao Ma, Jun Wang, Meltem Elitas, Rong Fan, James R Heath, "Microchip platforms for multiplex single-cell functional proteomics with application to immunology and cancer research", Genome Medicine, Vol. 5 (8), pp1-12, 2013 PMID: 23998271

17. Wei Wei*, Qihui Shi*, Francoise Remacle*, Lidong Qin, David Shackelford, **Young Shik Shin**, Paul S. Mischel, Raphael D. Levine, James R. Heath, "Hypoxia Induces a Phase Transition within a Kinase Signaling Network in Cancer Cells", Proc. Nat. Acad. Sci., pp. E1352-E1360, DOI:10.1073/pnas.1303060110 (*: equal contribution)

16. **Young Shik Shin**, Tae Su Choi, Hyungjun Kim, J. L. Beauchamp, James R. Heath and Hugh I. Kim, "A Microfluidic Based Bubble Generation Enables Analysis of Physical Property Change in Phospholipid Surfactant Layers by Interfacial Ozone Reaction", Lab Chip, Vol. 12 (24), pp. 5243-5248, 2012

15. Jun Wang, Douglas Tham, Wei Wei, **Young Shik Shin**, Chao Ma, Habib Ahmad, Qihui Shi, Jenkan Yu, Raphael D. Levine, and James R. Heath, "Quantitating Cell–Cell Interaction Functions with Applications to Glioblastoma Multiforme Cancer Cells", Nano Lett., Vol. 12 (12), pp. 6101-6106, 2012

14. Qihui Shi, Lidong Qin, Rong Fan, Wei Wei, Deliang Guo, **Young Shik Shin**, Leroy Hood, Paul S. Mischel, and James R. Heath, "Single Cell Proteomic Chip for Profiling Intracellular Signaling Pathways in Single Tumor Cells", Proc. Nat. Acad. Sci., Vol. 109 (2), pp. 419-424, 2012

13. Habib Ahmad, Alex Sutherland, **Young Shik Shin**, Kiwook Hwang, Lidong Qin, Russell-John Krom, and James R. Heath, "A Robotics Platform for Automated Batch Fabrication of High Density, Microfluidics-Based DNA Microarrays, with applications to single cell, multiplex assays of secreted proteins", Rev. Sci. Instrum., 82, 094301, 2011

12. **Young Shik Shin**, Francoise Remacle, Rong Fan, Kiwook Hwang, Wei Wei, Habib Ahmad, Raphael D. Levine, and James R. Heath, "Protein Signaling Networks from Single Cell Fluctuations and Information Theory Profiling", Biophysical Journal, Vol. 100(10), pp 2378-2386, 2011

11. **Young Shik Shin***, Habib Ahmad*, Qihui Shi*, Hyungjun Kim, Tod A. Pascal, Rong Fan, William A. Goddard, III, and James R. Heath, "Chemistries for Patterning Robust DNA MicroBarcodes Enable Multiplex Assays of Cytoplasm Proteins from Single Cancer Cells", ChemPhysChem, Vol. 11 (14), pp 3063-3069, 2010 (*: equal contribution)

10. Hugh I. Kim* , Hyungjun Kim* , **Young Shik Shin*** , Luther W. Beegle, William A. Goddard, James R. Heath, Isik Kanik, and J. L. Beauchamp, "On-line Probing Interfacial Reactions in a Phospholipid Surfactant Layer Using Field Induced Droplet Ionization Mass Spectrometry", J. Phys. Chem. B, *114* (29), pp 9496–9503, 2010 (*: equal contribution)

9. Arkadij M. Elizarov, R. Michael van Dam, **Young Shik Shin**, Hartmuth C. Kolb, Henry C. Padgett, David Stout, Jenny Shu, Jiang Huang, Antoine Daridon, and James R. Heath, "Design and Optimization of Coin-Shaped Microreactor Chips for PET Radiopharmaceutical Synthesis", J. Nucl. Med., Vol. 51, no.2, pp 282-287, 2010

