Ge "Christie" Zhang, M.D., PhD

Professor
Department of Biomedical Engineering, The University of Akron, Akron, OH, 44325
Phone: (330) 972-5237, Email: ge10@uakron.edu

EDUCATION

Degree	Field	Institution/Location	Date
PhD	Biomedical Engineering	University of Minnesota, Minnesota, MN	05/2006
MD	Medicine	Capital Medical University, Beijing, China	07/2002
BS	Biomedical Engineering	Capital Medical University, Beijing, China	07/1999

Training

Postdoctoral Fellow 2006-2009
Department of Biomedical Engineering, University of Texas at Austin, Austin, TX

POSITIONS/APPOINTMENTS

Professor 2023-Present
Department of Biomedical Engineering, The University of Akron, Akron, OH

Associate Professor 2016-2022
Department of Biomedical Engineering, The University of Akron, Akron, OH

Assistant Professor 2009-2015
Department of Biomedical Engineering, The University of Akron, Akron, OH

Consultant Staff 2021-Present
Lerner Research Institute, Cleveland Clinic, Cleveland, OH

Adjunct Faculty 2013-Present
Integrative Medical Sciences, Northeast Ohio Medical University, Rootstown, OH

Adjunct Faculty 2010-Present
Integrated Bioscience Program, The University of Akron, Akron, OH

SCHOLARLY PUBLICATIONS

Book Chapters

1. B. Wang, M. Shah, L. N. Williams,A.L.Curry, Y.Hong, J. Liao and G.Zhang, "Acellular Myocardial Scaffolds and Slices Fabrication, and Method for Applying Mechanical and Electrical Simulation to Tissue Construct" in Cardiac Tissue Engineering: Methods and Protocols, 2nd Edition, Springer Nature, Chapter 4, 2022

2. C.T. Drinnan, L.R. Geuss, G. Zhang and L.J. Suggs, "Tissue Engineering in Drug Delivery," in Fundamentals and Application of Controlled Release Drug Delivery, CRS Books, Chapter 17,533-548, 2012 (invited).

3. G. Zhang and L.J. Suggs, "Cardiovascular Stem Cells," in Biomaterials as Stem Cell Niche, Amit Gefen, Ed., Springer-Verlag, 2010, Volume 2, 173-193

Invited Commentary

1. G. Zhang, “Biomimicry in biomedical research,” Organogenesis, 2012, 8:4, 101–102.

Referred Journals

1. R. Xu, L. Ouyang, R. Shaik, H. Chen, G. Zhang, J. Zhe. “Rapid Detection of Microparticles Using a Microfluidic Resistive Pulse Sensor Based on Bipolar Pulse-Width Multiplexing”, ***Biosensors,*** 2023, 13, 721.

2. R. Xu, L. Ouyang, H. Chen, G. Zhang, J. Zhe. “Recent Advances in Biomolecular Detection Based on Aptamers and Nanoparticles”, ***Biosensors,*** 2023, 13, 474.

3. R. Shaik, J. Xu, Y. Wang, Y. Hong*, G. Zhang*, “Fibrin-Enriched Cardiac Extracellular Matrix Hydrogel Promotes In Vitro Angiogenesis”, ***ACS Biomaterials Science & Engineering,*** 2023, *9*, 877-888.

4. L. Ouyang, R. Shaik, R. Xu, G. Zhang, J. Zhe. “Cell Surface Charge Mapping Using a Microelectrode Array on ITO Substrate” ***Cells***, 2023, 12, 518.

5. R. Xu, L.Ouyang, R. Shaik, G. Zhang, J. Zhe “ Multiplexed Resistive Pulse Sensor Based on Geometry Modulation for High-throughput Microparticle Counting” ***Sensors and Actuator Reports,*** 2023, 5, 100140.

6. R. Xu, L Abune, B. Davis, L. Ouyang, G. Zhang, Y. Wang, J. Zhe, “Ultrasensitive Detection of Small Biomolecules Using Aptamer-based Molecular Recognition and Nanoparticle Counting” ***Biosensor and Bioelectronics***, 2022, 203,114023.

