CHANG LU

Fred W. Bull Professor of Chemical Engineering
Professor of Biomedical Engineering (Affiliate)
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Website: http://www.microfluidics.che.vt.edu/

RESEARCH INTERESTS

Microfluidic biotechnology, genomic profiling of tissue samples, brain neuroscience, mental diseases and addiction, cancer precision medicine

EDUCATION

2002-2004	Cornell University, Ithaca, NY Postdoctoral associate in Applied Physics Advisor: Harold G. Craighead
1998-2002	University of Illinois at Urbana-Champaign, Urbana, IL Ph.D. in Chemical Engineering Thesis title: *Efforts towards micro fuel cells* M.S. in Chemical Engineering Advisor: Richard I. Masel
1994-1998	Peking University, Beijing, China B.S. in Chemistry (with honors)

PROFESSIONAL EXPERIENCE

2010-present	Department of Chemical Engineering. Virginia Tech, Blacksburg, VA. *Graduate Program Director* (2020-present), *Fred W. Bull Endowed Professor* (2016-present), *Professor* (2015-2016), *Associate Professor* (2010-2015)
2015-present	Atrium Health Wake Forest Baptist Comprehensive Cancer Center, Winston-Salem, NC. *Assistant Director* (2024-present), *Co-leader of Signaling and Biotechnology Program* (2023-2024), *member* (2015-2023)
2022-2024	College of Engineering One Health Initiative, Virginia Tech. *Co-leader.*
2017-2024	ICTAS Center for Engineered Health, Virginia Tech *Director* (2023-2024), *Precision medicine track leader* (2017-2023)
2016	Salk Institute for Biological Studies, La Jolla, CA *Visiting professor (on sabbatical) in Prof. Joseph Ecker lab.*
2004-2009	Department of Agricultural and Biological Engineering. Purdue University, West Lafayette, IN. *Associate Professor (2009), Assistant Professor (2004-2009).*

HONORS AND AWARDS

2020	Fellow, American Institute for Medical and Biological Engineering (AIMBE)
2016	IChemE global biotechnology award finalist
2016	Fred W. Bull Endowed Professorship, Virginia Tech
2015	Dean's Award for Research Excellence, Virginia Tech

2012 Faculty Fellow, College of Engineering, Virginia Tech
2008 Teaching for Tomorrow Award, Purdue University
2008 NSF CAREER Award
2007 Wallace H. Coulter Foundation Early Career Award
2006 Seed for Success Award, Purdue University
2006 First Annual Millionaires Club Award, Purdue University

INVITED SEMINARS AND TALKS

1. Advanced Nanomedicine seminar, Virginia Tech, Blacksburg, VA, April 21, 2025.
2. School of Neuroscience seminar, Virginia Tech, Blacksburg, VA, Sept 25, 2024.
3. Analytical Chemistry seminar, Purdue University, West Lafayette, IN, Sept 10, 2024.
4. Guest lecture, BME, Georgia Institute of Technology, Atlanta, GA, Nov 28, 2023.
5. Plenary Talk, PittCon 2023, Philadelphia, PA, March 19, 2023.
6. Departmental colloquium, Electrical and Computer Engineering, University of Houston, April 11, 2022.
7. Departmental seminar, Chemical and Biomolecular Engineering, Clemson University, April 21, 2022.
8. Invited Talk, AICHE annual meeting, Boston, MA, Nov 8, 2021.
9. Wake Forest Baptist Comprehensive Cancer Center 1st Annual Signaling and Biotechnology (SBT) Retreat, Winston-Salem, NC, Dec 6, 2019
10. 20th Annual Innovative Molecular Analysis Technologies Meeting, NCI and Cedars-Sinai Medical Center, Los Angeles, CA, Nov 22, 2019.
11. Developmental and Translational Neurobiology Center special seminar series, Fralin Biomedical Research Institute of Virginia Tech Carilion School of Medicine, Roanoke, VA, Nov 5, 2019.
12. Craighead celebration symposium, Cornell University, Ithaca, NY, June 1, 2019.
13. AGTD meeting, Northeastern University, Boston, May 30, 2019.
14. Departmental seminar. Department of Chemical and Biomolecular Engineering, North Carolina State University, Feb 25, 2019.
15. Departmental seminar. Department of Physiology and Biophysics, School of Medicine, Virginia Commonwealth University, Richmond, VA, Feb 7, 2019.
16. Departmental seminar. Meinig School of Biomedical Engineering, Cornell University, Ithaca, NY, Feb 1, 2019.
17. Departmental seminar. Department of Bioengineering, UCSD, Dec 7, 2018.
18. Microtas 2018 workshop, Kaohsiung, Taiwan, Nov 11, 2018.
19. Analytical chemistry seminar, Department of Chemistry, University of Illinois at Urbana-Champaign, Sept 21, 2018.
20. Seminar series, School of Chemical and Biomolecular Engineering, Georgia Tech, Atlanta, GA, Sept 5, 2018.
21. Inaugural Single Cell Analysis conference at the Next Generation Dx Summit, Grand Hyatt Washington, Washington DC, August 23-24, 2018.
22. 2018 Applied Biosciences Horizons Conference, keynote lecture, University of Notre Dame, Indiana, July 22-24, 2018.
23. Departmental seminar, Department of Chemistry, City University of Hong Kong, Hong Kong, Dec. 20, 2017.
24. Plenary speaker, SciX 2017, Reno, Nevada, Oct 10, 2017.

25. Departmental seminar, Cain Department of Chemical Engineering, Louisiana State University, Baton Rouge, LA, Sept 22, 2017.
26. NIH Advanced Genomic Technology Development Meeting, Boston, MA, May 22-25, 2017.
27. Virginia Nanomedicine Symposium, Charlottesville, VA, April 20-21, 2017.
28. AACR Annual Meeting 2017, NCI Cross-Disciplinary Programs Supporting Integrated Cancer Research, April 4, 2017
29. Departmental seminar, Department of pharmaceutical sciences, Northeastern University, Boston, MA, March 23, 2017.
30. Departmental seminar, Department of Biomedical Engineering, Ohio State University, Columbus, OH, March 2, 2017.
31. 7th Persh workshop-the interface between materials and biology, Institute for Defense Analyses, Alexandria, VA, Feb 8, 2017.
32. Microfluidics in Biomedical Sciences Seminars, University of Michigan, Ann Arbor, MI, Nov 8, 2016.
33. Departmental seminar, Department of Biomedical Engineering, UC Irvine, Irvine, CA, May 20, 2016.
34. Harvard Biopolymers Core, Harvard Medical School, Boston, MA, May 4, 2016.
35. Departmental seminar, Department of Bioengineering, UCLA, Los Angeles, CA, Feb 25, 2016.
36. NIH IMAT Meeting, Bethesda, MD, Nov 12, 2015.
37. Chesapeake Cytomtry Consortium, Johns Hopkins University, Rockville, MD, Nov 6, 2015.
38. Chemical Engineering seminar, Penn State University, University Park, PA, March 16, 2015.
39. Departmental seminar, Ohio State University, Chemical and Biomolecular Engineering, Columbus, OH, Oct 16, 2014.
40. Departmental seminar, Department of Biomedical Sciences, City University of Hong Kong, Hong Kong, Sept 24, 2014.
41. Joint Chemistry and Biomedical Engineering seminar, Hong Kong University of Science and Technology (HKUST), Hong Kong, Sept 22, 2014.
42. Departmental Seminar, UNC/NCSU Joint department of Biomedical Engineering, Chapel Hill, NC, March 28, 2014.
43. Invited talk, Award Session of the American Electrophoresis Society/AICHE annual meeting, San Francisco, Nov 6, 2013.
44. Seminar at School of Public Health, Nantong University, Nantong, China, March 14, 2013.
45. Chemistry seminar, Nanjing University, Nanjing, China, March 13, 2013.
46. Invited talk, the 34th annual international conference of IEEE-EMBS (Engineering in Medicine and Biology Society). San Diego, Aug 28-Sept 1, 2012.
47. Departmental seminar, Department of Engineering Science and Mechanics, Virginia Tech, Blacksburg, VA, April 18, 2012.
48. Departmental seminar. Department of Chemical and Biomolecular Engineering, University of Akron, Akron, OH, Oct 27, 2011.
49. Chemical physics seminar, Imperial College London, Sept 8, 2011.
50. Plenary talk, the Bioprocessing Summit, "Optimizing Mammalian Cell Lines", Marriott Long Wharf hotel, Boston, August 24-25, 2011.
51. College of Pharmacy Seminar, University of South Carolina, Columbia, SC, Feb 8, 2011.
52. Plenary talk. 3rd National Symposium on Analytical Chemistry for Life Sciences. Beijing, China, Aug 19-22, 2010.
53. Plenary talk. Purdue University Center for Basic and Applied Studies of Biological Membranes symposium. West Lafayette, IN, May 8, 2009.
54. Chemical Engineering Departmental Seminar. Virginia Tech, Blacksburg, VA, May 4, 2009.
55. Analytical Chemistry Division seminar series. Department of Chemistry, University of California at Riverside, Riverside, CA, Feb 12, 2009.

