

PROMOTION RECOMMENDATION  
The University of Michigan  
College of Engineering

Mary-Ann Mycek, 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 University of California, Physics, Berkeley, CA  
M.A. 1991 University of California, Berkeley, Physics, Berkeley, CA  
B.S. 1989 Rochester Institute of Technology, Physics, Rochester, NY

Professional Record:

2006-present Associate Professor (with tenure), Department of Biomedical Engineering, University of Michigan  
2003-2006 Associate Professor (without tenure), Department of Biomedical Engineering, University of Michigan  
1998-2002 Assistant Professor, Department of Physics and Astronomy, Dartmouth College, Hanover, NH  
1996-1998 Post-doctoral Fellow, Harvard Medical School and Massachusetts General Hospital, Boston, MA

Summary of Evaluation:

Teaching: Professor Mycek has made substantial contributions to teaching through development of important new courses, strong classroom teaching and advising, and the development of a sizeable research group that is producing well-trained graduate and post-doctoral fellows. She developed two completely new courses, including Introduction to Biomechanics (BME 499/231), which is required of all biomedical engineering undergraduates. This course covers mechanics with an emphasis on applications to cells and tissues, and includes fundamental theoretical principles and their applications to biologically-based problems in statics, deformable body mechanics, and dynamics. Professor Mycek has also developed a graduate course in Biomedical Optics (BME 599/552), covering fundamental theoretical principles of tissue optics, computational approaches to light transport in turbid media, optical instrumentation, and an overview of applications in clinical optical diagnostics, biomedical microscopy, laser-based therapy, and biophotonic technology, including consideration of commercialization potential. She has also contributed to several other courses, including teaching components of Engineering 195, BME 295, and BME 500, co-organizing a Health Science and Engineering Seminar Series, and participating in a course at the Ross School of Business. Professor Mycek's Q1 and Q2 scores have generally ranged from high to very high (4-5). Students are unanimously enthusiastic about her teaching, mentoring, and support. She has also been active in teaching through research, including advising nine Ph.D. students at Michigan (six have graduated), 14 M.S. students and six undergraduate students.

Research: Professor Mycek has established a vibrant and productive research program. Her work has advanced biomedical engineering in the area of biomedical optics, specializing in applying optical science and engineering to study and assess living systems for improved, minimally-invasive patient diagnostics. Her program has been highly productive, with over 20 publications in high-quality peer reviewed journals since arriving at Michigan, including such prestigious journals as *The Journal of Biomedical Optics*, *Optics Express*, and *Biomedical Microdevices*. Her research has garnered strong funding, including

awards from NIH, NSF, NASA, DOE, Office of Naval Research, and multiple others. Professor Mycek has been actively engaged in technology transfer activities, as evidenced by two patent applications, three provisional patent applications, four invention and technology disclosures, and collaborations with multiple companies.

Professor Mycek's group has combined strong expertise in optical physics with detailed understanding of cells and tissues to produce advanced biomedical optics for improved, minimally-invasive patient diagnostics. She has formed strong interdisciplinary collaborations to bring these developments to bear on important disease states such as breast cancer, pancreatic cancer, and subdural hematomas. This is reflected in her publications which include collaborative work with investigators at Michigan's Medical Center Departments of Pathology, Surgery, and Internal Medicine, and participation in collaborative grants (e.g. multi investigator R01 on "Non-Invasive Assessment of Tissue Engineered Human Oral Mucosa"). There are three research areas where Professor Mycek's group has made particularly significant advances. First, she has developed innovative computational models of light propagation in tissue, toward the goal of resolving pathologic changes, especially for cancer diagnosis. These approaches have been widely adopted by the biomedical optics community. Second, she has developed new tools and techniques to enhance the precision of fluorescence-lifetime imaging (FLIM) in tissues. Third she has developed diagnostic applications of Raman spectroscopy in tissues, and applied these to develop tumor diagnostics.

