Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF BIOLOGICAL CHEMISTRY
COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS
PROGRAM IN BIOPHYSICS

Michael Cianfrocco, Ph.D., assistant professor of biological chemistry, Department of Biological Chemistry, Medical School, and assistant professor of biophysics, Program in Biophysics, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of biological chemistry, with tenure, Department of Biological Chemistry, Medical School, and associate professor of biophysics, without tenure, Program in Biophysics, College of Literature, Science, and the Arts [also being promoted to research associate professor, Life Sciences Institute].

Academic Degrees:

Ph.D.	2012	University of California, Berkeley, CA
B.S.	2007	Providence College, Providence, RI

Professional Record:

2018-present	Assistant Professor, Program in Biophysics, College of Literature, Science, and the Arts, University of Michigan
2017-present	Assistant Professor, Department of Biological Chemistry, Medical School, University of Michigan
2017-present	Research Assistant Professor, Life Sciences Institute, University of Michigan

Summary of Evaluation:

Teaching: Dr. Cianfrocco has been dedicated to teaching and mentoring. His contributions as an educator include mentoring post-doctoral fellows, graduate students, and undergraduate students. He has co-directed and taught several courses in protein structure, function, and dynamics with a focus on using cryogenic electron microscopy. These include director of Emerging Areas of Biochemistry: Cryo-EM (BIOCHEM713), co-director of Molecules of Life: Protein Structure, Function, and Dynamics (BIOCHEM660), and lecturer of Biophysical Methods Survey Course – Single Particle Cryo-EM (BIOPHYS520). Currently, Dr. Cianfrocco is co-leading an annual, one-week international course in cryo-EM computation held at the University of Michigan. His student evaluations are very good to excellent, consistently scoring above UM averages. Overall, he is a successful and sought-after mentor.

Research: Dr. Cianfrocco's research focuses on three major areas: 1) microtubule motor protein regulation studying microtubule modifications, motor protein autoinhibition, and motor protein-cargo interactions; 2) cloud computing solutions for the structural biology community; and 3) AI-driven automation tools for cryo-EM workflows that have been used by more than 4,000 scientists worldwide. Dr. Cianfrocco has been well funded with current support from two National Institutes of Health (NIH) R01 grants, an R25 grant, and a National Science Foundation (NSF)

grant as a mulit-principal investigator or principal investigator, and is a co-investigator of an NIH R01 and one institutional grant. He has been previously funded by the NIH, the Hewlett Packard Enterprise Company, and HaouTi, Inc., to name a few. Dr. Cianfrocco has authored 33 peer reviewed publications in highly regarded journals in the field of structural biology and cryo-EM, including *eLife, Science Advances, Structure,* and the *Journal of Cell Biology*. He has been invited on 31 occasions to present his work nationally. He is recognized for his development of algorithms to automate structure determination and for developing a cyber infrastructure to support structural biology. He has licensed technology and is listed as co-inventor of one patent.

Recent and Significant Publications:

Tan Z, Yue Y, da Veiga Leprevost F, Haynes SE, Basrur V, Nesvizhskii AI, Verhey KJ, Cianfrocco MA, "Autoinhibited kinesin-1 adopts a hierarchical folding pattern," *bioRxiv* [Preprint]. 2023 Sep 20:2023.01.26.525761. doi: 10.1101/2023.01.26.525761. Update in: *Elife*. 2023 Nov 01;12: PMID: 36747757; PMCID: PMC9901034.

Solon AL, Tan Z, Schutt KL, Jepsen L, Haynes SE, Nesvizhskii AI, Sept D, Stumpff J, Ohi R, Cianfrocco MA, "Kinesin-binding protein remodels the kinesin motor to prevent microtubule binding," *Sci Adv*. 2021 Nov 19;7(47):eabj9812. doi: 10.1126/sciadv.abj9812. Epub 2021 Nov 19. PMID: 34797717; PMCID: PMC8604404.

Kearns S, Mason FM, Rathmell WK, Park IY, Walker C, Verhey KJ, Cianfrocco MA, "Molecular determinants for α-tubulin methylation by SETD2," *J Biol Chem*. 2021 Jul;297(1):100898. doi: 10.1016/j.jbc.2021.100898. Epub 2021 Jun 19. PMID: 34157286; PMCID: PMC8294582.

Li Y, Cash JN, Tesmer JJG, Cianfrocco MA, "High-Throughput Cryo-EM Enabled by User-Free Preprocessing Routines," *Structure*. 2020 Jul 7;28(7):858-869.e3. doi: 10.1016/j.str.2020.03.008. Epub 2020 Apr 14. PMID: 32294468; PMCID: PMC7347462.

Cash JN, Urata S, Li S, Ravala SK, Avramova LV, Shost MD, Gutkind JS, Tesmer JJG, Cianfrocco MA, "Cryo-electron microscopy structure and analysis of the P-Rex1-Gβγ signaling scaffold," *Sci Adv*. 2019 Oct 16;5(10):eaax8855. doi: 10.1126/sciadv.aax8855. PMID: 31663027; PMCID: PMC6795519.

