Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Biomedical Engineering

Ariella Shikanov, associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, associate professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering, and associate professor of obstetrics and gynecology, without tenure, Department of Obstetrics and Gynecology, Medical School, is recommended for promotion to professor of biomedical engineering, with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering, and professor of obstetrics and gynecology, without tenure, Department of Obstetrics and Gynecology, Medical School.

Academic Degrees:

Ph.D.	2007	Hebrew University in Jerusalem, Jerusalem, Israel
B.S.	1998	Hebrew University in Jerusalem, Jerusalem, Israel

Professional Record:

2018 – present	Associate Professor, Department of Biomedical Engineering, University of Michigan
2018 – present	Associate Professor, Department of Obstetrics and Gynecology, University of Michigan
2018 – present	Associate Professor, Department of Macromolecular Science and Engineering, University of Michigan
2012 – 2018	Assistant Professor, Department of Biomedical Engineering, University of Michigan
2012 – 2018	Assistant Professor, Department of Obstetrics and Gynecology, University of Michigan
2012 – 2018	Assistant Professor, Department of Macromolecular Science and Engineering, University of Michigan

Summary of Evaluation:

Teaching: Professor Shikanov's contributions to teaching include classroom instruction and the mentoring of graduate and undergraduate students in research. Across 35 courses, her average Q2 score is 4.63 +/- 0.25. Professor Shikanov has integrated a number of innovations across these courses. In BME 418, she incorporated statistical mechanics for building models of biological processes and flipped the classroom for engaged learning through collaboration with another CoE faculty member. For BME 474, she incorporated a laboratory component, identified the space, and obtained resources to outfit the space with biological safety cabinets so that students could culture cells and encapsulate them within hydrogels. Professor Shikanov has graduated seven Ph.D. students with another eight in progress and is a member of several other Ph.D. committees. She has also mentored three current and three former post-doctoral fellows

and provided training to three Reproductive Endocrinology and Infertility Fellows from the Medical School. Professor Shikanov is also active in advising masters and undergraduate students.

Research: The overarching goal of Professor Shikanov's research program is to engineer restoration of ovarian reproductive and endocrine function in women suffering from premature ovarian insufficiency (POI), a common complication of anticancer treatments. The spectrum of Professor Shikanov's research is broad, game changing, and yet laser focused on improving women's health. Key research foci include: 1) development of tunable biomimetic hydrogels for in vitro culture to promote ovarian follicle development, 2) development of immuno-isolating capsules for transplantation of allogeneic ovarian tissue, 3) contribution to the development of the Human Cell Atlas, and 4) development of models for gender affirming hormone therapy. The most transformative aspect of her research program was proposing to use donor ovarian tissue encapsulated in an immuno-isolating hydrogel, when funding for women's health-related research was sparse. Professor Shikanov's commitment to the cause won her first the support from The Hartwell Foundation, and, with demonstrated success and a significant potential for a lasting impact on many lives, three NIH R01 grants. Her research is on a trajectory to bring engineered immuno-isolating capsules for restoring ovarian endocrine function to childhood cancer survivors. She dedicated her sabbatical to the commercialization of this technology and bringing it to the clinic. She created a startup company, *ArtOva Therapeutics Inc.*, completed a customer discovery program through NSF I-CORPs, obtained additional funding (Frankel Initiative, $500K and the Musculoskeletal Translational Foundation), and is now in the process of preparing an Investigational New Drug application to the FDA to perform the "first-in-human" clinical trial. She is a recognized leader in engineering biomimetic microphysiological systems to promote growth and maturation of ovarian follicles using animal models. As one of the leading scientists at the interphase of biomaterial engineering and reproductive medicine, she is highly sought after to give seminars and keynote addresses at major professional societies and key federal and private organizations such as the National Academy of Engineering. Professor Shikanov's h-index is 34, she has more than 30 publications as a corresponding author and close to 80 total publications in leading journals in the field of biomaterials, tissue engineering and reproductive medicine, such as *Acta Biomaterialia*, *npj Regenerative Medicine*, and *Biology of Reproduction*.

