

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF CELL AND DEVELOPMENTAL BIOLOGY
MEDICAL SCHOOL AND COLLEGE OF ENGINEERING
DEPARTMENT OF BIOMEDICAL ENGINEERING
COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS
DEPARTMENT OF BIOPHYSICS

Ajit P. Joglekar, Ph.D., assistant professor of cell and developmental biology, Department of Cell and Developmental Biology, Medical School, assistant professor of biomedical engineering, Department of Biomedical Engineering, Medical School and College of Engineering, and assistant professor of biophysics, Department of Biophysics, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of cell and developmental Biology, with tenure, Department of Cell and Developmental Biology, Medical School, associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, Medical School and College of Engineering, and associate professor of biophysics, without tenure, Department of Biophysics, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2004	University of Michigan
M.S.	2001	University of Michigan
B.S.	1999	University of Pune, India

Professional Record:

2011-present	Assistant Professor of Cell and Developmental Biology, University of Michigan
2011-present	Assistant Professor of Biomedical Engineering, University of Michigan
2011-present	Assistant Professor of Biophysics, University of Michigan

Summary of Evaluation:

Teaching: Dr. Joglekar has made a major contribution to the teaching portfolio of the Department of Cell and Developmental Biology (CDB) by co-developing a new course – Quantitative Fluorescence Microscopy in Cell Biology (CDB 560). This course instructs graduate and undergraduate students in the theory and practice of fluorescence microscopy and quantitative image analysis, both of which have become indispensable tools in the biomedical sciences. Thus, the new course fulfills an essential educational need in the Program in Biomedical Sciences (PIBS) program. Moreover, Dr. Joglekar participates in teaching and leading discussion sessions in CDB 530 (Cell Biology).

In addition to classroom instruction, Dr. Joglekar is extremely active in teaching and mentoring undergraduate and graduate students and post-doctoral fellows. He encourages critical,

independent thinking, and promotes professional development by helping students to hone their skillset in scientific presentation and discussion. One student from his laboratory has received her Ph.D., and received the prestigious Kaluza prize for excellence in research awarded by the American Society for Cell Biology. Dr. Joglekar has also mentored five post-doctoral fellows. Dr. Joglekar has served or continues to serve on ten dissertation committees across the many programs in which he actively participates (Biomedical Engineering, Biophysics, CDB, CMB).

Research: The overarching goal of Dr. Joglekar's research is to define the biophysical mechanisms that ensure an accurate segregation of duplicated chromosomes into the two daughter cells during cell division. Maximum accuracy in chromosome segregation is essential for maintaining genome stability, and chromosome missegregation produces genetically abnormal cells that can initiate tumorigenesis as well as cause developmental disabilities. Dr. Joglekar's research has advanced the cell division field on two fronts. First, Dr. Joglekar's work defined the nanoscale protein organization of the kinetochore, the organelle that drives accurate chromosome segregation. This work provides the foundational knowledge upon which all models and understanding of kinetochore function can be formulated and tested. Second, Dr. Joglekar's work demonstrated that the architecture of the kinetochore encodes a mechanical switch that controls a biochemical signal cascade commonly known as the spindle assembly checkpoint (SAC). They showed that when the switch is on, the kinetochore can arrest cell division if a chromosome is in danger of being missegregated. The switch is then turned off when the proper spindle-kinetochore attachments are made, thus allowing the cell to proceed in the cell division cycle. Although these initial discoveries were made in the model organism budding yeast (*Saccharomyces cerevisiae*), the mechanisms are conserved across evolution and importantly, the discovery of this mechanical switch opened up an entirely new research avenue that Dr. Joglekar's lab is now exploring. Based on their knowledge of the architecture and mechanics of the switch, Dr. Joglekar's lab has developed a genetically-encoded method of controlling the duration of cell division in all eukaryotic cells (including human cells). This method is highly significant not only because of its biological implications for understanding the accuracy of cell division, but also because of its potential biomedical applications. Dr. Joglekar is expecting to patent this method. In summary, Dr. Joglekar has established an exceptionally strong research program that will continue to grow and advance the field of cell division.

