

PROMOTION RECOMMENDATION
The University of Michigan
College of Pharmacy
Department of Pharmaceutical Sciences

Wei Cheng, associate professor of pharmaceutical sciences, with tenure, College of Pharmacy, and associate professor of biological chemistry, without tenure, Medical School, is recommended for promotion to professor of pharmaceutical sciences, with tenure, College of Pharmacy, and professor of biological chemistry, without tenure, Medical School.

Academic Degrees:

Ph.D.	2002	Washington University School of Medicine, St. Louis
B.S.	1995	University of Science and Technology of China

Professional Record:

2015 – Present	Associate Professor of Biological Chemistry, University of Michigan
2014 – Present	Associate Professor of Pharmaceutical Sciences, University of Michigan
2009 – 2014	Assistant Professor of Pharmaceutical Sciences, University of Michigan
2002 – 2008	Post-doctoral Fellow, University of California, Berkeley

Summary of Evaluation:

Teaching: Professor Cheng is a very dedicated and effective educator and mentor. His teaching and mentorship stand out prominently through his extensive involvement in developing curriculum materials for a range of courses related to pharmaceutical sciences in all our programs (undergraduate, graduate, and professional). He consistently receives high teaching scores and positive feedback from students. They praise him for his engaging, patient, and very clear, thorough way of teaching and how he helps them learn through intermixing practice activities within his lectures. He makes it easy for them to understand complex concepts. Professor Cheng has advised six Ph.D. students (dissertation), one PharmD/PhD student, 11 post-doctoral research fellows, and 14 undergraduate students in his laboratory. Additionally, he has served on thesis committees for 22 Ph.D. students. Under his guidance, his trainees have received numerous awards, including an NIH F32 fellowship, and graduates from his laboratory have been accepted for post-doctoral fellowships at highly regarded institutions such as MIT, Harvard, NIH, and Howard Hughes Medical Institute. Professor Cheng has pursued continual professional development in teaching through formal consultations and programs like the AACP Institute and Teaching Essentials, highlighting his commitment to evolving teaching methodologies. His teaching and mentoring have nurtured the next generation of pharmacists and pharmaceutical scientists.

Research: Professor Cheng's interdisciplinary research sits at the intersection of virology, immunology, and vaccine innovation and aims to understand the interactions between viruses and the human immune system. His work has centered on investigating the key attributes of viruses that trigger immune responses, notably focusing on the development of synthetic virus-like structures (SVLS). His research has shed new light on the mechanisms underpinning B cell reactions to virus-mimicking antigens and holds promise as a potential framework for next-generation vaccine platforms. Notably, his collaboration with Julie Zikherman at UCSF led to the discovery of a new B cell signaling pathway that allows antigen-specific B cells to selectively amplify activation (Brooks et al., *Nature Immunology* 2023). This groundbreaking work has broad implications and may accelerate vaccine development in the post COVID-19 era.

Professor Cheng's substantial achievements have garnered external research funding, notably two recent federal grants affirming the significance and potential impact of his work, as well as other funding from a

variety of sources. His scholarly achievements include 47 peer-reviewed articles, many in high profile journals, such as *Science*, *Nature Nanotechnology*, and *Nature Immunology*. Furthermore, his inventive efforts have led to patent filings, including novel vaccine compositions from his laboratory, showcasing his commitment to translating fundamental discoveries into tangible real-world applications. Professor Cheng has given numerous invited presentations. His contributions heralding a new frontier in vaccine development have been widely recognized in national and international levels.

Recent and Significant Publications:

- JF Brooks, J. Riggs, JL Mueller, R. Mathenge, WY Wholey, AR Meyer, S-T Yoda, VS Vykunta, W. Cheng, and J. Zikherman. (2023) Molecular basis for potent B cell responses to antigens displayed on particles of viral size. *Nature Immunology*, DOI: 10.1038/s41590-023-01597-9.
- WY Wholey, S-T Yoda and W. Cheng. (2021) Site-Specific and Stable Conjugation of the SARS-CoV-2 Receptor-Binding Domain to Liposomes in the Absence of Any Other Adjuvants Elicits Potent Neutralizing Antibodies in BALB/c Mice. *Bioconjugate Chem.* 32(12):2497-2506. doi: 10.1021/acs.bioconjchem.1c00463.
- MC DeSantis, C. Tian, JH Kim, JL Austin and W. Cheng. (2020) Probability of Immobilization on Host Cell Surface Regulates Viral Infectivity. *Phys. Rev. Lett.* 125: 128101.
- WY Wholey, JL Mueller, C Tan, JF Brooks, J Zikherman, and W. Cheng. (2020) Synthetic liposomal mimics of biological viruses for the study of immune responses to infection and vaccination. *Bioconjug Chem.* 31(3):685-697. doi: 10.1021/acs.bioconjchem.9b00825.
- Y. Pang, H. Song, J. Kim, X. Hou, and W. Cheng (2014). Optical Trapping of Individual Human Immunodeficiency Viruses in Culture Fluid Reveals Heterogeneity with Single-Molecule Resolution. *Nature Nanotechnology*, 9: 624-630.

