PROMOTION RECOMMENDATION
University of Michigan
College of Engineering

Shuichi Takayama, assistant professor of biomedical engineering, Department of Biomedical Engineering, and assistant professor of macromolecular science and engineering, Macromolecular Science and Engineering Program, without tenure, College of Engineering, is recommended for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, and associate professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering.

Academic Degrees

B.Sc.	1992	University of Tokyo, Agriculture
M.Sc.	1994	University of Tokyo, Agriculture
Ph.D.	1998	Scripps Research Institute, Chemistry

Professional Record

2000-present	Assistant Professor of Biomedical Engineering, University of Michigan
2000-present	Macromolecular Science and Engineering, University of Michigan
1998-2000	Postdoctoral Fellow, Leukemia and Lymphoma Society, Harvard University
1998	Postdoctoral Fellow, Scripps Research Institute

Summary Evaluation:

Teaching: With regard to teaching, Professor Takayama has excelled. Professor Takayama is probably the best teacher at the junior faculty ranks that we have in the College of Engineering. BME is a new department in the College of Engineering, with the newest curriculum created from a vacuum of preceding courses. This is especially true in Professor Takayama's area...though "his area" is a moving target since he has branched out significantly since his arrival. Professor Takayama is THE leader of creating new courses, 4 in 5 years, and along the way has garnered the highest ratings of all competitors. In addition to this personal dedication to building a curriculum, he has also been the BME mainstay on the College Curriculum Committee where his leadership has kept our efforts moving ever forward with education of undergraduate and graduate students.

Research: In terms of research, Professor Takayama is productive, creative, and versatile. He has excelled in research during his time here at Michigan and he will continue to excel in the future. Professor Takayama has developed an active research program that is nationally and internationally known and respected. He has published over 40 papers in top-notch peer-reviewed publications including Nature, Nature Materials, and Proceedings of the National Academy of Sciences. Five of these publications have over 100 citations. His work in microfluidics has spanned the range from fundamental science of cells to applications for assisted reproductive technologies. He has raised over $4 million in support of his research including an NSF Career award.

Recent and Significant Publications:

Kane, R. S.; Takayama, S.; Ostuni, E.; Ingber, D. E.; Whitesides, G. M. "Patterning Proteins and Cells Using Soft Lithography " *Biomaterials* **1999**, *20*, 2363-2376.

Takayama, S.; Ostuni, E.; Qian, X.; McDonald, J. C.; Jiang, X.; LeDuc, P.; Wu, M.-H.; Ingber, D. E.; Whitesides, G. M. "Topographical Micropatterning of Poly (dimethylsiloxane) Using Laminar Flows of Liquids in Capillaries" *Adv. Mater.* **2001**, *13*, 570-574.

Takayama, S.; Ostuni, E.; LeDuc, P. Naruse, K.; Ingber, D. E.; Whitesides, G. M. "Laminar Flows: Subcellular Positioning of Small Molecules" *Nature,* **2001,** *411*, 1016.

Takayama, S.; Ostuni, E.; LeDuc, P. Naruse, K.; Ingber, D. E.; Whitesides, G. M. "Selective Chemical Treatment of Cellular Microdomains Using Multiple Laminar Streams" *Chem. Biol.*, **2003**, *10*, 123-130.

Schuster, T.G.; Cho, B.; Keller, L. M.; Takayama, S.; Smith, G. D. "Isolation of Motile Sperm From Semen Samples Using Microfluidics" Reproduc. Biomed. Online. **2003**, *7*, 75-81.

Huh, D.; Tkaczyk, A. H.; Bahng, J.-H.; Chang, Y.; Wei, H.-H.; Grotberg, J. B.; Kim, C.-J.; Kurabayashi, K.; Takayama, S. "Reversible Switching of High-Speed Air-Liquid Two-Phase Flows Using Electrowetting-Assisted Flow-Pattern Change" J. Am. Chem. Soc. **2003**, *125*, 14678-14679.

Gu, W.; Zhu, X.; Futai, N.; Cho, B. S.; Takayama, S. "Computerized Microfluidic Cell Culture Using Elastomeric Channels and Braille Displays" Proc. Natl. Acad. Sci. U.S.A. **2004**, *101*, 15861-15866. (****Cover Photo Article****)

Huh, D.; Kamotani, Y.; Grotberg, J. B.; Takayama, S. "Microfluidics for Flow Cytometric Analysis of Cells and Particles" Physiol. Meas. **2005**, R73-R98.

Zhu, X.; Mills, K. L.; Peters, P. R.; Bahng, J. H.; Liu, E. H.; Shim, J.; Naruse, K.; Csete, M.E.; Thouless, M.D.; Takayama, S. "Fabrication of Reconfigurable Protein Matrices by Cracking" *Nat. Mater.* **2005**, *4*, 403-406. (****Cover Photo Article****)

Song, J. W.; Gu, W.; Futai, N.; Warner K. A.; Nor, J. E.; Takayama, S. "A Computer-Controlled Circulatory Support System for Endothelial Cell Culture and Shearing" *Anal. Chem.* **2005**, *77*, 3993-3999.

Service: With regard to service, Professor Takayama has been very active in the BME department, the College of Engineering, the University, and his research field. For the department, he has served on the Undergraduate Education Committee, as well as being on the planning committee for the department laboratory class, serving as advisor for the Biomaterials concentration in BME and serving on the Whitaker Foundation Grant planning committee. For the College, Professor Takayama serves on the curriculum committee, and serves as a valuable interface between the departments Undergraduate Education Committee and the College curriculum committee. During the past two years, Professor Takayama's service on both of these committees has helped smooth the incorporation of the BME undergraduate curriculum.

External Reviewers:

Reviewer (A): "... has a relatively large number of publications in total and his publications independent of former advisors is solid in number and quality."

Reviewer (B): "... it all impresses me!" "... if I was you, I would rather hurry to keep him at your institution! It seems, I would take him, too!"

Reviewer (C): "... the breadth of the work is impressive and there are many irons in the fire." "His publication record thus far argues in favor of tenure..."

Reviewer (D): "... he has been productive, publishing work in strong journals on projects that are highly collaborative but bear a common theme that indicates that it is driven by Dr. Takayama. It is often the case, especially in the biological arena, that work is highly collaborative, because of the complexity of the problems addresses."

Reviewer (E): "His recent work has been recognized by publication in leading "general journals" such as PNAS and Nature Materials..." "He has established a solid research group, and made advances by building bridges with other colleagues."

Summary of Recommendation: Overall, Professor Takayama is an amazing individual. In addition to being a world-class researcher and leader in tech transfer, he also provides outstanding service to UM and the world. His most outstanding characteristic, however, is his ability to motivate young students both in the classroom and lab. It is with the support of the College of Engineering Executive Committee that I recommend him for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, and associate professor of macromolecular engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering.

Ronald Gibala
Interim Dean, College of Engineering

May 2006