56. Departmental seminar series, Department of Chemical and Biomolecular Engineering, University of Notre Dame, Notre Dame, IN, Jan 20, 2009.
57. Departmental seminar series, Department of Chemical and Petroleum Engineering, University of Kansas, Lawrence, KS, Nov 4, 2008.
58. Departmental seminar series, School of Biomedical Engineering, Purdue University, West Lafayette, IN, September 2007.
59. Nanotechnology seminar series, Birck Nanotechnology Center, Purdue University, West Lafayette, IN, November 2006.
60. Monthly MEMS and Microfluidics seminar series, GE Global Research Center, Niskayuna, NY, August 2006.
61. Departmental seminar. School of Chemical Engineering, Purdue University, West Lafayette, IN, June 2004.
62. Departmental seminar. Department of Chemistry, Purdue University, West Lafayette, IN, May 2004.
63. Departmental seminar. Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, IN, May 2004.
64. Departmental seminar series, Department of Chemical Engineering, University of Houston, Houston, TX, March 2004.
65. Departmental seminar series, Department of Chemical Engineering, The City College of New York, New York, NY, February 2004.
66. Department of Chemical Engineering, departmental seminar series, Lehigh University, Bethlehem, PA, February, 2004.
67. Nanobiotechnology Center (NBTC) seminar series, Cornell University, Ithaca, NY, February 2004.

PUBLICATIONS

Representative Papers

1. Jaster, A.M., Hadlock, T.M., Buzzi, B., Maltman, J.L., Saha, S., Silva, G.M., Thakur, N., Zhang, X., Li, G., Ledesma-Corvi, S., Fujita, B., Zylko, A.L., Lewis, M.R., Wolstenholme, J.T., Hamilton, P.J., Lu, C.*, Damaj, M.I.*, González-Maeso, J.* Sex-specific role for 5-HT_{2A} receptor in psychedelic-induced extinction of opioid rewarding properties. **Nature Communications**, (2025) accepted. (*The first study on sex difference in brain epigenomics involved in psychedelic treatment of opioid use disorder*).
2. Liu, Z., Deng, C., Zhou, Z., Xiao, Y., Jiang, S., Zhu, B., Naler, L., Jia, X., Yao, D., Lu, C. Epigenomic tomography for probing spatially defined chromatin state in the brain. **Cell Reports Methods** 4 (2024) 100738. (*a new low-cost spatial epigenomic tool for mapping epigenomic dynamics across brain regions*) https://www.cell.com/cell-reports-methods/fulltext/S2667-2375(24)00063-8
3. Zhu, B., Ainsworth, R.J., Wang, Z., Liu, Z., Sierra, S., Deng, C., Callado, L.F., Meana, J.J., Wang, W.*, Lu, C.*, Gonzalez-Maeso, J*. Antipsychotic-induced epigenomic reorganization in frontal cortex of individuals with schizophrenia. **eLife** 12 (2023) RP92393. (*The first study on epigenomic reorganization in postmortem human brain due to antipsychotic treatment*) https://elifesciences.org/articles/92393
4. Zhang, Q., Ma, S., Liu, Z., Zhu, B., Zhou, Z., Li, G., Meana, J., González-Maeso, J., Lu, C. Droplet-based bisulfite sequencing for high-throughput profiling of single-cell DNA methylomes. ***Nature Communications*** 14 (2023) 4672. (*The first droplet-based single-cell methylomic tool.)* https://www.nature.com/articles/s41467-023-40411-w
5. de la Fuente Revenga, M., Zhu, B. #, Guevara, C.A. #, Naler, L.B., Saunders, J.M., Zhou, Z., Toneatti, R., Sierra, S., Wolstenholme, J.T., Beardsley, P.M., Huntley, G.W., Lu, C.*, Gonzalez-Maeso, J.* Prolonged epigenomic and synaptic plasticity alterations following single exposure to a psychedelic

in mice. ***Cell Reports*** 37 (2021) 109836. (*For the first time, we described the prolonged epigenomic alternation after psychedelic exposure in mouse brain, in contrast to highly transient transcriptomic changes*) https://www.sciencedirect.com/science/article/pii/S2211124721013000?via%3Dihub

6. Zhu, B., Hsieh, Y.-P., Murphy, T.W., Zhang, Q., Naler, L.B., Lu, C. MOWChIP-seq for low-input and multiplexed profiling of genome-wide histone modifications. ***Nature Protocols,*** 14 (2019) 3366-3394. (*We described semi-automated MOWChIP-seq with 8 assays running in parallel*) https://www.nature.com/articles/s41596-019-0223-x
7. Ma, S., Hsieh, Y.-P., Ma, J., Lu, C. Low-input and multiplexed microfluidic assay reveals epigenomic variation across cerebellum and prefrontal cortex. ***Science Advances*** 4 (2018) eaar8187. (*SurfaceChIP-seq was demonstrated to profile histone modifications with both ultralow input ~30 cells (compared to 10 million cells required by conventional assays) and high throughput ~8 assays in parallel)* https://www.science.org/doi/10.1126/sciadv.aar8187
8. Ma, S., de la Fuente Revenga, M., Sun, Z., Sun, C., Murphy, T.W., Xie, H., Gonzalez-Maeso, J., Lu, C. Cell-type-specific brain methylomes profiled via ultralow-input microfluidics. ***Nature Biomedical Engineering*** 2 (2018) 183-194. *(We demonstrated MID-RRBS which is capable of profiling DNA methylomes with ng-to-single cell quantities of DNA)* https://www.nature.com/articles/s41551-018-0204-3
9. Cao, Z., Chen, C., He, B., Tan, K., Lu, C. A microfluidic device for epigenomic profiling using 100 cells. ***Nature Methods*** 12 (2015) 959-962. *(We described the first microfluidic epigenomic profiling technology MOWChIP-seq, which is capable of profiling epigenomes using 100 cells, compared to 10 million cells required by conventional methods)* https://www.nature.com/articles/nmeth.3488
10. Geng, T., Zhan, Y., Wang, J., Lu, C. Transfection of cells using flow-through electroporation based on constant voltage. ***Nature Protocols*** 6 (2011) 1192-1208. *(a paper that describes our electroporation method under microscale Dean flow for gene delivery)* https://www.nature.com/articles/nprot.2011.360

