Approved by the Regents
May 19, 2022

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
COLLEGE OF ENGINEERING
DEPARTMENT OF BIOMEDICAL ENGINEERING
DEPARTMENT OF CHEMICAL ENGINEERING

Brendon M. Baker, Ph.D., assistant professor of biomedical engineering, Department of Biomedical Engineering, Medical School and College of Engineering, and assistant professor of chemical engineering, Department of Chemical Engineering, College of Engineering, is recommended for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, Medical School and College of Engineering, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2010	University of Pennsylvania
B.S.	2005	Columbia University

Professional Record:

2021 - present	Assistant Professor of Chemical Engineering, University of Michigan
2016 - present	Assistant Professor of Biomedical Engineering, University of Michigan

Summary of Evaluation:

Teaching: Dr. Baker's contributions to teaching include classroom instruction at the undergraduate and graduate level, as well as mentorship of undergraduate and graduate students in research. He was the recipient of the 2021 EBS Teaching Award in the Department of Biomedical Engineering. Dr. Baker has also made an impact through instruction and mentorship of student research for eight Ph.D., three masters, and 23 undergraduate students. His Ph.D. mentees have been recognized for their research, with five receiving a National Science Foundation graduate research fellowship, and two receiving a National Institutes of Health F31 Ruth L. Kirschstein pre-doctoral individual national research award. Dr. Baker's classroom instruction and his research mentorship have demonstrated a dedication to excellence in teaching students at all levels.

Research: Dr. Baker's research interests are in the areas of mechanobiology, cellular microenvironments, and extracellular matrix (ECM). Using a combination of innovative biomaterials, microfabricated devices, and cellular/molecular biology, he and his research grouphave made highly significant contributions to understanding the roles of the ECM's fibrous microarchitecture on single and multicellular migration, fibrosis, and angiogenic sprouting, as well as cardiac and musculoskeletal (tendon) regeneration. In one example, using electrospun dextran fibers to mimic the fibrous nature of the ECM, Dr. Baker and his team discovered a novel mode of fibroblast migration, whereby actomyosin forces generate tensile stretch in the ECM, which in turn stores the elastic energy to induce rapid cell motion upon adhesion failure and recoil of the matrix. In a second example, examining the mechanobiological role of the ECM in idiopathic pulmonary fibrosis (IPF), Dr. Baker and his team demonstrated that myofibroblast differentiation in 3D was inversely correlated with hydrogel stiffness (unlike in 2D) but positively correlated with matrix fibers. They have also shown that endothelial cell- generated forces transmitted to ECM fibers can induce long-distance mechanical communicationto accelerate the formation of microvascular networks and angiogenic sprouting.

Dr. Baker has published 54 peer-reviewed articles, in numerous top tier journals, including the Proceedings of the National Academy of Sciences, *Nature Communications*, and the *Journal of Clinical Investigation*. His research has been well-fundedby the National Institutes of Health, National Science Foundation, the Juvenile Diabetes Research Foundation, and industry.

Recent and Significant Publications:

DePalma SJ, Davidson CD, Stis AE, Helms AS**,** Baker BM: Microenvironmental determinantsof organized iPSC-cardiomyocyte tissues on synthetic fibrous matrices, *Biomaterials Science*, 2021 Jan 5;9(1):93-107.

Matera DL, DiLillo KM, Smith MR, Davidson CD, Parikh R, Said M, Wilke CA, Lombaert IM,Arnold KB, Moore BB, Baker BM: Microengineered 3D pulmonary interstitial mimetics highlight a critical role for matrix degradation in myofibroblast differentiation, *Science Advances*, 2020 Sep 9;6(37):eabb5069.

Wang WY, Lin D, Jarman EH, Polacheck WJ, Baker BM: Functional angiogenesis requires microenvironmental cues balancing endothelial cell migration and proliferation, *Lab on a Chip*, 2020 Mar 17;20(6):1153-1166.

Davidson CD, Wang WY, Zaimi I, Jayco DKP, Baker BM: Cell force-mediated matrix reorganization underlies multicellular network assembly, *Scientific Reports,* 2019 9(1):12.

Wang WY, Davidson CD, Lin D, Baker BM: Actomyosin contractility-dependent matrix stretchand recoil induces rapid cell migration, *Nature Communications*, 2019 Mar 12;10(1):1186.

Service: Dr. Baker has participated as an ad hoc fellowship or grant reviewer for the Departmentof Defense and the NIH. He has served as a peer reviewer for over 30 journals and reviewed abstracts for conferences in his field, including the BMES Annual Meeting, World Congress of Biomechanics, and the Summer Biomechanics, Bioengineering and Biotransport Conference. In the department, Dr. Baker served as a member of the Research Administration Advisory Committee, Space Committee, and Graduate School Admissions Committee. He is a strong supporter of undergraduate and graduate research programs on campus, and is a reviewer for the Medical Scientist Training Program Admissions and the Frankel Cardiovascular Center SummerUndergraduate Research Fellowship. Dr. Baker has also served on 14 dissertation/qualifying exam committees, outside of his own students, from biomedical engineering and mechanical engineering at the University of Michigan, and one from ÉEcolePolytechnique Féedéerale de Lausanne in Switzerland.

External Reviewers:

Reviewer A: "Dr. Baker has met or exceeded the accomplishments of those other files in academic scholarship (funding and publications), service, teaching and mentorship…I believe that he would have a reasonably strong case at my home institution for tenure and advancement."

Reviewer B: "He has demonstrated his ability to develop innovative tools and research questions that will allow him to sustain a top-notch research program focused on cell-microenvironment interactions that I expect to further grow in the future…Dr. Baker has already established himself as a leader in his field…Dr. Baker demonstrated his ability to successfully mentor his trainees and ensure their professional success…Finally, Dr. Baker demonstrates leadership by engaging in service to his profession…He has developed a program that operates at the leading edge of the field."

Reviewer C: "In my opinion, Dr. Baker has made significant and creative scholarly contributions to his research field. He is well-regarded in our community and considered a rising star. Dr. Baker has made novel intellectual contributions to understanding how physical and mechanical cues in extracellular matrices drive cell behaviors…Dr. Baker has established a strong, interdisciplinary research program, as

demonstrated by his outstanding publication record, excellent funding from NIH and NSF, and conference presentations and invited seminars. He has received several notable recognitions for his research excellence and promise, notably the NIH Pathway to Independence Award, Boehringer Ingelheim Discovery Award, and the Biomedical Engineering Society Cell and Molecular Bioengineering Young Investigator Award."

Reviewer D: "Dr. Baker has demonstrated his talent as a scholar, instructor, and member of the biomedical engineering community. He has pursued imaginative research avenues related to the development of models of the tissue microenvironment…His visibility within the United States has grown significantly over the past 5 years and I judge him to be at a level appropriate for someone seeking appointment as an Associate Professor…Dr. Baker has distinguished himself as a rising research leader as well as someone who provides valuable service within his university and to the greater professional community."

Reviewer E: "Dr. Baker has established himself as an expert in fibrillar microenvironments andrelated biomechanical interactions. Honestly, it wouldn't be a stretch to say that, even as juniorfaculty, he is one of *the* top investigators in this realm."

Summary of Recommendation:
Dr. Baker is an established and nationally renowned expert on the interplay between the extracellular microenvironment and cellular decision making focusing on mechanobiology. He is an excellent educator and has strong service commitments. We are pleased to recommend Brandon M. Baker, Ph.D. for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, Medical School and College of Engineering, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.

Marschall S. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean of the Medical School

Alec D. Gallimore, Ph.D.
Robert J. Vlasic Dean of Engineering
College of Engineering

May 2022