

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Biomedical Engineering

Zhen Xu, associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, is recommended for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School.

Academic Degrees:

Ph.D. 2005 University of Michigan, Biomedical Engineering, Ann Arbor, MI
M.S. 2003 University of Michigan, Biomedical Engineering, Ann Arbor, MI
B.S.E. 2001 Southeast University (DongNan University), Biological Science and Medical Engineering, Nanjing, China

Professional Record:

2015 – present Associate Professor (with tenure), Department of Biomedical Engineering, University of Michigan
2009 – 2015 Assistant Professor, Department of Biomedical Engineering, University of Michigan
2007 – 2009 Assistant Research Scientist, Department of Biomedical Engineering, University of Michigan
2006 – 2006 Post-doctoral Research Fellow, Department of Biomedical Engineering, University of Michigan

Summary of Evaluation:

Teaching: Professor Xu has a strong teaching record. Her teaching evaluations have been uniformly strong, with nearly all scores related to course and teaching quality exceeding 4.0 and many above 4.5. Student letters describe Professor Xu helping students to develop course projects that go beyond the course skills and expectations, providing one-on-one instruction for struggling students, helping to connect students to employers, and working with students to provide appropriate experiences to apply to graduate school. She has graduated nine Ph.D. students (two as co-chair) and runs a large lab with six current Ph.D. students. She has opened her lab to numerous other trainees, from high school and undergraduate students to post-doctoral fellows. She has a well-articulated vision for her lab, provides the necessary resources and individualized mentoring for the students' success, expects scientific excellence, celebrates successes, and gives her students exposure to other aspects of academic research such as grant writing. She has a sustained record of outstanding teaching in biomedical engineering and has developed new courses. Her engagement with the undergraduate program clearly goes beyond didactic classroom teaching and the students sense and appreciate her commitment to the educational mission.

Research: Professor Xu has been recognized as the world leader in histotripsy and acoustic cavitation. Her recent work has been focusing on studies to facilitate the clinical translation of

histotripsy, including cancer, cardiovascular, and neurological applications. Many significant publications demonstrating the efficacy and safety of histotripsy from her research are critical for the ultimate translation of this tool. She has published over 80 peer-reviewed journal papers, leading to an h-index of 36 and a total citation of over 4400 per Google Scholar. During her time in rank, she has consistently published eight to 10 peer-reviewed papers every year, most as senior author. Professor Xu is the PI of three NIH R01 grants, and also the subcontract PI or co-I of three additional NIH R01 grants and a major multi-institutional grant from the Office of Naval Research. Professor Xu's research has secured \$27M of external research funding to Michigan, including \$12M as her share. Highly active in entrepreneurship and clinical translation, she is a co-founder of HistoSonics Inc, a startup company that licensed the patents on histotripsy from UM.

Recent and Significant Publications:

Shi A, Lundt JE, Deng Z, Macoskey JJ, Gurm H, Owens G, Zhang X, Hall TL, Xu Z, "Integrated Histotripsy and Bubble Coalescence Transducer for Thrombolysis," *Ultrasound in Medicine and Biology*, 12/2018; 44(12): 2697-709.

Lundt JE, Rao A, Fowlkes JB, Cain CA, Lee F Jr., Xu Z, "Coalescence of residual histotripsy cavitation nuclei using low gain regions of the therapy beam during electronic focal steering," *Physics in Medicine and Biology*, 2018, 11/2018; 63(22):225010.

Macoskey JJ, , Zhang X, , Hall TL, Shi J, Beig SA, Johnsen E, Lee FT, Jr, Cain CA, Xu Z, "Bubble-Induced Color Doppler Feedback Correlates with Histotripsy-Induced Destruction of Structural Components in Liver Tissue," *Ultrasound in Medicine and Biology*, 2018; 44(3): 602-12.

Macoskey JJ, Hall TL, Sukovich J, Choi SW, Ives K, Johnsen E, Cain CA, Xu Z, "Soft-Tissue Aberration Correction for Histotripsy," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 2018; 65(10): 1822-31.

Vlaisavljevich E, Owens G, Lundt J, Teofilovic D, Ives K, Duryea A, Bertolina J, Welling TH, Xu Z, "Non-Invasive Liver Ablation Using Histotripsy: Preclinical Safety Study in an In Vivo Porcine Model," *Ultrasound in Medicine and Biology*, 2017; 43(6): 1237-51.

Service: Professor Xu has a strong service record. In addition to being a member of several departmental and university-level committees, she has been the BME graduate chair since 2016. She has led several DEI initiatives both within and outside of the university. As the BME faculty liaison for NextProf, she helped host a workshop in BME attracting URM doctoral students and post-doctoral fellows interested in pursuing academic careers. She was a faculty mentor for the UM Women in Science and Engineering program that organizes summer programs for local high school women. She has also mentored ten high school students (predominantly female) in her lab. As the Women-In-Engineering chair for the IEEE Ultrasound, Ferroelectronics and Frequency Control Society, she led a series of career development and networking events to benefit current female members as well as attract new female members. These events drew more than 700 female attendees. Her international reputation is recognized through service in multiple leadership roles in international professional societies, chairing and organizing sessions at national and international conferences, and being a standing member of NIH study sections.

External Reviewers:

Reviewer A: "...Dr. Xu's overall impact, research output, quality of post-graduate and post-doctoral supervision, funding track record, teaching aptitude, and level of international recognition would fully warrant promotion to the rank of Full Professor at [my university]."

Reviewer B: "...Dr. Xu has made outstanding scientific contributions which have created significant positive impact for the University of Michigan through the development of therapeutic ultrasound and histotripsy systems."

Reviewer C: "...Dr. Xu has established herself as a clear leader in therapeutic ultrasound, she is publishing important and significant advances, and her service to her community is excellent. She is definitely worthy of promotion to the rank of Professor with Tenure, and I am confident that she would be promoted to the rank of Professor with Tenure at [my institution]."

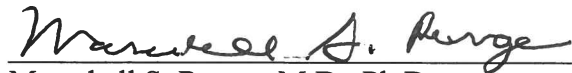
Reviewer D: "Her ability and work would place her as a valued professor with tenure at any academic institution with an interest in addressing biomedical science and engineering. I would rank her among the top few in her generation in the academic area."

Reviewer E: "...Dr. Xu has established herself as an international leader in the ultrasound field, particularly as the pioneer in histotripsy. Her research has both significant scientific and clinical impact. She has performed substantial professional service and served leadership roles in various international professional organizations."

Summary of Recommendation: Professor Xu has established a thriving research enterprise, has excelled at teaching, and is a leader in her field. It is with the support of the College of Engineering Executive Committee that I recommend Zhen Xu for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School.



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



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