Full List of Publications

1. Jaster, A.M., Hadlock, T.M., Buzzi, B., Maltman, J.L., Saha, S., Silva, G.M., Thakur, N., Zhang, X., Li, G., Ledesma-Corvi, S., Fujita, B., Zylko, A.L., Lewis, M.R., Wolstenholme, J.T., Hamilton, P.J., Lu, C.*, Damaj, M.I.*, González-Maeso, J.* Sex-specific role for 5-HT_{2A} receptor in psychedelic-induced extinction of opioid rewarding properties. **Nature Communications**, accepted.
2. Wu, P., Liu, Z., Zheng, L., Zhou, Z., Wang, W.*, Lu, C.* Comprehensive multimodal and multiomic profiling reveals epigenetic and transcriptional reprogramming in lung tumors. **Communications Biology** 8 (2025) 527.
3. Udayasuryan, B., Zhou, Z., Ahmad, R.N., Sobol, P., Deng, C., Nguyen, T. T. D., Kodikalla, S., Morrison, R., Goswami, I., Slade, D. J., Verbridge, S., Lu, C. Fusobacterium nucleatum infection modulates the transcriptome and epigenome of HCT116 colorectal cancer cells in an oxygen-dependent manner. **Communications Biology** 7 (2024) 551.
4. Liu, Z., Deng, C., Zhou, Z., Xiao, Y., Jiang, S., Zhu, B., Naler, L., Jia, X., Yao, D., Lu, C. Epigenomic tomography for probing spatially defined chromatin state in the brain. **Cell Reports Methods** 4 (2024) 100738.
    - "New spatial profiling approach maps out discoveries for future brain research". VT news, March 19, 2024.
    - "Brain chromatin state evaluation using epigenomic tomography". Science News Highlights, March 20, 2024.
    - "An epigenetic brain scan". The Scientist, July 16, 2024.

5. Zhu, B., Ainsworth, R.J., Wang, Z., Liu, Z., Sierra, S., Deng, C., Callado, L.F., Meana, J.J., Wang, W.*, Lu, C.*, Gonzalez-Maeso, J*. Antipsychotic-induced epigenomic reorganization in frontal cortex of individuals with schizophrenia. **eLife** 12 (2023) RP92393.
6. Zhang, Q., Ma, S., Liu, Z., Zhu, B., Zhou, Z., Li, G., Meana, J., González-Maeso, J., Lu, C. Droplet-based bisulfite sequencing for high-throughput profiling of single-cell DNA methylomes. **Nature Communications** 14 (2023) 4672.
7. Afrose, S., Song, W., Nemeroff, C.B., Lu, C., Yao, D. Subpopulation-specific Machine Learning Prognosis for Underrepresented Patients with Double Prioritized Bias Correction. **Communications Medicine** 2 (2022) 111.
    - "New AI fairness technique has significant lifesaving implications", VT news, September 27, 2022.
8. Liu, Z., Naler, L.B., Zhu, Y., Deng, C., Zhang, Q., Zhu, B., Zhou, Z., Sarma, M., Murray, A., Xie, H., Lu, C. nMOWChIP-seq: low-input genome-wide mapping of non-histone targets. **NAR Genomics and Bioinformatics** 4 (2022) Iqac030.
9. Hsieh, Y.-P. #, Naler, L.B. #, Ma, S., Lu, C. Cell-type-specific epigenomic variations associated with BRCA1 mutation in pre-cancer human breast tissues. **NAR Genomics and Bioinformatics** 4 (2022) Iqac006.
10. Naler, L.B., Hsieh, Y.-P., Geng, Z., Zhou, Z., Li, L.*, Lu, C.* Epigenomic and transcriptomic analyses reveal differences between low-grade inflammation and severe exhaustion in LPS-challenged murine monocytes. **Communications Biology** 5 (2022) 102.
11. de la Fuente Revenga, M., Zhu, B., Guevara, C.A., Naler, L.B., Saunders, J.M., Zhou, Z., Toneatti, R., Sierra, S., Wolstenholme, J.T., Beardsley, P.M., Huntley, G.W., Lu, C.*, Gonzalez-Maeso, J.* Prolonged epigenomic and synaptic plasticity alterations following single exposure to a psychedelic in mice. **Cell Reports** 37 (2021) 109836.
    - "Epigenetic roots of long-lasting therapy", Nature, Vol 609, S99, Sept 29, 2022.
    - "Treatments not trips". Nature, Vol 609, S80, 2022.
    - "Are psychedelics superior for treating mental illness? Potentially, yes". BioTechniques, Dec 7, 2021.
    - "Psychedelics show promise in treating mental illness: Genomic analysis process developed at Virginia Tech helps scientists see why." VT news, Nov 18, 2021.
    - "Single dose of a psychedelic drug alters neurons' structure and gene environment". VCU news, Nov 8, 2021.
12. Murphy, T. W., Hsieh, Y.-P., Zhu, B., Naler, L.B., Lu, C. Microfluidic platform for next-generation sequencing library preparation with low-input samples. **Analytical Chemistry** 92 (2020) 2519-2526.
13. Deng, C., Murphy, T.W., Zhang, Q., Naler, L., Xu, A., Lu, C. Multiplexed and ultralow-input ChIP-seq enabled by tagmentation-based indexing and facile microfluidics. **Analytical Chemistry** 92 (2020) 13661-13666.
14. Rahtes, A., Pradhan, K., Sarma, M., Xie, H., Lu, C., Li, L. 4-PBA facilitates resolution of inflammatory macrophages programmed by subclinical low dose LPS. **Innate Immunity**, 26 (2020) 62-72.
15. Deng, C., Naler, L.B., Lu, C. Microfluidic epigenomic mapping technologies for precision medicine. **Lab on a Chip**, invited review, 19 (2019) 2630-2650.
16. Zhu, B., Hsieh, Y.-P., Murphy, T.W., Zhang, Q., Naler, L.B., Lu, C. MOWChIP-seq for low-input and multiplexed profiling of genome-wide histone modifications. **Nature Protocols,** 14 (2019) 3366-3394.
    - "Highly sensitive epigenomic technology combats disease". VT news, Nov 25, 2019.
17. Hu, Y., Xu, F., Zhang, R., Legarda, D., Dai, J., Wang, D., Li, H., Zhang, Y., Xue, Q., Dong, G., Zhang, H., Lu, C., Mortha, A., Liu, J., Cravedi, P., Ting, A., Li, L., Qi, C., Pierce, S., Merad, M., Heeger, P., Xiong, H. Interleukin-1β-induced IRAK1 ubiquitination is required for T_H-GM-CSF cell differentiation in T cell-mediated inflammation. **Journal of Autoimmunity**, 102 (2019) 50-64.

