

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Approved by the Regents

May 14, 2009

Michael Mayer, assistant professor of biomedical engineering, Department of Biomedical 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, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2000 Swiss Federal Institute of Technology, Biophysical Chemistry, Zurich
M.S. 1996 University Braunschweig, Bioengineering, Germany
B.S. 1992 University Braunschweig, Bioengineering, Germany

Professional Record:

2004-present Assistant Professor, Biomedical Engineering, University of Michigan
2004-present Assistant Professor, Chemical Engineering, University of Michigan
2001-2003 Postdoctoral Fellow, Biological Chemistry, Harvard University
1996-1998 Scientist, Drug Metabolism & Pharmacokinetics, Novartis Pharma, Switzerland
1995-1996 Visiting Scientist, Analytical Chemistry, University of Washington, Seattle
1993-1995 Scientist, Molecular Test Systems, Federal Inst. for Biotechnology, Germany

Summary of Evaluation:

Teaching: Professor Michael Mayer has made substantial contributions in teaching through development of important new courses, through strong classroom teaching and advising, and through the development of a sizeable research group that is producing well-trained graduate and post-doctoral fellows. He developed two completely new courses, including BME 221 on Biophysical Chemistry and Thermodynamics, which is now required of all biomedical engineering undergraduates. This course is providing students with a fundamental understanding of the energetics and chemistry of processes from a molecular point of view, and serves as a foundation for their future educational development. Professor Mayer has also developed a graduate course (BME 522) titled "Biomembranes: Transport, Signaling and Disease" that focuses on the importance of thin membranes for controlling important biological processes. This framework makes it possible for Professor Mayer to introduce advance concepts in biomimetic engineering structures, such as the analogies between nanoscale components (motors, valves, and switches) and their realization in engineered devices. Professor Mayer's Q1 and Q2 scores have been high (averaging 4.1 and 4.4, respectively), and students are enthusiastic about his energy and commitment. He has also been extremely active in teaching through research, including service as advisor to eight Ph.D. students including two who have already graduated, seven M.S. students, 13 undergraduate students, and six post-doctoral fellows.

Research: Professor Mayer has established a vibrant research program that has materially advanced the biomedical engineering areas of biomembranes, ion channels, and nanopores sensing with health relevance to areas of immunology and neurological diseases. Professor Mayer's program is noteworthy in both its productivity (18 accepted or published articles based on work at University of Michigan alone) and its quality, leading to publications in highly respected journals. He has presented his work in invited talks in national and international settings. This is also supported by the strong research funding for his work, which includes a diverse set of sources including NIH (R01), NSF CAREER Award, and the State

of Michigan (Technology Tri-Corridor Fund). Professor Mayer has been actively engaged in technology transfer activities through filing of patents (four issued, two inventions disclosed) and collaborations with multiple companies. Professor Mayer's group has adeptly combined his strong background in biomembranes with micro/nanotechnology to critically analyze existing technology then push the limits forward significantly. His group is also starting to make important contributions in use of these technologies towards significant biological problems. His work is interdisciplinary, as demonstrated by publications with a broad group of collaborators. Professor Mayer and his research group have demonstrated significant accomplishment through peer reviewed publications at the University of Michigan in three research areas in particular; biomembrane printing, nanopores for biosensing; and applying these technologies toward important biological problems such as immunology and Alzheimer's disease. These biological applications are perhaps the most exciting area of research that is just recently starting to emerge out of his lab.

