

PROMOTION RECOMMENDATION  
The University of Michigan  
College of Engineering

Cheri X. Deng, associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering, is recommended for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering.

Academic Degrees:

Ph.D. 1995 Yale University, Mechanical Engineering, New Haven, CT  
M.Ph. 1992 Yale University, Mechanical Engineering, New Haven, CT  
M.S. 1988 Nanjing University, Acoustics, P.R. China  
B.S. 1985 Nanjing University, Physics, P.R. China

Professional Record:

2007-present Associate Professor (with tenure), Department of Biomedical Engineering, University of Michigan  
2007-2008 Adjunct Associate Professor, Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH  
2003-2006 Assistant Professor, Department of Radiology and Department of Mechanical and Aerospace Engineering, Case Western Reserve University, Cleveland, OH  
2002-2006 Assistant Professor, Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH  
1996-2002 Assistant Member of the Research Staff, Biomedical Engineering Laboratories, Riverside Research Institute, New York, NY  
1996-2002 Consultant, Biomedical Engineering Laboratories, Riverside Research Institute, New York, NY  
1995-1996 Post-doctoral Fellow, Leukemia and Lymphoma Society, Harvard University, Cambridge, MA

Summary of Evaluation:

Teaching: Professor Deng has a strong teaching record. She has developed two new graduate classes in biomedical engineering: "Ultrasound in drug and gene delivery" and "Cell and Microenvironment Engineering with Microtechnology and Ultrasound." She has regularly taught BME 479 Biotransport, an important class for several of biomedical engineering's B.S. and M.S. concentration areas. Her Q1 and Q2 scores for this class have improved steadily to an outstanding level of 4.50 and 4.67, respectively in Winter 2012. She also has taught a number of other service courses for the department and college, including BME 458 Biomedical Instrumentation, BME 418 Quantitative Cell Biology, and Eng 100 Introduction to Engineering.

In addition to Professor Deng's classroom instruction, she has an outstanding record of mentoring undergraduate students through directed research projects and graduate students in graduate research since joining the University of Michigan. She has chaired or co-chaired or is currently chairing seven doctoral committees. Her Ph.D. students have an excellent record of publishing in top journals and going on to take excellent post-doctoral positions and industrial positions. She has advised four Master's students and supervised 13 undergraduate research projects. Letters from graduate and undergraduate

students described Professor Deng as being approachable, with a “passion” for both research and teaching that is coupled with technical rigor and perfectionism.

Research: Professor Deng has established a strong international reputation for high quality research in biomedical ultrasound, specifically therapeutic applications. She is particularly well-known for her work in non-viral drug and gene delivery methods using ultrasound sonoporation. Her laboratory conducted a seminal study that innovatively applied electrophysiology techniques (voltage clamp and patch clamp) and obtained for the first time quantitative, real time measurements of cell membrane disruption generated by ultrasound at the single cell level. The work reveals the key properties of ultrasound generated non-specific openings in the cell membrane for intracellular transport. Professor Deng is engaged in a number of other research areas, including the thermal ablation using high-intensity focused ultrasound (HIFU) to treat the abnormal conduction in the heart (cardiac arrhythmias), which has great potential with several advantages (non-ionizing, focal treatment, potential for non-invasive application).

Professor Deng has over 50 peer-reviewed articles published or “in-press.” Her work has appeared in excellent journals, such as *Proceedings of the National Academy of Science*, *Journal of Controlled Release*, and *Ultrasound in Medicine and Biology*. Her laboratory has been well-funded mainly through difficult to obtain grants from the National Institutes of Health. She has broad ranging collaboration with colleagues through-out the university, highlighting her strong commitment to interdisciplinary research.