7. L. Ouyang, R. Shaik, R. Xu, G. Zhang*; J. Zhe*, “Mapping Surface Charge Distribution of Single-Cell via Charged Nanoparticle” ***Cells***, 2021, 10, 1519. (* corresponding author)

8. E. Mulvany, S. McMahan, J. Xu, N. Yazdani, R. Willits, J. Liao, G. Zhang*****, Y. Hong*****, “In vitro comparison of harvesting site effects on cardiac extracellular matrix hydrogels” ***Journal of Biomedical Materials Research Part A***, 2021,109(10),1922-1930.

9. B. L. Brazile, J. R. Butler, S. S. Patnaik, A. Claude, R. Prabhu, L. N. Williams, K. L. Perez, K.T. Nguyen, G. Zhang, P. Bajona, M. Peltz, Y. Yang, Y. Hong, J. Liao, “Biomechanical properties of acellular scar ECM during the acute to chronic stages of myocardial infarction” ***Journal of the Mechanical Behavior of Biomedical Materials,*** 2021, 116; 104342.

10. N Rashidi, A.D. Pant, S.D. Salinas, M. Shah, V.S. Thomas, G. Zhang, S. Dorairaj, R. Amini, “Iris stromal cell nuclei deform to more elongated shapes during pharmacologically-induced miosis and mydriasis” ***Experimental Eye Research,*** 2021; 202:108373.

11. P. KC, M. Shah, R. Shaik, Y. Hong, G. Zhang, “Preseeding of Mesenchymal Stem Cells Increases Integration of an iPSC-Derived CM Sheet into a Cardiac Matrix” ***ACS Biomaterials Science & Engineering,*** 2020, *6* (12), 6808-6818.

12. N. Zhao, J. Coyne, L. Abune, P. Shi, X.L. Lian, G. Zhang, Y. Wang, “Exogenous Signaling Molecules Released from Aptamer-Functionalized Hydrogels Promote the Survival of Mesenchymal Stem Cell Spheroids” ***ACS Applied Materials and Interfaces***, 2020, 12(22), 24599-24610.

13. L. Ni, R. Shaik, R. Xu, G. Zhang*, J. Zhe*, “A Microfluidic Sensor for Continuous, in Situ Surface Charge Measurement of Single Cells” ***ACS Sensors***, 2020, 5(2), 527-534.

14. D. Zhang, F. Yang, J. He, L. Xu, T. Wang, Z Q Feng, Y. Chang, X. Gong, G. Zhang, J. Zheng, “Multiple Physical Bonds to Realize Highly Tough and Self-Adhesive Double-Network Hydrogels” ***ACS Applied Polymer Materials,*** 2020 2 (3), 1031-1042.

15. L. Ni, P. Kc, G. Zhang*, J. Zhe*, “Enabling single cell electrical stimulation and response recording via a microfluidic platform” ***Biomicrofluidics***, 2019,13(6), 064126.

16. M. Shah, P. KC**,** G. Zhang,“*In Vivo* Assessment of Decellularized Porcine Myocardial Slice as an Acellular Cardiac Patch” ***ACS Applied Materials and Interfaces****,* 2019, 11(27), 23893-23900.

17. L. Ni, P. KC**,** E. Mulvany, G. Zhang*, J. Zhe*****, “A microfluidic device for noninvasive cell electrical stimulation and extracellular field potential analysis” ***Biomed Microdevices***, 2019;21(1): 20.

18. N. Zhao, A. Suzuki, X. Zhang, P. Shi, L. Abune, J. Coyne, H. Jia, N. Xiong, G. Zhang, Y. Wang, “Dual Aptamer-Functionalized in Situ Injectable Fibrin Hydrogel for Promotion of Angiogenesis via Codelivery of Vascular Endothelial Growth Factor and Platelet-Derived Growth Factor-BB” ***ACS Applied Materials and Interfaces****,* 2019;11(20):18123-18132.

