

PROMOTION RECOMMENDATION

The University of Michigan
College of Engineering
Department of Chemical Engineering

Xiaoxia Lin, associate professor of chemical engineering, with tenure, Department of Chemical Engineering, College of Engineering, and associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School, is recommended for promotion to professor of chemical engineering, with tenure, Department of Chemical Engineering, College of Engineering, and professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School.

Academic Degrees:

Ph.D.	2003	Princeton University, Chemical Engineering, Princeton, NJ
B.S.	1997	Tsinghua University, Chemical Engineering, Beijing, China
B.S.	1997	Tsinghua University, Computer Science & Technology, Beijing, China

Professional Record:

2014 – present	Associate Professor (with tenure), Department of Chemical Engineering, University of Michigan
2014 – present	Associate Professor (without tenure), Department of Biomedical Engineering, University of Michigan
2006 – 2014	Assistant Professor, Department of Chemical Engineering, University of Michigan

Summary of Evaluation:

Teaching: Professor Lin has taught several important and difficult undergraduate core courses: ChE Thermodynamics (ChE 330), Process Dynamics and Control (ChE 466) and ChE Process Economics (ChE 485), ChE Process Design (ChE 487), and co-taught ChE Product Design (ChE 488/489). For these classes, she introduced many innovative ideas to improve the interest of the students, such as a project in thermodynamics that had student groups look for applications of thermodynamics in everyday life and put their reports up on a Wikipedia page. More recently, she has introduced “much-needed material on entrepreneurship, innovation, and technology transfer” to the curriculum of CHE 488/489, in the words of one letter-writer. Her teaching evaluations are generally good with many excellent scores up to 5.0. She gets particularly high scores in “treating the students with respect” (Q217) and in “being well prepared” (Q230). Professor Lin has chaired or co-chaired 14 Ph.D. students and is a member of several other Ph.D. committees. In addition, she is active in advising masters and undergraduate students, as well as mentoring post-doctoral students.

Research: Professor Lin’s research lies at the intersection of chemical engineering and microbiology with a focus on microbial systems, in particular microbial communities. In collaboration with others, Professor Lin pioneered the development and application of microdroplet-based parallel co-cultivation and characterization methods to better understand co-

culture behaviors. Importantly, using these microfluidic devices Professor Lin has demonstrated the ability to co-cultivate various subsets of the microbes in complex communities. Professor Lin has published over 40 peer-reviewed papers in her career. Of these, 17 papers (13 as corresponding author) were published since her promotion to associate professor in 2014. This is an average of about three peer-reviewed papers per year in the past six years. In total, Professor Lin has received over 6,000 citations to her papers, with an average of about 450 citations per year in the past six years. Professor Lin has an h-index of 27 and an i10-index of 30 (Google Scholar). Professor Lin has been successful at garnering financial support for her research team. For example, she is the PI on a recent \$1.5M Department of Energy (DOE) grant. Professor Lin co-founded Ecovia Renewables in 2014 with a former Ph.D. student, and she has served as a scientific advisor and board member.

Recent and Significant Publications:

- Adam G. Krieger, Jiahao Zhang, Xiaoxia Nina Lin, “Temperature regulation as a tool to program synthetic microbial community composition,” *Biotechnology and Bioengineering*, 2021(118): 1381-1392.
- Tatyana E. Saleski, Meng Ting Chung, David N. Carruthers, Azzaya Khasbaatar, Katsuo Kurabayashi, Xiaoxia Nina Lin, “Optimized gene expression from bacterial chromosome by high-throughput integration and screening,” *Science Advances*, 2021; eabe1767.
- James Y. Tan, Sida Wang, Gregory J. Dick, Vincent B. Young, David H. Sherman, Mark A. Burns, Xiaoxia Nina Lin, “Co-cultivation of microbial subcommunities in microfluidic droplets facilitates high-resolution genomic dissection of microbial ‘dark matter,’” *Integrative Biology*. 2020; 12(11): 263-274.
- David N. Carruthers, Chang Kyu Byun, Bradley J. Cardinale, Xiaoxia Nina Lin, “Demonstration of transgressive overyielding of algal mixed cultures in microdroplets,” *Integrative Biology*. 2017(9): 687-694.
- Jeremy J. Minty, Marc E. Singe, Scott Scholz, Chang Hoon Bae, JungHo Ahn, Cliff E. Foster, James C. Liao, Xiaoxia Nina Lin, “Design and characterization of synthetic fungal-bacterial consortia for direct production of isobutanol from cellulosic biomass,” *Proc Natl Acad Sci USA*. 2013; 110(36): 14592-14597.

Service: Professor Lin’s service record is outstanding. She has contributed to her department, college, university, and profession through numerous service activities, and has done so with the highest level of dedication. At the departmental level, she has chaired the ChE DEI Steering Committee since 2020 and has served in various DEI roles since 2017. She also served as the Graduate Program Recruiting chair for two years. Beyond ChE, Professor Lin has served as a member of the CoE Graduate Student and Postdoc DEI Education Advisory Committee and served on two Faculty Launch Committees. It is further noteworthy that Professor Lin has served on a large number of dissertation committees for Ph.D. candidates who are not her own advisees, a very time-consuming but important service contribution that further highlights her commitment to graduate students.

External Reviewers:

Reviewer A: “She has pioneered a platform for consolidated processing, designing and optimizing co-cultures consisting of a cellulolytic member responsible for hydrolyzing hemicellulose and insoluble cellulose into mono and oligosaccharides and a fermenting member

for converting hexose/pentose monomer and oligosaccharides into desired products, especially isobutanol, amino acids.”

Reviewer B: “Nina is always the first person I seek to assign as a reviewer—although she is in such high demand that it is not unusual for me to find that insufficient time has passed since her last assignment to enable me to invite her again! Her long history in this space really does make her the go-to person for such papers.”

Reviewer C: “...based on the number courses she has taught she seems to be an integral component in the teaching mission of the Department.”

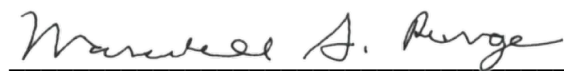
Reviewer D: “Dr. Lin continues to innovate in this space in exciting new directions, most notably to pursue droplet based high-throughput characterization techniques to mix-and-match microbes together and evaluate their metabolic interactions.”

Reviewer E: “Dr. Lin’s group was one of the first in demonstrating that the alternative approach of engineering consortia of coordinated microbial specialists is a feasible and highly promising solution to addressing some of the most complex bioengineering challenges.”

Summary of Recommendation: Professor Lin is a creative researcher who addresses important problems at the interface between biology and engineering. She is a leader in microbial consortia engineering. She is a highly respected scientist and dedicated educator and mentor. It is with the support of the College of Engineering Executive Committee that I recommend Xiaoxia Lin for promotion to professor of chemical engineering, with tenure, Department of Chemical Engineering, College of Engineering, and professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School.



Alec D. Gallimore, Ph.D.
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