Recent and Significant Publications:

- Estes, D.J., Memarsadeghi, S., Lundy, S.K., Marti, F., Mikol, D.D., Fox, D.A. and Mayer, M., "High-throughput profiling of ion channel activity in primary human lymphocytes," *Analytical Chemistry*, 2008, 80, pp. 3728-3735.
- Uram, J.D., Ke, K. and Mayer, M., "Noise and bandwidth of current recordings from submicrometer pores and nanopores," *ACS Nano*, 2008, 2, pp. 857-872.
- Capone, R., Blake, S., Rincon, Restrepo, M., Yang, J. and Mayer M., "Designing Nanosensors based on Charged Derivatives of Gramicidin A," *Journal of the American Chemical Society*, 2007, 129, pp. 9737-9745.
- Estes, D. J., Lopez, S. R., Fuller, A. O. and Mayer, M., "Triggering and observing the aggregation and fusion of lipid membranes in a microfluidic chamber," *Biophysical Journal*, 2006, 91, pp. 233-243.
- Uram, J. D., Ke, K., Hunt, A. J. and Mayer, M., "Label-free affinity assays by rapid detection of immune complexes using nanopores," *Angewandte Chemie International Edition*, 2006, 45, pp. 2281-2285.
- Majd, S. and Mayer, M., "Hydrogel-stamping of arrays of supported lipid bilayers with varying lipid compositions for screening of drug-membrane and protein-membrane interactions," *Angewandte Chemie International Edition*, 2005, 44, pp. 6697-6700.

Service: Professor Mayer's service record is excellent. He has served on numerous biomedical engineering department committees including the External Funding Committee for writing training grants (NIH, GAANN), Graduate Admissions (chair) and Financial Aid Committee and served as advisor for the largest graduate concentration area in the department. At the national level he has been a session chair or co-chair at four national meetings and an international workshop. He has served as a panelist three times to review grant proposals for NSF, as well as a regular NSF reviewer. He has reviewed manuscripts for twenty-one different journals and has served on several NSF grant review panels.

External Reviewers:

Reviewer A: "What I like about the work is that he realizes the limitations and/or flaws of earlier work, and sees opportunities, often using contemporary fabrication methods, surface or protein modification, to improve upon past performance."

Reviewer B: "Because of his significant progress in research, Michael Mayer has attracted NSF and NIH funding. Such funding is becoming ever more difficult for assistant professors to obtain. Therefore, securing federal grants is a clear sign of Mayer's success. Based on his strong record of accomplishments, I urge you to grant tenure to Michael Mayer."

Reviewer C: "His work is of the highest quality and also is extraordinary [sic] difficult. In the next phase of his development I would expect him to flourish and become an international superstar as he can apply his difficult techniques to biological problems of significance."

Reviewer D: "Mayer has had an impressively productive start as an assistant professor at the University of Michigan. ... his record shows that this was not dependent upon the environment provided by his mentors in Lausanne and Cambridge, but rather derives from his own energy. ... I would be supportive of promotion to associate professor with tenure without reservation."

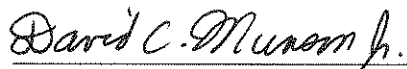
Reviewer E: "He works in an area that will continue to be very exciting and productive for the next decade, and he has a head start on the rest of us. His ideas are cutting edge and his work is first class."

Reviewer F: "Among his peers working in the same field, I consider Dr. Mayer a clear leader. He is unquestionably among the most creative researchers specializing in the application of modern technologies such as micro-fabrication to biomembrane research."

Reviewer G: "Clearly he has all the requirements needed for promotion: he is productive, creative, has done high quality work in several places, is well funded and well known ..."

Reviewer H: "In my opinion, Dr. Michael Mayer is definitely one of [the] pioneers in [biomembrane research]. He has been making many original contributions to the study of membrane reconstitution, membrane patterning and the ion channel recording in the artificial membrane."

Summary of Recommendation: Professor Mayer produces a substantial quantity of research of very high quality, is highly regarded as a teacher, advisor and mentor, and has made extraordinary service contributions. Professor Mayer has developed and taught important new courses for the College of Engineering, and his trainees have demonstrated strong professional skills. He has established a laboratory with an interdisciplinary and translational focus that has developed a strong national reputation in his field and produced work of high impact. It is with the support of the College of Engineering Executive Committee that I recommended Michael Mayer for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.



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

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