18. Zhang, X., Wang, Y., Chiang, H.-C., Hsieh, Y.-P., Lu, C., Park, B. H., Jatoi, I., Jin, V. X., Hu, Y., Li, R. BRCA1 mutations attenuated super-enhancer function and chromatin looping in haploinsufficient human breast epithelial cells. **Breast Cancer Research,** 21 (2019) 51.
19. Zhu, Y., Cao, Z., Lu, C. Microfluidic MeDIP-seq for low-input methylomic analysis of mammary tumorigenesis in mice. **Analyst** 144 (2019) 1904-1915.
20. Murphy, T.W., Sheng, J., Naler, L.B., Feng, X., Lu, C. On-chip Manufacturing of Synthetic Proteins for Point-of-care Therapeutics. **Microsystems & Nanoengineering** 5 (2019) 13.
    - "Therapeutics-on-a-chip (TOC): Manufacturing synthetic proteins for point-of-care therapeutics." Phys.org, April 11, 2019.
21. Cox, M., Deng, C., Naler, L., Lu, C., Verbridge, S. Effects of culture condition on epigenomic profiles of brain tumor cells. **ACS Biomaterials Science & Engineering** 5 (2019) 1554-1552.
22. Sarma, M., Lee, J., Ma, S., Li, S., Lu, C. A diffusion-based microfluidic device for single-cell RNA-seq. **Lab on a Chip** 19 (2019) 1247-1256.
23. Ma, S., Hsieh, Y.-P., Ma, J., Lu, C. Low-input and multiplexed microfluidic assay reveals epigenomic variation across cerebellum and prefrontal cortex. **Science Advances** 4 (2018) eaar8187.
    - "Epigenetic changes guide development of different brain regions". *Dana Foundation*, July 11, 2018.
    - "Difference in gene switching discovered in different parts of brain". *Virginia Tech news*. April 26, 2018.
    - "Virginia Tech team develops microfluidic technique for low-input ChIP-seq." *GenomeWeb*, April 19, 2018.
24. Ma, S., de la Fuente Revenga, M., Sun, Z., Sun, C., Murphy, T.W., Xie, H., Gonzalez-Maeso, J., Lu, C. Cell-type-specific brain methylomes profiled via ultralow-input microfluidics. **Nature Biomedical Engineering** 2 (2018) 183-194.
    - "Epigenomic tool breakthrough has implications for identifying disease processes." *Virginia Tech news*, March 9, 2018.
25. Murphy TW, Hsieh Y-P, Ma S, Zhu Y, Lu C. Microfluidic low-Input fluidized-bed enabled ChIP-seq device for automated and parallel analysis of histone modifications. **Analytical Chemistry**. 90 (2018) 7666–7674.
26. Murphy, T.W., Zhang, Q., Naler, L.B., Ma, S., Lu, C. Recent advances on microfluidic technologies for single cell analysis. (review) **Analyst** 143 (2018) 60-80.
27. Sun, C., Lu, C. Microfluidics-based chromosome conformation capture (3C) technology for examining chromatin organization with a low quantity of cells. **Analytical Chemistry** 90 (2018) 3714–3719.
28. Ma, S., Murphy, T.W., Lu, C. Microfluidics for Genome-wide Studies Involving Next Generation Sequencing. Invited Review, **Biomicrofluidics**, 11 (2017) 021501.
29. Sun, C., Hsieh, Y.P., Ma, S., Geng, S., Cao, Z., Li, L., Lu, C. Immunomagnetic Separation of Tumor Initiating Cells by Screening Two Surface Markers. **Scientific Reports**, 7 (2017) 40632.
30. Sun, C., Hassanisaber, H., Yu, R., Ma, S., Verbridge, S.S., Lu, C. Paramagnetic structures within a microfluidic channel for enhanced immunomagnetic isolation and surface patterning of cells. **Scientific Reports** 6 (2016) 29407.
31. Ma, S., Bryson, B.D., Sun, C., Fortune, S.M., Lu, C. RNA extraction from a mycobacterium under ultrahigh electric field intensity in a microfluidic device. **Analytical Chemistry** 88 (2016) 5053-5057.
32. Cao, Z., Lu, C. A microfluidic device with integrated sonication and immunoprecipitation for sensitive epigenetic assays. **Analytical Chemistry** 88 (2016) 1965-1972.
33. Lu, C., Verbridge, S.S. ed. **Microfluidic methods for molecular biology**. Springer, April 2016. ISBN: 978-3-319-30017-7.

34. Zhu, Y., Lu, C. Microfluidic Chromatin Immunoprecipitation for Analysis of Epigenomic Regulations, **Microfluidic methods for molecular biology**, (Lu, C. and Verbridge, S.S. ed.). Springer, April 2016.
35. Cao, Z., Chen, C., He, B., Tan, K., Lu, C. A microfluidic device for epigenomic profiling using 100 cells. **Nature Methods** 12 (2015) 959-962.
    - "Research highlights: microfluidic-enabled single-cell epigenetics." *Lab on a Chip,* Oct, 2015.
    - "Microfluidic ChIP makes a few cells go a long way". *Epigenie*, September 11, 2015.
    - "Well-washed ChIP-seq profiles the epigenome with just 100 cells". *GEN (Genetic Engineering & Biotechnology News)*, July 28, 2015.
    - "ChIP-seq Gets Fresh." *BioTechniques,* Sept 9, 2015.
    - "New technique can help scientists conduct epigenomic analysis with just 100 cells." *Tech Times*, July 28, 2015.
    - "New technology helps personalized medicine by enabling epigenomic analysis with a mere 100 cells" *Virginia Tech News,* July 28, 2015.
36. Cao, Z.N., Lu, C. Quantitative detection of nucleocytoplasmic transport of native proteins at the single cell level. Single cell protein analysis, **Methods in Molecular Biology**, (Singh, A.K. and Chandrasekaran, A. ed.), Springer, 2015.
37. del Rosal, B., Sun, C., Yan, Y., Mackenzie, M.D., Lu, C., Bettiol, A.A., Kar, A.K., Jaque, D. Flow effects in the laser-induced thermal loading of optical traps and optofluidic devices. **Optics Express** 22 (2014) 23938-23954.
38. Sun, C., Ouyang, M., Cao, Z., Ma, S., Alqublan, H., Sriranganathan, N., Wang, Y., Lu, C. Electroporation-delivered fluorescent protein biosensors for probing molecular activities in cells without genetic encoding. **Chemical Communications** 50 (2014) 11536-11539.
39. Sun, C., Cao, Z., Wu, M., Lu, C. Intracellular Tracking of Single Native Molecules with Electroporation-delivered Quantum Dots. **Analytical Chemistry** 86 (2014) 11403-11409.
40. Ma, S., Loufakis, D.N., Cao, Z., Chang, Y., Achenie, L.E.K., Lu, C. Diffusion-based Microfluidic PCR for "One-pot" Analysis of Cells. **Lab on a Chip** 14 (2014) 2905-2909. (**Selected as HOT article and the journal cover of issue 16)**
41. Ma, S., Schroeder, B., Sun, C., Loufakis, D.N., Cao, Z., Sriranganathan, N., Lu, C. Electroporation-based delivery of cell-penetrating peptide conjugates of peptide nucleic acids for antisense inhibition of intracellular bacteria. **Integrative Biology** 6 (2014) 973-978.
42. Loufakis, D.N., Cao, Z., Ma, S., Mittelman, D., Lu, C. Focusing of mammalian cells under an ultrahigh pH gradient created by unidirectional electropulsation in a confined microchamber. **Chemical Science** 5 (2014) 3331-3337.
43. Cao, Z.,Geng, S., Li, L., Lu, C. Detecting intracellular translocation of native proteins quantitatively at the single cell level. **Chemical Science** 5 (2014) 2530-2535.
    - "Researchers follow a protein's travel inside cells to improve patient monitoring, develop drugs" *Virginia Tech News,* May 5, 2014.
44. Geng, T., Lu, C. Microfluidic Electroporation for Cellular Analysis and Delivery. (Critical review) **Lab on a Chip** 13 (2013) 3803-3821.
45. del Rosal, B., Sun, C., Loufakis, D.N., Lu, C., Jaque, D. Thermal loading in flow-through electroporation microfluidic devices. **Lab on a Chip** 13 (2013) 3119-3127.
46. Cao, Z., Chen, F., Bao, N., He, H., Xu, P., Jana, S., Jung, S., Lian, H., Lu, C. Droplet Sorting Based on the Number of Encapsulated Particles Using a Solenoid Valve. **Lab on a Chip** 13 (2013) 171-178.
    - "Droplet Orchestrator". *Marblar.com, Challenge of new technologies.* Sponsored by Royal Society of Chemistry (RSC), April-June, 2013.