#### Recent and Significant Publications:

- Kumon, R.E., Gudur, M.S.R., Zhou, Y. and Deng, C.X., “High-frequency ultrasound M-mode techniques for real time monitoring of HIFU ablation,” *Ultrasound in Medicine and Biology*, 38: 626-641, 2012.
- Zhou, Y., Yang, K., Cui, J., Ye, J. and Deng CX, “Controlled permeation of the cell membrane by single bubble acoustic cavitation,” *Journal of Controlled Release*, 157:103-111, 2012.
- Laughner, J.I., Sulkin, M.S., Wu, Z., Deng, C.X. and Efimov, I.R., “Three potential mechanisms for failure of HIFU ablation in cardiac tissue,” *Circulation Arrhythmia and Electrophysiology*, 5:409-16, 2012.
- Kumon, R.E., Pollack, M.J., Faulx, A.L., Olowe, K., Farooq, F.T., Chen, V.K., Zhou, Y., Wong, R.C.K., Isenberg, G.A., Sivak, M.V., Chak, A. and Deng, C.X., “In vivo characterization of pancreatic and lymph node tissue using endoscopic ultrasound spectrum analysis: validation study,” *Gastrointestinal Endoscopy*, 71:53-63, 2010.
- Kumon, R.E., Aehle, M., Sabens, D., Parikh, P., Kourennyi, D. and Deng, C.X., “Ultrasound-induced calcium oscillations and waves in Chinese hamster ovary cells in the presence of microbubbles,” *Biophysical Journal*, 93 (6): L29-31, 2007.
- Fan, Z., Liu, H., Mayer, M. and Deng, C.X., “Spatiotemporally controlled single cell sonoporation,” *Proceedings of the National Academy of Sciences of the United States of America*, 109 (41), pp. 16486-16491, 2012.

Service: Professor Deng’s service record is excellent. She has served on numerous departmental committees, including two casebook committees, several faculty search committees, graduate admission committee and several college committees including the scholastic standing committee and the international program committee. Her professional service is also strong, having served as a charter member of an NIH study section and an elected member of the bioeffects committee of the American Institute of Ultrasound in Medicine. Professor Deng was invited to be a guest editor in a special issue on Image-Guided Therapeutics in Molecular Pharmaceutics in 2009. She has also been an active reviewer of many scientific journals.

External Reviewers:

Reviewer A: “Dr. Deng’s research work is of high quality and she has, especially of late, chosen to focus her research efforts on several innovative and highly impactful therapeutic applications of ultrasound...with confidence and emphasis, I do recommend that Dr. Deng be promoted to Full Professor with Tenure.”

Reviewer B: “...I would rank Dr. Deng’s achievements as equal to her peers who are typically under consideration for a full professorship at research intensive universities, particularly given her recent high level of productivity.”

Reviewer C: “I have always thought that her work was innovative and especially well done.”

Reviewer D: “Her research interests have focused on the topic of ultrasound aided drug delivery and sonoporation, which are becoming important fields in biomedical ultrasound research. I would say that her papers have provided significant new information that has helped this field to move forward...She is a bright and talented researcher who will have a large impact in the field of biomedical research.”

Reviewer E: “Professor Deng’s research focus is novel and medically significant. Her ideas are first rate and this outstanding scientist and scholar is being watched; she is becoming a bioengineering superstar.”

Reviewer F: “Her approaches are original and innovative, and her observations are important and inspire others to follow. In my opinion, her work on sonoporation represents the best and most productive achievement among many of her diverse research interest...I am really impressed by the breadth and innovative nature of Cheri Deng’s research, her humble personality, and significant achievements in the field of biomedical ultrasound.”

Summary of Recommendation: Professor Deng has performed well in classroom teaching where she has been described as well-prepared and approachable, and is a passionate and hardworking mentor. She has developed a well-funded research program and has established an international reputation for creative and high quality research. Her professional and institutional service has been outstanding. Professor Deng is a committed educator, a creative and careful researcher, and great departmental and professional citizen. It is with the support of the College of Engineering Executive Committee that I recommend Cheri X. Deng for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering.



David C. Munson, Jr.  
Robert J. Vlasic Dean of Engineering  
College of Engineering

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