8. Hugh I. Kim, Hyungjun Kim, **Young Shik Shin**, Evan L. Neidholdt, Luther W. Beegle, Seung Soon Jang, James R. Heath, William A. Goddard, Isik Kanik, and J. L. Beauchamp, "Interfacial Reactions of Ozone with Surfactant Protein B in a Model Lung Surfactant System", J. Am. Chem. Soc., Vol. 132, no. 7, pp 2254-2263, 2010

7. Jungkyu Kim, Michael Junkin, Deok-Ho Kim, Seunglee Kwon, **Young Shik Shin**, Pak Kin Wong and Bruce K. Gale, "Applications, techniques, and microfluidic interfacing for nanoscale biosensing," Microfluid. Nanofluid., Vol. 7(2), pp 149-167, 2009

6. Jeong Ah Kim, Keunchang Cho, **Young Shik Shin**, Neoncheol Jung, Chanil Chung and Jun Keun Chang, "A multi-channel electroporation microchip for gene transfection in mammalian cells," Biosensors and Bioelectronics, Vol. 22, no. 12, pp 3273-3277, 2007

5. Jonathan E. Green, Jang Wook Choi, Akram Boukai, Yuri Bunimovich, Ezekiel Johnston-Halperin, Erica DeIonno, Yi Luo, Bonnie A. Sheriff, Ke Xu, **Young Shik Shin**, Hsian-Rong Tseng, J. Fraser Stoddart, and James R. Heath, "A 160 kilobit molecular electronic crossbar memory circuit patterned at 10 11 Bits per square centimeter," Nature, Vol. 445, pp 414-417, 2007

4. Yuri L. Bunimovich, **Young Shik Shin**, Woon-Seok Yeo, Michael Amori, Gabriel Kwong, and James R. Heath, "Quantitative Real-Time Measurements of DNA Hybridization with Alkylated Nonoxidized Silicon Nanowires in Electrolyte Solution," J. Am. Chem. Soc., Vol. 128, pp 16323-16331, 2006

3. Chung-Cheng Lee, Guodong Sui, Arkadij Elizarov, Chengyi Jenny Shu, **Young-Shik Shin**, Alek N. Dooley, Jiang Huang, Antoine Daridon, Paul Wyatt, David Stout, Hartmuth C. Kolb, Owen N. Witte, Nagichettiar Satyamurthy, James R. Heath, Michael E. Phelps, Stephen R. Quake, Hsian-Rong Tseng, "Multistep Synthesis of a Radiolabeled Imaging Probe Using Integrated Microfluidics," Science, Vol. 310, no. 5755, pp 1793 – 1796, 2005

2. **Young Shik Shin**, Keunchang Cho, Jung Kyung Kim, Sun Hee Lim, Chan Hee Park, Kyu Baek Lee, Yongdoo Park, Chanil Chung, Dong-Chul Han and Jun Keun Chang, "Electrotransfection of M ammalian Cells Using Microchannel-Type Electroporation Chip," Anal. Chem., Vol.76, pp 7045-7052, 2004

1. **Young Shik Shin**, Keunchang Cho, Sun Hee Lim, Seok Chung, Sung-Jin Park, Chanil Chung, Dong-Chul Han and Jun Keun Chang, "PDMS-based micro PCR chip with Parylene coating," J. Micromech. Microeng., Vol. 13, pp 768-774, 2003

CONFERENCE PROCEEDINGS

6. Won Gu Lee, Hyunwoo Bang, Hoyoung Yun, Jeong Ah Kim, Keunchang Cho, **Young Shik Shin**, Chanil Chung, Neon Chul Chung, Jun Keun Chang, and Dong-Chul Han, "In Situ Investigation Of Uptake Phenomena Of Bilological Molecules And Silica Nanoparticles Into Mammalian Cells In Microstructures," Nanotech 2007, Santa Clara Convention Center, Santa Clara, California, Usa, Vol. 2, pp 243-245, May 20-24 2007