#### Recent and Significant Publications:

- M.D. Keller, E. Vargis, N. de Matos Granja, R.H. Wilson, M.-A. Mycek, M.C. Kelley, and A. Mahadevan-Jansen, "Development of a spatially offset Raman spectroscopy probe for breast tumor surgical margin evaluation," *Journal of Biomedical Optics*, Vol.16, No.7, 077006 (2011).
- R.H. Wilson, M. Chandra, L.-C. Chen, W.R. Lloyd, J. Scheiman, D. Simeone, J. Purdy, B. McKenna, and M.-A. Mycek, "Photon-tissue interaction model enables quantitative optical analysis of human pancreatic tissues," *Optics Express*, Vol.18, No. 21, pp. 21612-21621 (2010).
- C.-W. Chang and M.-A. Mycek, "Enhancing precision in time-domain fluorescence lifetime imaging," *Journal of Biomedical Optics*, Vol.15, No.5, 056013 (2010).
- C.-W. Chang and M.-A. Mycek, "Precise fluorophore lifetime mapping in live-cell, multi-photon excitation microscopy," *Optics Express*, Vol.18, No.8, pp.8688-8696 (2010).
- M. Raghavan, N.D. Sahar, R.H. Wilson, M.-A. Mycek, N. Pleshko, D.H. Kohn, and M.D. Morris, "Quantitative polarized Raman spectroscopy in highly turbid bone tissue," *Journal of Biomedical Optics*, Vol.15, No.3, 037001 (2010).
- R.H. Wilson, M. Chandra, J. Scheiman, D. Simeone, B. McKenna, J. Purdy, and M.-A. Mycek, "Optical spectroscopy detects histological hallmarks of pancreatic cancer," *Optics Express*, Vol.17, No.20, pp. 17502-17516 (2009).

Service: Professor Mycek has provided major service to her department, the College, the University, and professional communities. She has served on numerous biomedical engineering department committees including director of the Graduate Program and associate chair, during which time she was instrumental to the department obtaining a GAANN award from the Department of Education. She has also served on the BME Executive Committee and Graduate Admissions Committee, as well as multiple faculty search and casebook committees. At the College level, she has served on the Nominating Committee, the Honors and Awards Committee, on a college Committee charged to review the BME Department, as well as serving on the BME Department Chair Search Committee, and on the Committee on Entrepreneurial Environment and Programs for Students. At the University level, she has served on the Rackham Merit Fellowship Committee and the Medical School Imaging Institute Committee.

Professor Mycek has served on the editorial board of two journals, and has been very active in the main professional societies in her research area, the Optical Society of America and the Society of Photo-Optical Instrumentation Engineers. She has also helped to organize and/or chaired multiple meetings and symposia for major international societies. In addition, Professor Mycek has represented societies before Congress to promote funding for optics research, and has provided service to federal funding agencies, including a term as a standing member of an NIH Study Section. Professor Mycek has also been involved in a significant amount of outreach, at both the professional and K-12 levels. She has taught several short courses and workshops, and she has been involved in Math and Science Night at the Ann Arbor Hands-On Museum.

External Reviewers:

Reviewer A: “Dr. Mycek is well-known throughout the Biophotonics community for her innovative work on quantitative, state-of-the-art laser spectroscopy methods for biomedical research. She is internationally-recognized and considered to be a pioneer in this rapidly growing field, with particularly important contributions in two broad areas: 1) quantitative time-resolved methods for characterizing and imaging cellular and tissue fluorescence, and 2) quantitative computational models of light propagation in tissue.”


Reviewer B: “The scientific and technological quality of Prof. Mycek’s research, publications, and advances have been exceptional, and her laboratory is regularly viewed as being one of the best in the world for establishing future directions in her field.”

Reviewer C: “One of the most outstanding strengths of Dr. Mycek is her ability to excite others, especially outside her own field. Her outstanding contributions to the biomedical optical imaging community are wide ranged.”

Reviewer D: “Of course, [at my institution] we place special value on the intersection of Biomedical Engineering and Optics; Professor Mycek is highly regarded around here, and our own BME department would be lucky to have someone of her caliber.”

Reviewer E: “I am convinced that Dr. Mycek is an exceptionally high-quality scientist and already an established researcher in the field of biomedical optical spectroscopy. It is without any reservations that I provide my whole-hearted support for her promotion.”

Summary of Recommendation: Professor Mycek has established an innovative, well-funded, internationally recognized, and very productive research program. She is highly regarded as a teacher, advisor and mentor, and has made outstanding service contributions. It is with the support of the College of Engineering Executive Committee that I recommend Mary-Ann Mycek 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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