Service: Professor Cheng's service contributions across multiple committees and other departmental service activities underscore his robust commitment to the university and his scientific field. He has served as a member or chair of several committees within the College of Pharmacy and Department of Biological Chemistry, including the College of Pharmacy Executive Committee, various faculty and student recruitment committees, and many others. His involvement in university-level committees, including serving on the provost's Advisory Committee for the Dean Search (twice) and the provost's Committee on Being a Faculty Member in the 21st Century, signifies a broader impact beyond the college. Furthermore, Professor Cheng has served on the editorial board of the *Journal of Pharmaceutical Sciences*, a top pharmaceutical science journal, and as a reviewer for numerous journals, including *PNAS* and *Nature Communications*. He is a member of several national professional organizations, and has served as an ad hoc reviewer for NIH Study Sections and the National Science Foundation.

External Reviewers:

Reviewer A: "This SVLS system may provide a new platform for vaccine development...In another paper published in *Nature Nanotechnology*, Dr. Cheng and co-authors applied optical tweezers to study HIV-1 viruses via optical trapping. This novel approach can characterize single viral particles and elucidate the heterogeneity of these viral particles. These results could help further understand the transmission and infection of HIV...These achievements...demonstrate the success of his research program and mentorship."

Reviewer B: "I find his careful synthetic strategy and approach to understand how the biophysical feature of the SVLSs influence B cell activation and antibody response systematic with potential for broader applications...These structures have the potential for delivery of potent neutralizing antibody response...I find his works of high quality and significance."

Reviewer C: “All of these [manuscripts] are high-quality outstanding work representing major advances to the study of how the immune system responds to viral infections and as such, have significant implications for basic research as well as wide utility for future vaccine development.”

Reviewer D: “The work uses optical tweezers to manipulate single particles such as viruses and nanoparticles and correlate the motional characteristics with the biological property. The work was elegant and refreshing...Dr. Cheng has also published many related articles about vaccines. His approach is always from a structure point of view, which makes the research unique.”

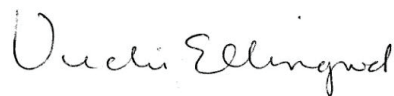
Reviewer E: “His high-quality publications, strong record of research support, uniquely defined and meticulously refined research focus, and substantial and well-received teaching responsibilities are clear and demonstrable testaments of his research distinction and teaching recognition. He has successfully transformed himself from a biophysicist to a vaccine development scientist.”

Reviewer F: “I am very favorably impressed with the rigor of the work...In the top 10% [of his peer group]. He has very strong biophysical training that enables him to undertake experiments that few other laboratories can attempt. He has obviously reached out to excellent collaborators from the cellular immunology community. This has produced notable work.”

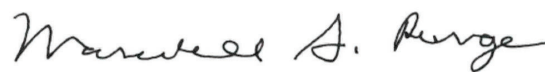
Reviewer G: “Notable strengths of the record are several publications in high profile / high quality journals including *Nature Immunology* and the *Journal of Biological Chemistry*. These are nicely balanced with publications in more practical pharmaceuticals and methods journals...Dr. Cheng’s performance far exceeds the average for associate professors in pharmaceuticals programs nationally and is well above average for pharmaceuticals faculty in research intensive departments.”

Summary of Recommendation

Professor Cheng is an outstanding scientist and dedicated educator and citizen of his profession whose innovative work holds promise as a potential framework for next-generation vaccine platforms. It is with great pleasure that we recommend Wei Cheng for promotion to professor of pharmaceutical sciences, with tenure, College of Pharmacy, and professor of biological chemistry, without tenure, Medical School.



Vicki L. Ellingrod, PharmD, FCCP, FACNP
Dean
John Gideon Searle Professor, Professor of
Pharmacy
Professor of Psychiatry
College of Pharmacy



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

May 2024