5. Won Gu Lee, Hyunwoo Bang, Jeong Ah Kim, Joonmo Lee, Keunchang Cho, Asif Riaz, **Young Shik Shin**, Hoyoung Yun, Junha Park, Neon C . Chung, Chanil Chung, Dong-Chul Han, and Jun Keun C hang, "Electrotransfection In Microchannel: A Shortcut To Its Uptake Mechanism," μTAS 2006, Tokyo International Forum, pp 1351-1353, November 5-9, 2006

4. J. K. Kim, S. H. Lim, Y. Lee, **Y. S. Shin**, C. Chung, J. Y. Yoo, and J. K. Chang, "Conjugation of Streptavidin-coated Quantum Dots for the Real-time Imaging of Gene Transfer in to Live Cells, " NanoTech 2004, Boston, Massachusetts, vol. 3, pp 379 - 382, Mar 2004

3. **Young Shik Shin**, Jung Kyung Kim, Sun Hee Lim, Young Kyung Lee, Keunchang Cho, Yongku Lee, Seok Chung, Chanil Chung, Dong-Chul Han, and Jun Keun Chang, "Highly Efficient Electro-permeabilization of Mammalian Cells Using Micro-electroporation Chip," NanoTech 2004, Boston, Massachusetts, Vol. 1, pp 70 - 73, Mar 2004

2. J. K. Kim, S. H. Lim, Y. Lee, **Y. S. Shin**, C. Chung, J. K. Chang, and J. Y. Yoo, "Visualization of Gene Transfer into Live Cells Using Fluorescent Semiconductor Nanocrystals," Proc. of 2 nd KSV Conference 2003, Pohang, Korea, pp 81-, Nov 2003

1. **Young Shik Shin**, Keunchang Cho, Sun Hee Lim, Seok Chung, Sung-Jin Park, Chanil Chung, Dong-Chul Han and Jun Keun Chang, "PDMS-based microchip for polymerase chain reaction," BioMEMS & Microfluidics 2003, San Diego, CA, May 2003

PATENTS

4. Sunnie Park Kim, **Young Shik Shin,** Changgeng Liu, Rory Kelly, Becky Chan, "MICROFLUIDIC-BASED LAB-ON-A-TEST CARD FOR A POINT-OF-CARE ANALYZER," Patent Publication No. WO/2010/065967, 6 Oct 2010

3. **Young Shik Shin**, Michael Amori, Yuri Bunimovich, James R. Heath, "Apparatus and Method for Quantitative Determination of Target Molecule," Patent Publication No. WO/2008/030395, 13 March 2008

2. Chang, Jun-Keun, Cho, Keun-Chang, Chung, Chan-Il, **Shin, Young-Shik**, Kim, Jeong-Ah, Jung, Neon-Cheol, "Electroporator Having An Elongated Hollow Member," Patent Publication No. WO/ 2006/001614 A1, 1 May 2006 (This patent was disposed to Life Technologies from NanoEnTek, Inc. for USD 13 million.)

1. Chang, Jun-Keun, Cho, Keun-Chang, Chung, Chan-Il, **Shin, Young-Shik**, Kim, Jeong-Ah, Jung, Neon-Cheol, "Pipette Tip For Electroporation Device," Korean Patent Application No. 10-2008-0034744, 15 April 2008

Invited Conference Presentations

1. "Single cell Phosphoproteomics identifies adaptive network dynamics of mTOR inhibitor resistance and defines effective combination therapy in glioblastoma," AACR Precision Medicine Series: Drug Sensitivity and Resistance: Improving Cancer Therapy, 21 June 2014 (Orlando, FL)

Reviewer Service

Proposals: University of California Center for Accelerated Innovation (UC CAI) from NIH