19. P. KC, Y. Hong, G. Zhang, “Cardiac tissue-derived extracellular matrix scaffolds for myocardial repair: advantages and challenges” ***Regenerative Biomaterials***, 2019; 6(4), 185–199.

20. M. Shah, P. KC**,** K Copeland, J. Liao, G. Zhang, “A Thin Layer of Decellularized Porcine Myocardium for Cell Delivery” ***Scientific Reports,*** 2018 (8), Article number: 16206.

21. F. Liu, P. KC**,** Ni, L., G. Zhang*, J. Zhe*****, “Microfluidic Competitive Immuno-aggregation Assay for High Sensitivity Cell Secretome Detection” ***Organogenesis****,* 2018; 8:1-15.

22. P. KC**,** F Liu, J. Zhe, G. Zhang, “Development and Comparison of Two Immuno-disaggregation Based Bioassays for Cell Secretome Analysis” ***Theranostics****,* 2018, 8(2), 328-340.

23. P. KC**,** M. Shah, J. Liao, G. Zhang, “Prevascularization of Decellularized Porcine Myocardium Slice for Cardaic Tissue Engineering” ***ACS Applied Materials and Interfaces****,* 2017; 9 (3), 2196-2204.

24. F. Liu, P. KC**,** G. Zhang*, J Zhe*****, “*In Situ* Single Cell Detection Via Microfluidic Magnetic Bead Assay” ***PLOS One****,* 2017; 12: e0172697.

25. F. Liu, P. KC**,** G. Zhang*, J. Zhe*****, “Microfluidic Magnetic Bead Assay for Cell Detection” ***Analytical Chemistry****,* 2016, 88, 711-717.

26. M. Shah, R. George, M. Chapman, G. Zhang, “Current Challenges in Dedifferentiated Fat Cells Research” ***Organogenesis***, 2016; 12(3); 119-127.

27. B. Wang, S. Patnaik, B. Brazil, J. Butler, A Claude, G. Zhang, J. Guan, Y. Hong, J. Liao, "Establish Early Functional Perfusion and Structure in Tissue Engineered Cardiac Constructs" ***Critical Reviews in Biomedical Engineering***, 2015, 43(5-6), 455-471.

28. M.E. Jeffords, J. Wu, M. Shah, Y. Hong, G. Zhang, "Tailoring Material Properties of Cardiac Matrix Hydrogels to Induce Endothelial Differentiation of Human Mesenchymal Stem Cells*"* ***ACS Applied Materials & Interfaces***, 2015, 7 (20), 11053–11061.

29. N. Patel, G. Zhang, "Stacked stem cell sheets enhance cell-matrix interactions" ***Organogenesis***, 2014,10 (2), 1-7.

30. B. Liu, M. Shah, G. Zhang, Q. Liu, Y. Pang, "Biocompatible Flavone-based Flurogenic Probes for Quick Wash-Free Mitochondrial Imaging in Living Cells" ***ACS Applied Materials & Interfaces****,* 2014, 10, 6(23), 21638-44.

31. J. Wang, Y Li, N. Patel, G. Zhang, D. Zhou, Y. Pang, "A single molecular probe for multi-analyte (Cr^{3+}, Al^{3+} and Fe^{3+}) detection in aqueous medium and its biological application" ***Chemical Communications,*** 2014, 50, 12258-12261.

32. B. Liu, Q. Liu, M. Shah, J. Wang, G. Zhang**,** Y. Pang, "Fluorescence monitor of hydrazine *in vivo* by selective deprotection of flavonoid" ***Sensors and Actuators B,*** 2014, 202, 194-200.

33. B. Liu, J. Wang, G. Zhang, R. Bai, Y. Pang, "Flavone-based ESIPT ratiometric chemodosimeter for detection of cysteine in living cells" ***ACS Applied Materials and Interfaces***, 2014, 26, 6(6), 4402-7.