47. Wang, J., Zhan, Y., Bao, N., Lu, C. Quantitative measurement of quantum dot uptake at the cell population level using microfluidic evanescent-wave-based flow cytometry. **Lab on a Chip** 12 (2012) 1441-1445 (Cover article).
48. Awwad, Y., Geng, T., Baldwin, A.S., Lu, C. Observing single cell NF-kappa B dynamics under stimulant concentration gradient. **Analytical Chemistry** 84 (2012) 1224-1228.
49. Zhan, Y., Cao, Z., Bao, N., Li, J., Wang, J., Geng, T., Lin, H., Lu, C. Low-frequency ac electroporation shows strong frequency dependence and yields comparable transfection results to dc electroporation. **Journal of Controlled Release** 160 (2012) 570-576.
50. Shi, C., Shan, X., Pan, Z.-Q., Xu, J.J., Lu, C., Bao, N., Gu, H.-Y. Quantum-Dot-Modified Carbon Tape Electrodes for Reproducible Electrochemiluminescence Emission on a Paper-based Platform. **Analytical Chemistry** 84 (2012) 3033-3038.
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42. Ma, S., Schroeder, B., Sun, C., Loufakis, D.N., Cao, Z., Sriranganathan, N., Lu, C. Microfluidic electroporation for delivery of cell-penetrating peptide conjugates of peptide nucleic acids (PNA) for antisense inhibition of intracellular bacteria. 2014 AICHE annual meeting, Nov 16-21, Atlanta, GA, USA.
43. Loufakis, D.N., Cao, Z., Ma, S., Mittelman, D., Lu, C. Unidirectional electrical pulses for cell alignment in a closed microfluidic chamber. 2014 BMES annual meeting, Oct 22-25, San Antonio, TX, USA.
44. Lu, C., Ma, S., Loufakis, D.N., Cao, Z., Chang, Y., Achenie, L.E.K., Diffusion-based Microfluidic PCR for "One-pot" Analysis of Cells. 2014 BMES annual meeting, Oct 22-25, San Antonio, TX, USA.
45. Loufakis, D.N., Cao, Z.N., Ma, S., Mittelman, D., Lu, C. Alignment of cells under unidirectional electric pulses. 2013 SciX conference, Sept 29-Oct 4, 2013, Milwaukee, WI, USA.
46. Loufakis, D.N., Cao, Z.N., Ma, S., Mittelman, D., Lu, C. Cell Alignment Under Unidirectional Electropulsation In A Microfluidic Device. AICHE annual meeting, Nov 3-8, 2013, San Francisco, CA, USA.
47. Cao, Z., Chen, F., Bao, N., Xu, P., Jana, S., Jung, S., Lu, C. Sorting Droplets Based On the Number of Encapsulated Particles. AICHE annual meeting, Nov 3-8, 2013, San Francisco, CA, USA.
48. Cao, Z., Geng, S., Li, L., Lu, C. Nucleocytoplasmic Translocation of Proteins Detected By a Novel Flow Cytometry Assay without Imaging. AICHE annual meeting, Nov 3-8, 2013, San Francisco, CA, USA.
49. Sun, C. Wang, Y., Wang, Y., Lu, C. Electroporation-delivered protein biosensors for study of molecular activity. BMES annual meeting, Sept 25-28, 2013, Seattle, WA, USA.
50. Sun, C., Cao, Z., Geng, T., Wu, M., Lu, C. Intracellular Targeting with Electroporation-Delivered Quantum Dots. BMES annual meeting, Oct. 24-27, 2012, Atlanta, GA, USA.
51. Loufakis, D.N., Varghese, R., Mittelman, D., Lu, C. A Microfluidic Device for Single Cell PCR. BMES annual meeting, Oct. 24-27, 2012, Atlanta, GA, USA.
52. Zhan, Y., Loufakis, D.N., Bao, N., Lu, C. Biomechanical Study of Erythrocytes Using Microfluidic Osmotic Lysis. BMES annual meeting, Oct. 24-27, 2012, Atlanta, GA, USA.
53. Cao, Z., Chen, F., Bao, N., Xu, P., Jana, S., Jung, S., Lu, C. Droplet sorting based on the number of encapsulated particles using a solenoid valve. BMES annual meeting, Oct. 24-27, 2012, Atlanta, GA, USA.
54. Zhan, Y., Martin, V.A., Geahlen, R.L., Lu, C. One-Step Extraction of Subcellular Proteins From Eukaryotic Cells. American Institute of Chemical Engineers (AIChE) Annual Meeting, Nov. 7-12, 2010, Salt Lake City, UT, USA.
55. Geng, T., Mishra, K. Bhunia, A.K., Lu, C. Rapid and Sensitive Detection of Salmonella Using An Integrated Microfluidic Chip and Real-Time PCR. AIChE Annual Meeting, Nov. 7-12, 2010, Salt Lake City, UT, USA.
56. Geng, T., Bao, N., Litt, M., Lu, C. Microfluidic Native Chromatin Immunoprecipitation (μNChIP) Assay for Histone Acetylation Detection. AIChE Annual Meeting, Nov. 7-12, 2010, Salt Lake City, UT, USA.
57. Zhan, Y., Bao, N., Wang, J., Lu, C. Flow-through Electroporation for Transfection Based On Low-Frequency AC Voltage. AIChE Annual Meeting, Nov. 7-12, 2010, Salt Lake City, UT, USA.
58. Wang, J., Lu, C. Tracking Nanoparticle Uptake Into Cells by Total Internal Reflection Fluorescence Flow Cytometry. AIChE Annual Meeting, Nov. 7-12, 2010, Salt Lake City, UT, USA.
59. Bao, N., Zhan, Y., Lu, C. Microfluidic electroporative flow cytometry for studying single-cell biomechanics, The 238th ACS National Meeting, Aug. 16-20, 2009, Washington D.C.