Recent and Significant Publications

Jones A, Peñalver Bernabé B, Padmanabhan V, Li J, Shikanov A., "Capitalizing on transcriptome profiling to optimize and identify targets for promoting early murine folliculogenesis in vitro," *Scientific Reports*, 11, 12517, 2021

Tomaszewski CE, DiLillo KM, Baker BM, Arnold KB, Shikanov A., "Sequestered cell-secreted extracellular matrix proteins improve murine folliculogenesis and oocyte maturation for fertility preservation," *Acta Biomaterialia*, 132, 313-324, 2021.

Brunette MA, Kinnear HM, Hashim PH, Flanagan CL, Day JR, Cascalho M, Shikanov A., "Human Ovarian Follicles Xenografted in Immunoisolating Capsules Survive Long Term Implantation in Mice," *Frontiers in Endocrinology*, 13:886678, 2022.

Kinnear HM, Hashim PH, Dela Cruz C, Chang FL, Rubenstein G, Nimmagadda L, Elangovan VR, Jones A, Brunette MA, Hannum DF, Li JZ, , Padmanabhan V, Moravek MB,

Shikanov A, "Presence of ovarian stromal aberrations after cessation of testosterone therapy in a transgender mouse model," *Biology of Reproduction*, 108 (5), 802-813, 2023.

Day JR, Flanagan CL, Davis A, Hartigan-O'Connor DJ, Barbosa MGM, Martinez ML, Lee C, Barnes J, Farkash E, Zelinski M, Tarantal A, Cascalho M, Shikanov A, "Encapsulated Allografts Preclude Host Sensitization and Promote Ovarian Endocrine Function in Ovariectomized Young Rhesus Monkeys and Sensitized Mice," *Bioengineering*, 10 (5), 550, 2023

Service: Professor Shikanov has provided major service to her department, the college, university, and nationally/internationally. Internally, Professor Shikanov has the responsibility of serving as BME's associate chair for undergraduate education, where she is dedicated to providing equitable education of the highest quality and has made significant improvements in the delivery of the undergraduate curriculum as the department doubled its enrollment over the past five years. At the university level, Professor Shikanov serves several important roles, including as the associate director of the Cellular and Molecular Biology program and member of the Biomedical Research Council. Externally, she is a reviewer for the NIH, NSF, NASA, and multiple private foundations. She has been active in professional societies in her research area, where she has had significant impact as a catalyst for women's health issues. Professor Shikanov's efforts on engineering and women's health, diversity in health care and education have significant DEI impact. Her overall service contributions have had a direct and measurable impact.

External Reviewers:

Reviewer A: "…Dr. Shikanov's overall achievements at this stage of her career exceed those expected of a full professor. Her research will continue to have an impact in the field of reproductive health…I fully support her promotion to full professor with tenure."

Reviewer B: "In addition to establishing a world-renowned research lab, Dr. Shikanov has also been an outstanding member of the biomaterials community and very active at the national level in professional service. She has been instrumental in establishing women's health programming at the Biomedical Engineering Society, Tissue Engineering (TERMIS) and Society for Biomaterials annual meetings. ... I am truly impressed with Dr. Shikanov's approach to novel biomaterial design to address premature ovarian insufficiency for young women and prepubertal girls diagnosed with cancer."

Reviewer C: "In my mind her promotion is well overdue. Dr. Shikanov's work has been on a strong upward trajectory, emphasized by the annual increase in the number of citations of her independent research as well as significant funding, including NSF, NIH, and private sector."

Reviewer D: "…based upon the excellent and continued impact of Dr. Shikanov's educational and research contributions in biomedicine, current and continued research funding successes, continued commitment to the greater biomedical community, and leadership in women's and LGBTQ+ health, I strongly believe that she will continue to excel an important member and impactful leader at the University of Michigan and in our broader biomedical community."

Reviewer E: “I can state at the outset that I am impressed by the innovation and importance in Prof. Shikanov’s scholarship, and her tireless and continuing commitment to mentorship and leadership in bioengineering. ... She has produced a record of independently funded research and scholarship of the highest quality while taking on substantive service and teaching responsibilities at her institution and in the larger community.”

Summary of Recommendation: Professor Shikanov’s research is of high quality and has had a significant impact. She is an outstanding mentor and teacher, and she has performed exemplary service. It is with the support of the College of Engineering Executive Committee that we recommend Ariella Shikanov for promotion to professor of biomedical engineering with tenure, Department of Biomedical Engineering, College of Engineering and Medical School, professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering, and professor of obstetrics and gynecology, without tenure, Department of Obstetrics and Gynecology, Michigan Medical School.

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