34. Q. Wang, G. Liang, M. Zhang, J. Zhao, K. Patel, X. Yu, C. Zhao, B. Ding, G. Zhang, F. Zhou, J. Zheng, "De novo design of self-assembled hexapeptides as beta-amyloid (Abeta) peptide inhibitors" ***ACS Chemical Neuroscience***, 2014, 5, 972-981.

35. Y. Xu, S. Patnaik, X. Guo, Z. Li, W. Lo, Z. Liu, G. Zhang, J. Liao, P. Anderson, J. Guan, "Cardiac Differentiation of Cardiosphere-Derived Cells in Scaffolds Mimicking Morphology of the Cardiac Extracellular Matrix" ***Acta Biomaterialia*****,** 2014, 10(8), 3449-62.

36. R. Hu, M. Zhang, K. Patel, Q. Wang, Y. Chang, X. Gong, G. Zhang, J. Zheng, "Cross-sequence interactions between human and rat islet amyloid polypeptides" ***Langmuir***, 2014, 30, 5193-5201.

37. C. Zhao, K. Patel, L.M. Aichinger, Z. Liu, R. Hu, H. Chen, X. Li, L. Li, G. Zhang, Y. Chang, J. Zheng, "Antifouling and biodegradable poly(N-hydroxyethyl acrylamide) (polyHEAA)-based nanogels" ***RSC Advances***, 2013, 3**,**19991-20000.

38. N.G. Patel, G. Zhang, "Responsive Systems for Cell Sheet Detachment" ***Organogenesis***, 2013, 9 (2), 93-100.

39. Q. Wang, X. Yu, K. Patel, R. Hu, S. Chuang, G. Zhang*, J. Zheng*, "Tanshinones inhibit amyloid aggregation by amyloid-β peptide, disaggregate amyloid fibrils, and protect cultured cells" ***ACS Chemical Neuroscience***, 2013, 4, 1004-1015

40. C. Zhao, Q. Chen, K.Patel, L. Li, X Li,Q. Wang, G. Zhang, J. Zheng "Synthesis and characterization of pH-sensitive poly(N-2-hydroxyethyl acrylamide)–acrylic acid

(poly(HEAA/AA)) nanogels with antifouling protection for controlled release" ***Soft Matter***, 2012, 8, 3848-3857.

41. N. Patel, J Cacicchia, G. Zhang*,B.Z. Newby*,"Rapid Cell Detachment using spin-Coated pNIPAAm Films Retained on Surfaces by an Aminopropyltriethoxysilane Network" ***Acta Biomaterialia***, 2012, 8, 2559-2567.

42. S. Natesan, G. Zhang, D.G. Baer, T.J. Walters, R.J. Christy,L.J. Suggs, "A Bilayer Construct Controls Adipose Derived Stem Cell Differentiation into Endothelial Cells and Pericytes without Growth Factor Stimulation" ***Tissue Engineering Part A***, 2011, 17(7-8), 941-53.

43. G. Zhang, C.T. Drinnan, L.R. Geuss, L.J. Suggs, "Vascular differentiation of bone marrow stem cells is directed by a tunable 3D matrix" ***Acta Biomaterialia***, 2010, 6(9), 3395-3403.

44. C.T. Drinnan, G. Zhang, M.A. Alexander, A.S. Pulido, L.J. Suggs, "Multimodal Release of Transforming Growth Factor-α1 and the BB Isoform of Platelet Derived Growth Factor from PEGylated Fibrin Gels" ***Journal of Controlled Release***, 2010, 147(2), 180-185.

45. G. Zhang, Q. Hu, E. Braunlin, L.J. Suggs, J. Zhang, "Enhancing Efficacy of Cell Transplantation in Hearts with Post-infarction LV Remodeling by an Injectable Biomatrix" ***Tissue Engineering Part A*****,** 2008, 14(6): 1025-1036.
46. G. Zhang**,** L.J. Suggs, "Matrices and Scaffolds for Drug Delivery in Vascular Tissue Engineering" ***Advanced Drug Delivery Reviews***, 2007, 59(4-5), 360-73.