60. Bao, N., Wang, J., Lu, C. Microfluidic electroporation for high-throughput differentiation of intracellular materials at the single-cell level, The 238th ACS National Meeting, Aug. 16-20, 2009, Washington DC, USA.
61. Bao, N., Zhan, Y., Lu, C. Microfluidic electroporative flow cytometry for studying single-cell biomechanics, AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
62. Zhan, Y., Wang, J., Bao, N., Lu, C. Electroporation of cells in microfluidic droplets, AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
63. Wang, J., Fei, B., Geahlen, R.L., Lu, C. Nucleocytoplasmic Trafficking of NF-Kappa B Studied by Microfluidic Electroporative Flow Cytometry, AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
64. Wang, J., Zhan, Y., Ugaz, V.M., Lu, C. Enhanced Gene Delivery by Transverse Cell Migration During Flow-through Electroporation. AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
65. Wang, J., Bao, N., Paris, L.L., Geahlen, R.L., Lu, C. Total Internal Reflection Fluorescence Flow Cytometry, AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
66. Geng, T., Bao, N., Gall, O.Z., Lu, C. Modulating DNA Adsorption on Silica Beads in an Electrically Actuated Microfluidic Device. AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
67. Geng, T., Zhan, Y., Wang, H.Y., Witting, S.R., Cornetta, K.G., Lu, C. Flow-through Electroporation for Large-Volume Transfection of Cells. AIChE Annual Meeting, Nov. 7-13, 2009, Nashville, TN, USA.
68. Wang, J., Stine, M.J. and Lu, C. (Poster) Microfluidic cell electroporation using a mechanical valve. American Physical Society (APS) annual march meeting, March 11, 2008, New Orleans, LA.
69. Lu, C., Wang, J., Bao, N., Wang, H.Y., Geahlen, R.L. Detection of kinase translocation using microfluidic electroporative flow cytometry. (Focus Session: DNA and Biofluid Analysis with Micro and Nano Fluidic Devices). APS annual march meeting, March 12, 2008, New Orleans, LA.
70. Bao, N., Lu, C. (Poster) A Microfluidic Device for Physical Extraction of Intracellular Proteins from Bacterial Cells. Biomedical Engineering Society (BMES) annual Fall meeting, October 2-4, 2008, St. Louis, MO.
71. Geng, T. , Zhan, Y.H. and Lu, C. (Poster) Scale-up and optimization of flow-through electroporation for gene delivery. BMES annual Fall meeting, October 2-4, 2008, St. Louis, MO.
72. Wang, J. , Stine, M.J. and Lu, C. (Poster) Microfluidic cell electroporation using a mechanical valve. BMES annual Fall meeting, October 2-4, 2008, St. Louis, MO.
73. Wang, J., Bao, N., Paris, L.L., Wang, H.Y., Geahlen, R.L. and Lu, C. (Poster) Detection of kinase translocation using microfluidic electroporative flow cytometry. BMES annual Fall meeting, October 2-4, 2008, St. Louis, MO.
74. Bao, N., Lu, C. A Microfluidic Device for Physical Extraction of Intracellular Proteins from Bacterial Cells. AICHE annual meeting, November 16-21, 2008, Philadelphia, PA.
75. Wang, H.Y., Bao, N. and Lu, C. A microfluidic cell array with individually addressable culture chambers. AICHE annual meeting, November 16-21, 2008, Philadelphia, PA.
76. Wang, J. , Stine, M.J. and Lu, C. Microfluidic cell electroporation using a mechanical valve. AICHE annual meeting, November 16-21, 2008, Philadelphia, PA.
77. Wang, J., Bao, N., Paris, L.L., Wang, H.Y., Geahlen, R.L. and Lu, C. Detection of kinase translocation using microfluidic electroporative flow cytometry. AICHE annual meeting, November 16-21, 2008, Philadelphia, PA.
78. Wang, H.Y. and Lu, C. Microfluidics-based electroporative delivery of small molecules and genes into cells under constant voltage. 234th American Chemical Society (ACS) National Meeting, Boston, MA, August 19-23, 2007.
79. Wang, J. and Lu, C. Single molecule Lamda-DNA stretching studied by microfluidics and single particle tracking. AICHE annual meeting, November 4-9, 2007, Salt lake city, Utah.

80. Wang, F., Wang, H., Wang, J., Wang, H.Y., Rummel, P.L., Garimella, S.V. and Lu, C. Microfluidic delivery of small molecules into mammalian cells based on hydrodynamic focusing. AICHE annual meeting, November 4-9, 2007, Salt lake city, Utah.
81. Bao, N., Wang, J. and Lu, C. Differential release of intracellular molecules during electroporation observed at the single cell level. AICHE annual meeting, November 4-9, 2007, Salt lake city, Utah.
82. Wang, J. and Lu, C. Microfluidic cell fusion under constant direct current voltage. AICHE annual meeting, November 4-9, 2007, Salt lake city, Utah.
83. Bao, N., Jagadeesan, B., Bhunia, A.K., and Lu, C. Determination of the number of bacteria based on autofluorescence on a microfluidic chip. AICHE annual meeting, November 4-9, 2007, Salt lake city, Utah.
84. Wang, H.Y. and Lu, C. Electroporation of mammalian cells in a microfluidic channel with geometric variation. 2006 AICHE/AES annual meeting, November 12-17, 2006, San Francisco, CA.
85. Wang, H.Y. and Lu, C. Microfluidic chemical cytometry based on modulation of local field strength. 2006 AICHE/AES annual meeting, November 12-17, 2006, San Francisco, CA.
86. Wang, H.Y. , Mascarenhas, N., Kothari, S.A., Lu, C. Delivery of molecules and DNA into mammalian cells by electroporation on a microfluidic device. 2006 AICHE/AES annual meeting, November 12-17, 2006, San Francisco, CA.
87. Wang, H.Y. and Lu, C. High-throughput and real-time study of single cell electroporation using microfluidics: effects of medium osmolarity. 2006 AICHE/AES annual meeting, November 12-17, 2006, San Francisco, CA.
88. Lu, C. and Wang, H.Y. Microfluidic electroporation for analysis of intracellular materials at single cell level. 2006 MRS fall meeting, November 27-December 1, 2006, Boston, MA.
89. Wang, H.Y., Banada, P.P., Jagadeesan, B., Bhunia, A.K., Lu, C. Microfluidic devices for processing and analyzing bacterial cells. Optics East 2005, SPIE, Oct. 23-26, Boston, MA.
90. Wang, H.-Y., Jagadeesan, B., Bhunia, A.K., Lu, C. Integrated cell lysis and electrophoresis-based immunoassay for bacteria detection on a microfluidic chip. 2005 AICHE/AES annual meeting, October 30 - November 4, Cincinnati, OH.
91. Wang, H.-Y., Banada, P.P., Bhunia, A.K., Lu, C. Continuous lysis of cells in a locally concentrated DC field on a microfluidic chip. 2005 AICHE/AES annual meeting, October 30 - November 4, Cincinnati, OH.
92. Lu, C., Gold, S.A., Chu, K., Masel, R.I. Functionalized nanoporous semiconductors: active proton exchange membranes for micro fuel cells, 2003 AICHE annual meeting, November 16-21, San Francisco, CA.
93. Lu, C., Craighead, H.G., Walker, L.P. Protein transport and separation on a glass microchip, 2003 AICHE annual meeting, November 16-21, San Francisco, CA.
94. Lu, C., Gold, S.A., Chu, K., Masel, R.I. Functionalized nanoporous semiconductors: active proton exchange membranes for micro fuel cells, 2003 Materials Research Society (MRS) Fall meeting, December 1-5, Boston, MA.
95. Lu, C., Craighead, H.G., Walker, L.P. Protein transport and separation on a glass microchip, 2003 MRS Fall meeting, December 1-5, Boston, MA.
96. Lu, C., Rice, C., Masel, R.I., Lu, G.Q., Waszczuk, P., Wieckowski, A. The fundamental basis of CO tolerance in fuel cells, 2001 AICHE annual meeting, November 4-9, Reno, NV.
97. Lu, C., Masel, R.I. The effect of ruthenium on the binding of CO, H_2 and water on Pt(110), 2001 AICHE annual meeting, November 4-9, Reno, NV.
98. Lu, C., Thomas, F.S., Lee, I.C., and Masel, R.I. Chemistry of methoxonium on (2x1)Pt(110), 2000 AICHE annual meeting, November 12-17, Los Angeles, CA.