Journals: PLOS ONE

Synergistic Activities

Professional Memberships American Association for Cancer Research (AACR), Biomedical Engineering Society (BMES), American Chemical Society (ACS)

Community Outreach Caltech Student-Faculty Programs (SFP) Co-Mentor (2011)

Courses

M PHAM 99 – Student Research Program, 2014-present

Students advised

Undergraduate

Stephen To (BioChem, 2014 - present)
Varun Agarwal (Biology, 2014 - present)
Monique Gandawidjaja (Biology, 2014 - present)

Research Support

Active

U54 CA151819 (Heath) 9/3/2010-7/31/2015
CalTech (NIH Prime) $274,608
Nano Systems Biology Cancer Center 2
Role: Project PI
We propose to develop and use *in vitro* and in vivo molecular imaging technologies to study metabolic switches that happen in malignant transformation and to determine the importance of these metabolic switches for tumor proliferation, survival, and recognition/rejection by the immune system.

KSEA Young Investigator Grant (Shin) 6/14/2014-6/13/2015
Korean-American Scientists and Engineers Assoc. $9,350
Young Investigator Award
Role: PI
This grant is designed to recognize and support those who have demonstrated the outstanding early career development as a young investigator whose achievement in science or technology areas is outstanding within the context of the mission of KSEA. Proposed research is the development and implementation of novel molecular diagnostic tools to study resistance mechanism of various cancer types including malignant glioma and melanoma.

Start-up support from UCLA and Phelps Foundation 09/01/2013-06/30/2017
The goal is to build the UCLA/Caltech Translational Medicine Lab within the Department of Molecular and Medical Pharmacology, which will entail providing new generations of *in vitro* molecular diagnostics along with novel approaches to integrating the biology of disease, *in vitro* and *in vivo* (imaging) molecular diagnostics and molecular and cell therapeutics.

Pending

R21 (Wei) 7/1/2015 - 6/30/2018
National Institutes of Health $175,000
Global Scale Singe-cell Functional Proteomics Platform via Beads-On-Barcodes Microarray (BOBarray)
Role: Co-Investigator
We propose to develop a global scale high throughput single cell proteomics platform that allows characterizing functional proteins of heterogeneous tumors with unprecedented multiplexity, yielding knowledge that may lead to new therapeutic strategies to improve the treatment of extensive heterogeneous human cancer by combining highly flexible and scalable bead-based protein assays with highly versatile microfluidics chips and DNA barcode microarrays.

R03 (Shin) 4/1/2015 - 3/31/2017
National Institutes of Health $50,000
Fast Metabolic phenotyping of GBM cells acquiring resistance to targeted therapy
Role: PI
The goal of the proposed research is developing a technology for a kinetic measurement of cellular metabolism as well as proteomics under drug treatment that informs us any signature of therapy effectiveness and resistance.

U54 (Phelps/ Heath) 9/1/2015 - 8/31/2020
CalTech (NIH Prime) $420,000
Nano Systems Biology Cancer Center 3
Role: Co-Investigator (Project 4) / Co-director (Nano/Microfab & Biomaterials Core)
We propose the Nano Systems Biology Cancer Center as a collaboration between Caltech and the UCLA Geffen School of Medicine, to develop nanotechnologies for addressing challenges in combinatorial cancer therapies. Four specific Projects are supported by two Core Resources and an Administrative structure designed to promote cross-university interactions at the frontiers of cancer biology, clinical oncology, and the basic and engineering sciences.

References

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Department of Chemistry, California Institute of Technology
1200 E. California Blvd. Pasadena, CA 91125, USA
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Professor Paul S. Mischel
Ludwig Institute for Cancer Research, University of California, San Diego
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Professor Rong Fan
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Professor Raphael D. Levine
Department of Physical Chemistry, Hebrew University, Jerusalem 91904, Israel
Department of Chemistry and Biochemistry, University of California, Los Angeles
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