47. L. Zeng, Q. Hu, X. Wang, A. Mansoor, J. Lee, J. Feygin, G. Zhang, P. Suntharalingam, S. Boozer, A. Mhashilkar, C.J. Panetta, C. Swingen, R. Deans, A.H. From, R.J. Bache, C.M. Verfaillie, J. Zhang, "Bioenergetic and functional consequences of bone marrow-derived multipotent progenitor cell transplantation in hearts with postinfarction left ventricular remodeling" ***Circulation***, 2007, 115(14), 1866-75.

48. G. Zhang, Y. Nakamura, X. Wang, Q. Hu, L.J. Suggs, J. Zhang, "Controlled Release of Stromal Cell Derived Factor-1α in situ Increases Stem Cell Homing to the Infarcted Heart." ***Tissue Engineering*****,** 2007,13(8), 2063-71.

49. Q. Hu, X. Wang, J. Lee, A. Mansoor, J. Liu, L. Zeng, C. Swingen, G. Zhang, J. Feygin, K Ochiai, K. Bransford, R. Bache, J. Zhang, "Profound bioenergetic abnormalities in peri-infarct myocardial regions" ***American Journal of Physiology-Heart and Circulatory Physiology***, 2006, 291, H648-57.

50. X. Wang, Q. Hu, Y. Nakamura, J. Lee, G. Zhang**,** A.H. Form, J. Zhang, "The Role of Sca-1+/CD31- Cardiac Progenitor Cell Population in Postinfarction LV Remodeling" ***Stem Cells***, 2006, 24, 1779-1788.

51. G. Zhang**,** Z. Wang, X. Wang, J. Zhang, L.J. Suggs "A PEGylated Fibrin Patch for Mesenchymal Stem Cell Delivery" ***Tissue Engineering****, 2006,* 12(1): 9-19.

RESEARCH CONTRACTS/GRANTS

Current

1. 09/01/2023 – 08/31/2026, $435,293

NSF/ECCS, “Ultrasensitive, Rapid, Amplification-Free RNA Virus Detection Using Nanodimer-Based Nucleic Acid Target Sequence Recognition”
Role: co-PI

2. 06/15/2020– 05/31/2024, $2,056,261
NIH/NHLBI R01, “Aptamer-functionalized cardiac patches”
Role: PI of subcontract

Completed

1. 09/1/2019 – 08/31/2023, $574,855
NSF/IIBR, “Development of a Single Biomolecule Detection Instrument via Digital Counting of Nanoparticles”
Role: co-PI

2. 06/1/2019 – 05/31/2023, $373,373
NSF/ ECCS, “A High Throughput Platform for Rapid Single Cell Surface Mapping”
Role: co-PI

3. 9/1/2018 – 8/31/2022, $ 460,049
NIH/NHLBI R15, “Bioactive injectable blends for cardiac stem cell recruitment”
Role: PI of subcontract

4. 1/1/2019 – 12/31/2021, $154,000
American Heart Association, “Development of a Vascularized Engineered Myocardial Tissue for Cardiac Repair”
Role: PI

5. 9/1/2016 – 8/31/2020, $ 260,930
NSF/ECCS, “MRI: Development of an Instrument for Single Cell Electrical Stimulation and Analysis”
Role: co-PI

6. 12/12/2014-11/30/2019, $459,991
NIH/NHLBI R15, “Reinforce Cell Sheets with Acellular Porcine Myocardial Scaffolds: Application in Cardiac Repair”
Role: PI

7. 05/15/2014-05/14/2018, $546,636
NSF/IDBR, “TYPE A: An Integrated Microfluidic Platform for Parallel Analysis of Cell Secretome and Cell Responses in Real Time”
Role: co-PI

8. 05/14/2018-08/31/2018, $10,000
The University of Akron Summer Research Fellowship, “Injectable Stem Cell-Recruiting Hydrogel for Myocardial Infarction Treatment”
Role: PI