RESEARCH GRANTS

Funding category	Total	Personal share
Category I External Funding	$28.2M	$11.3M
Category III Internal Funding	$2.4M	$1.1M
Total	$30.6M	$12.4M

Funding from various institutes of NIH (NIGMS, NIDA, NCI, NIBIB, NHGRI, and NINDS), USDA, NSF, and several private foundations (Keck, AACR, and Coulter).

ACADEMIC ADVISING

PhD Students

Current PhD Students

1. Thomas Hadlock, PhD student in chemical engineering.
2. Gaoshan Li, PhD student in chemical engineering.
3. Jenna Catalano, PhD student in chemical engineering.
4. Xin Zhang, PhD student in chemical engineering.
5. Jacob Neice, PhD student in chemical engineering.
6. Rui Han, PhD student in chemical engineering.

Former PhD students

1. Zirui Zhou, Low-input and single-cell transcriptomic technologies and their application to disease studies, PhD in Chemical Engineering, Virginia Tech, 12/23 (current position: Clinical Genomic Scientist, Children's Hospital of Philadelphia, Philadelphia, PA).
2. Zhengzhi Jerry Liu, Microfluidics for low input epigenomic analysis and application to oncology and brain neuroscience, PhD in Biomedical Engineering, Virginia Tech, 05/23 (current position: Research Scientist, Quanterix, Billerica, MA).
3. Bohan Zhu, Low-input multi-omic studies of brain neuroscience involved in mental diseases, PhD in Chemical Engineering, Virginia Tech, 08/22 (current position: Postdoc at Icahn School of Medicine at Mount Sinai, New York City).
4. Qiang Zhang, Droplet-based microfluidics for high-throughput single-cell omics profiling, PhD in Chemical Engineering, Virginia Tech, 08/22 (current position: Research Scientist, Bio-Rad, Pleasanton, CA).
5. Lynette Naler, Epigenomic and transcriptomic changes in the onset of disease, PhD in Chemical Engineering, Virginia Tech, 05/21 (current position: Senior research specialist, Dow Chemical, Freeport, TX).
6. Chengyu Deng, Microfluidics for low input epigenomic analysis and its application to brain neuroscience, PhD in Chemical Engineering, Virginia Tech, 12/20 (current position: postdoc at UCSF).
7. Yuan-pang Hsieh, New microfluidic technologies for studying histone modifications and long non-coding RNA bindings, PhD in chemical engineering, Virginia Tech, 5/20 (current position: Assistant Professor, Department of Chemical Engineering, National Taiwan University of Science and Technology, Taiwan).
8. Travis Murphy, Microfluidic tools for molecular analysis and engineering, PhD in Chemical Engineering, Virginia Tech, 5/19. (current position: Research scientist, Decisive Analytics, Arlington, VA).
9. Mimosa Sarma, Microfluidics for transcriptomics and epigenomics, PhD in Chemical Engineering, Virginia Tech, 5/19. (current position: Scientist, 10x Genomics, Pleasanton, CA.)

10. Yan Zhu, Microfluidic technology for low-input epigenomic analysis. PhD in chemical engineering, Virginia Tech, 5/18. (current position: Research scientist, Thermo Fisher Scientific, San Francisco, CA)
11. Sai Ma, Microfluidics for genetic and epigenetic analysis. PhD in Biomedical Engineering, Virginia Tech, 5/17. (current position: Assistant Professor, Department of Genetics and Genomic Sciences, Icahn School of Medicine at Mount Sinai, New York City.)
12. Chen Sun, Microfluidic technology for cellular analysis and molecular biotechnology, PhD in Biomedical Engineering, Virginia Tech, 3/16. (current position: Research scientist at Berkeley Lights, Emeryville, CA)
13. Zhenning Cao, Microfluidic engineering for ultrasensitive molecular analysis of cells, PhD in Biomedical Engineering, Virginia Tech, 10/15. (current position: research scientist at Illumina, San Diego)
14. Despina Nelie Loufakis, Microfluidics for cell manipulation and analysis. PhD in Chemical Engineering, Virginia Tech, 12/14. (current position: Research scientist, Dow Chemical, Freeport, TX)
15. Tao Geng, Microfluidics for genetic and epigenetic analysis of cells. PhD in Biological Engineering, Purdue University, 05/12. (current position: Research staff, Pacific Northwest National Laboratory (PNNL))
16. Yihong Zhan, Microfluidic electroporation for gene delivery and cellular analysis. PhD in Biological Engineering, Purdue University, 12/11.
17. Jun Wang, Microfluidic devices for cellular analysis and processing, PhD in Biological Engineering, Purdue University, 12/09. (current position: Associate Professor of Biomedical Engineering, Stony Brook University)
18. Hsiang-Yu Wang, Microfluidic electroporation and cell arrays. PhD in Chemical Engineering, Purdue Univerisity, 12/07. (current position: Professor of Engineering and System Science, National Tsing Hua University, Taiwan)

Master Students

Former Master students

1. Hamid Hassanisaber, Flow-through electroporation in asymmetric curving microfluidic channels, M.S. in Chemical Engineering, Virginia Tech, 12/13.
2. Yousef Awwad, The effect of interleukin-1 (IL-1) concentration on single cell NF-κB activation in a gradient-generating microfluidic device, M.S. in Biomedical Engineering, Virginia Tech, 12/11.
3. Yihong Zhan, Gene delivery based on microfluidic electroporation, M.S.E. in Biological Engineering, Purdue University, 05/09.
4. Oren Gall, Electrical actuation of DNA adsorption on silica beads, M.S.E. in Electrical and Computer Engineering, Purdue University, 05/08.
5. Diana Jiang, Microfluidics-based electroporation to delivery small interfering RNA (siRNA), M.S. in Biological Engineering, Purdue University, 12/07.
6. Fen Wang, Microfluidic delivery of small molecules into mammalian cells based on hydrodynamic focusing, M.S.E. in Biological Engineering, Purdue University, 5/07.