Service: Dr. Cianfrocco is an exemplary citizen with excellent service. Internationally, he is an ad hoc grant reviewer for the United Kingdom Wellcome Trust and the Canadian Natural Sciences and Engineering Research Council. Nationally, he is a member of four scientific societies, the Biophysical Society, the American Society for Cell Biology, the Microscopy Society of America, and the American Crystollography Association. At annual meetings of these societies, he has organized and/or chaired several symposia. He is a frequent grant reviewer for the NSF and National Center for Cryo-EM Access and Training (NCCAT). He is a manuscript reviewer for 13 high-impact journals, including *Nature Methods*, *eLife*, and *Journal of Cell Biology*. Institutionally, he serves on the Life Sciences Institute (LSI) cryo-EM facility oversight committee, the LSI equipment committee, the LSI Core DEI strategic committee, and the Ph.D. student admissions committee for Biological Chemistry. Additionally, he has served on an impressive 20 dissertation committees, chairing six and serving as a member on the others.

External Reviewers:

Reviewer A: "Michael is well known to the field of cryo-EM as a technology expert, particularly for his work on implementing cloud computing for cryo-EM (both single particle and electron

tomography) data processing, and his efforts on introducing machine learning to cryo-EM. These efforts not only significantly advanced application of cryo-EM technologies, they also broadened the field of cryo-EM, greatly accelerated populating cryo-EM and lowering the barriers to broad biomedical research community to access cryo-EM."

Reviewer B: "Dr. Cianfrocco possesses an extensive list of significant publications, both during his training and as an independent researcher. Additionally, he has collaborated effectively with other laboratories at the University of Michigan...These collaborative publications highlight his ability to work well with others and contribute to interdisciplinary research efforts. Dr. Cianfrocco's reputation extends beyond the University of Michigan, as evidenced by the numerous invitations he has received to present seminars and participate in conferences and meetings. This recognition from the broader scientific community demonstrates the impact and relevance of his research. Furthermore, Dr. Cianfrocco has demonstrated excellent success in securing independent funding throughout his career."

Reviewer C: "Dr. Cianfrocco has made valuable contributions through teaching and service. He has also been able to secure substantial funding from several sources to support his exciting work."

Reviewer D: "In addition to his strong publication record, Dr. Cianfrocco has made numerous, substantive contributions to the field of cryo-EM. He was an early adopter of cloud-based computing strategies, and worked with investigators from around the world to access these computing services that would allow them to process their cryo-EM data without requiring prohibitively expensive investments in local computing infrastructure. He has given many invited talks, and workshop demonstrations, on this topic, and is one of, if not [THE] world's expert on this matter. Dr. Cianfrocco also created and maintains the Cosmic2 Science Gateway, a collection of online cryo-EM programs and related tools, such as AlphaFold2, that are used by many investigators."

Reviewer E: "Dr. Cianfrocco's commitment and deep-involvement in mentoring trainees is also clear…Not only has Dr. Cianfrocco been active and successful at fostering trainees at the undergraduate and graduate level[s], but they have also been productive and successful in developing independent investigators who were trained as postdocs in their lab. This success is hallmarked by the fact that the two postdocs trained in their lab to date have been successfully placed into assistant professorship and in industry. This is an outstanding achievement from such an early career mentor, and it speaks to the deep emphasis Dr. Cianfrocco places on career development for their trainees."

Reviewer F: "Dr. Cianfrocco shows excellent citizenship at the level of his discipline and to his University, Departments and Institute. Dr. Cianfrocco evaluates grant proposals for national (NSF and NCCAT) and international (UK and Canada) research agencies. Since 2017 Dr. Cianfrocco has participated in the oversight of the cryo-EM facility at the University of Michigan and he has also been a member of the DEI committee of the Department of Biological Chemistry. Dr. Cianfrocco began serving on the Admissions Committee for Biological Chemistry – an important and time-consuming job…Dr. Cianfrocco's service contributions are impressive and the workshops and educational efforts are having an impact nationally…"

Reviewer G: "He has a very solid publication record with 43 publications, 18 since he became and independent investigator…Michael has also been very successful at securing extra-mural funding and is currently the principal investigator of two NIH R01 research grants and one research and education R25 grant. These awards underscore Michael's exceptional standing as investigator and educator."

Summary of Recommendation:
Dr. Cianfrocco is a a technology expert in the field of cryo-EM, particularly for his work on implementing cloud computing for cryo-EM (both single particle and electron tomography) data processing, his efforts in introducing machine learning to cryoEM, and his research focused on microtubule motor protein regulation. Dr. Cianfrocco has also emerged as likely the foremost global authority in leveraging cloud computing for cryo-EM and, on a broader scale, structural biology. His greatest impact is in the creation to curate a set of online tools for state-of-the-art structural prediction and cryo-EM data processing that have been used by more than 4000 users globally. He has an excellent record of scholarship, independence, education, and service. We are pleased to recommend Michael Cianfrocco, Ph.D. for promotion to associate professor of biological chemistry, with tenure, Department of Biological Chemistry, and associate professor of biophysics, without tenure, Program in Biophysics, College of Literature, Science, and the Arts.

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