9. 07/01/2013-07/01/2018, $100,525
SUMMA Health System, “Integrated Bioscience Fellowship in Biomedicine”
Role: PI

10. 10/31/2013-10/31/2014, $10,000
    Austen BioInnovation Institute in Akron: “Dedifferentiated fat cells for wound healing treatment”
    Role: PI

11. 06/01/2012-06/01/2013, $10,000
    The University of Akron Summer Research Fellowship: “Developing Stiffness Gradient Scaffolds for Cardiac Cell Therapy”
    Role: PI

12. 05/15/2012-05/12/2013, $10,000
    Firestone Research Initiation Award, “Smart Thermo-responsive Surface for Cell Sheet Engineering”
    Role: PI

TEACHING EXPERIENCE

The University of Akron	Advanced Biomaterials (BMEN 440 &BMEN 661) Instructor: Fall 2022
	Tissue Engineering (4800:485:001) *Instructor:* Spring 2010, Fall 2010-present
	Tissue Engineering & Regenerative Medicine (4800:697:001) *Instructor:* Fall 2010, Spring 2017-present
	Fundamentals of BME (4800:697:002) *Instructor:* Spring 2018, Fall 2021
	Introduction to Biomaterials Lab (4800:401:001) *Instructor:* Spring 2017-present
	Tools for Biomedical Engineering (4800:101:001) *Instructor:* Fall 2013-2019
	Biomaterials (4800:400:001) *Instructor:* Spring 2011-2016
University of Texas	Cell Engineering, BME 385J *Guest Lecturer*, Spring 2010
	Cell and Tissue Engineering, BME 379 *Co-Instructor*, Spring 2007

ADMINISTRATIVE AND COMMITTEE SERVICE

National:
National Library of Medicine Literature Review Committee, 2009 to 2013

College:
The University of Akron Research Taskforce, 2022 to Present
The University of Akron Animal Care and Use Committee, 2014 to Present
The University of Akron Biosafety Committee, 2009 to Present
The University of Akron School of Polymer Science and Polymer Engineering Director Search Committee, 2021
University of Akron Faculty Research Committee, 2012 to 2015

Department:
The University of Akron BME Scholarship Committee, 2018 to Present
Integrated Bioscience (IB) Program Admission Committee, 2018 to Present
The University of Akron BME Undergraduate Curriculum Committee, 2017 to Present
Integrated Bioscience (IB) Graduate Committee, 2014 to Present
Search Committee Chair for The Margaret F. Donovan Chair for Women in Engineering, 2022
The University of Akron BME Faculty Search Committees 2011, 2018, 2022
The University of Akron BME Workload Policy Development Committee, 2019
Chair of the RTP Committee for NTT faculty (Dr. Larry Noble), 2019
Chair of the RTP Committee for TT faculty (Dr. Liu Yang), 2017, 2018
The University of Akron BME Department Chair Search Committee, 2012, 2017
The University of Akron BME Graduate Committee, 2012 to 2016
The University of Akron BME Undergraduate Student Advising Committee, 2012 to 2013

PROFESSIONAL SERVICE

Proposal Reviewer
American Heart Association, Bioeng BSc3, BSc2, IPA, SFRN Study Groups
National Institutes of Health, BST-80 Bioengineering Sciences and Technologies Panel, BMBI
National Science Foundation, RECODE Proposal Panel
National Science Foundation, Biomedical Engineering Program
National Science Foundation, Faculty Early Career Development Program (CAREER)
National Science Foundation, Biomechanics and Mechanobiology (BMMB) Review Panel
Government of the Hong Kong, The Innovation and Technology Commission

Journal Editor
Associate Editor, Frontiers in Materials (Biomaterials and Bio-Inspired Materials), 2023 to Present
Acquisitions Editor, *Organogenesis*, 2012 to 2022

Membership in Professional Societies
Biomedical Engineering Society (BMES)
American Heart Association (AHA)
Society for Biomaterials (SFB)
Tissue Engineering and Regenerative Medicine Society (TERMIS)