Postdoctoral associates and visiting scholars

Current postdocs

1. Chenlong Wang, postdoc, 01/25-present.

Former postdocs

2. Bo Xiong, postdoc, 04/11-10/11 (Associate Professor, Institute of Analytical Chemistry, Central China Normal University, Wuhan, China).
3. Ning Bao, postdoc, 05/06-07/11 (Professor, Nan Tong University, Nan Tong, China).

PROFESSIONAL SERVICE

External Committee Service

Date	Committee	Member/chair
03/25	Graduate Program Review Committee, Virginia Commonwealth University, Chemical and Life Sciences Engineering	Co-Chair
09/22	AIMBE fellow review committee member (Biotech and Pharma)	Member
09/21	AIMBE fellow review committee member (Biosensors and nanotechnology)	Member

Internal Committee Service

Date	Committee	Member/chair
08/22- 08/23	Hord Endowed Professor search committee	Chair
09/22-08/23	FBRI biomaterials and body-device interface faculty search committee	member
12/20-12/21	Graduate program external review committee	Chair
11/20- 05/21	College of Engineering research task force	member
08/20-present	Graduate committee, Chemical Engineering	Chair
1/18-6/18	Chemical Engineering department head evaluation committee	Member
1/18-6/18	Interim Graduate Committee Chair, Chemical Engineering	Chair
8/17-8/20	Faculty senate	Senator
07/15-present	Promotion and Tenure Committee, Chemical Engineering	Member
10/14-05/15	Faculty search committee, chemical engineering	Member
09/13-05/14	Faculty search committee, chemical engineering	Chair
08/12-08/13	Faculty search committee, Biosystems Engnieering (BSE)	Member
08/11-08/20	Graduate Committee, Chemical Engineering	Member
08/10-08/11	Degree Requirements, Standards, Criteria, and. Academic Policies (DRSCAP) Committee, Virginia Tech	Member
08/10-1/11	Commission on Graduate Studies and Policies, Virginia Tech	Member
08/10-5/11	Faculty search committee, Chemical Engineering	Member

Editorial boards

1. Biomicrofluidics (AIP publishing, 12/2015-present)

Federal grant review panels

1. NIH NCI IMAT R61 review panel, January 30-31, 2025.
2. NIH NHGRI R01 early career investigator, July 16, 2024.
3. NIH BRAIN Initiative: Development of Novel tools to probe cell-specific and circuit-specific processes in the brain (R01, UG3/UH3), Nov 1, 2022.
4. NIH Special emphasis panel on Cellular Senescence Network (Chair), NIH Common Fund UG3/UH3, Apr. 1, 2022.
5. NIH Enabling Bioanalytical and Imaging Technologies (EBIT) study section, Oct, 2021.
6. NIH NIDA, the rat opioid genome project (U01), March, 2020.
7. NIH Cellular and Molecular Technologies (CMT) study section: Feb 12-13, 2020.
8. NIH Director's transformative research award, Feb 28, 2019.

9. NHGRI Novel Genomic technology development, Feb 13, 2019
10. NCI IMAT R21/R33 panel, June 6, 2018.
11. Special emphasis panel on CFS/ME, Nov 1, 2017.
12. NIH NIBIB Trailblazer award, June 23, 2017.
13. NIH NHGRI, Advanced Genomic Technology Development (R01, R21, R43/44), March 15, 2017.
14. NIH Instrumentation and Systems Development (ISD) Study Section, Feb 15-16, 2017.
15. NIH NCI, Cancer Detection, Diagnosis and Treatment Technologies for Global Health (UH2/UH3), June 29, 2016.
16. NIH Instrumentation and Systems Development (ISD) Study Section, June 7-8, 2016.
17. NIH NCI IMAT "Innovative Molecular Analysis Technologies for Cancer Research" R21 review panel, March 8, 2016.
18. NIH NCI IMAT "Advanced Development and Validation of Emerging Molecular Analysis Technologies for Cancer Research (R33)" review panel, Nov 18, 2015.
19. NIH Brain Initiative: New Concepts and Early-Stage Research for Large-Scale Recording and Modulation in the Nervous System, July 13-14, 2015.
20. NIH Instrumentation and Systems Development (ISD) Study Section, Feb 17-18, 2015.
21. NIH Instrumentation and Systems Development (ISD) Study Section, Oct 8-9, 2014.
22. NIH NCI IMAT "Early-Stage Innovative Technologies Development" review panel, July 31, 2014.
23. NIH common fund, Single Cell Analysis program, May 8, 2012.
24. NIH Small business: Cell, Computational, and Molecular Biology, Nov 10, 2011.
25. NIH Small Business: Basic and Integrative Bioengineering, July 18-19, 2011.
26. NSF, CBET Biotechnology, Biochemical and Biomass Engineering (BBBE) program, Jan 2011.
27. NIH Cell Biology and Molecular Imaging SBIR/STTR review panel, June 30, 2010.
28. NIH Special Emphasis (Challenge grants) Panel 2009/10, July 2009.
29. NIH Study Section, cell biology and instrumentation, July 2009.
30. NSF, CBET, Biotechnology, Biochemical and Biomass Engineering (BBBE) Program, June 2009.
31. NSF, CBET Biotechnology program 2008.
32. USDA, 1890 Institutions Capacity Building Grants Program, 2007.
33. NSF SBIR Technologies for cellular analysis, 2007.
34. USDA, 1890 Institutions Capacity Building Grants Program, 2006.

Mail-in grant reviewer

1. Canada Research Chair nominations, Tier 1, Nov 2016.
2. Oak Ridge Associated Universities (ORAU) Proposal review, May and Sept 2014, Oct 2015, Dec 2016.
3. American Association for the Advancement of Science (AAAS) Research Competitiveness Program, August 2012
4. Louisiana Board of Regents, Oct 2009
5. Canada British Columbia Natural Resources and Applied Sciences (NRAS) Endowment, Oct 2009
6. NSF Inorganic Chemistry, Jan 2009
7. NSF MCB Cellular systems, Sept 2008.
8. NASA EPSCoR program, 2007.
9. American Chemical Society PRF grants, 2007.
10. Louisiana state board of trustees, 2007.
11. Missouri state research grants, 2007.
12. BARD, the United States - Israel Binational Agricultural Research & Development Fund, FY 2006.
13. CICEET (The Cooperative Institute for Coastal and Estuarine Environmental Technology) FY 2006 Environmental Technology Development.

Journal peer reviewer

Nature Biotechnology, Nature Methods, Nature Biomedical Engineering, Nature Protocols, Nature Communications, Science Advances, PNAS, Molecular Psychiatry, Journal of Clinical Investigation, Nucleic Acids Research, Genome Biology, Plos Biology, Communications Biology, Journal of American Chemical Society, Chemical Reviews, Advanced Materials, Advanced Science, Analytical Chemistry, Lab on a Chip, Journal of Controlled Release, Chemical Communications, Nanomedicine, Biosensors and Bioelectronics, Applied Physics Letters, Langmuir, Optics Express, Electrophoresis, Analyst, Journal of Chromatography A, Biotechnology and Bioengineering, Microfluidics and Nanofluidics, Analytica Chimica Acta, Biomicrofluidics, Biotechnology Journal, Journal of Microelectromechanical Systems.