Recent and Significant Publications:

Aravamudhan P, Felzer-Kim I, Joglekar AP: Budding yeast point centromere associates with two Cse4 molecules during mitosis. *Current Biology* 23:770-774, 2013.

Joglekar AP, Chen T, Lawrimore J: Sensitized emission based calibration of FRET efficiency for probing the architecture of macromolecular machines. *Cell and Molecular Bioengineering* 6:369-382, 2013.

Aravamudhan P, Felzer-Kim I, Gurunathan K, Joglekar AP: Assembling the protein architecture of the budding yeast kinetochore-microtubule attachment using FRET. *Current Biology* 24: 1437-1446, 2014.

Aravamudhan P, Goldfarb AA, Joglekar AP: Kinetochore encodes a mechanical switch to disrupt spindle assembly checkpoint signaling. *Nature Cell Biology* 17:868-879, 2015.

Verma V, Mallik L, Hariadi RF, Sivaramakrishnan S, Skiniotis G, Joglekar AP: Using protein dimers to maximize the protein hybridization efficiency with multisite DNA origami scaffolds *PLoS One* 10, e0137125, 2015.

Service: Dr. Joglekar currently serves on a number of departmental committees. These include the Graduate Recruitment, Admissions, seminar, curriculum, and the CDB website Committees. Additionally, he also organizes a monthly CDB social to foster informal dialog and collaborations within the department. Dr. Joglekar is a member of the American Society for Cell Biology, and has served as a reviewer for a large number of scientific journals. Additionally, Dr. Joglekar has served as an ad hoc member on grant review panels of both the NIH and NSF.

External Reviewers:

Reviewer A: “Ajit is a highly creative and driven scientist whose work has had a major influence on how biologists think about mitosis...Ajit is doing outstanding work. He has developed a terrific independent research program with a strong emphasis on quantitative, statistical methods. His contributions already demonstrate great creativity, an obvious passion for the biological phenomena he studies, an ability to cross disciplinary boundaries, and a talent for communicating his findings clearly and broadly.”

Reviewer B: “He consistently publishes in top tier journals at a rate of just over one publication per year and his publications receive numerous citations. I am impressed with his productivity at this stage and his ability to make excellent contributions to some of the most important (and competitive) questions about kinetochore biology.”

Reviewer C: “He uses both the genetic and molecular methods he learned from Bloom and the optical microscopy of living cells he learned from Salmon to make a real breakthrough in our understanding of how the binding of microtubules to yeast kinetochores silences the checkpoint and allows a cell to enter anaphase. This work is unique to Ajit’s lab and in my opinion constitutes a significant advance in the understanding of a fundamental aspect of cell division.”

Reviewer D: “...he has made significant innovations in use of biologically encoded optical probes to extract mechanistic information. His use of quantitative optical microscopy coupled to innovative design of fluorescent reporters of protein localization and state is world-class research, and his methods development has influenced others well beyond the mitosis field.”

Reviewer E: “...Ajit’s success validates his approach and strongly indicates that he will continue to make important discoveries in cell biology. He is doing well in terms of career development benchmarks. He started with a prestigious Career Award at the Scientific Interface from Burroughs Wellcome Fund and he now has two NIH R01 grants from NIGMS... All three of his proposed projects address important questions. All three are technically challenging, and he is the right person to take on these challenges.”

Summary of Recommendation:

Dr. Joglekar continues to build on a strong record of academic and research excellence. The high quality of research is recognized broadly by leading scientists inside and outside of Dr. Joglekar's research field. He is a truly interdisciplinary scientist and is poised to lead our progress and standing in this area in the coming years. We are pleased to recommend Ajit P. Joglekar, Ph.D. for promotion to associate professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School, associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, Medical School and College of Engineering, and associate professor of biophysics, without tenure, Department of Biophysics, College of Literature, Science, and the Arts.



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