

PROMOTION RECOMMENDATION  
The University of Michigan  
College of Engineering  
Department of Material Science and Engineering

Ashwin J. Shahani, assistant professor of materials science and engineering, Department of Materials Science and Engineering, and assistant professor of chemical engineering, Department of Chemical Engineering, College of Engineering, is recommended for promotion to associate professor of materials science and engineering, with tenure, Department of Materials Science and Engineering, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2016 Northwestern University, Materials Science and Engineering, Evanston, NY  
B.S. 2012 Cornell University, Material Science and Engineering, Ithaca, NY

Professional Record:

2021 – present Assistant Professor, Department of Chemical Engineering, University of Michigan  
2016 – present Assistant Professor, Department of Materials Science and Engineering, University of Michigan

Summary of Evaluation:

Teaching: Professor Shahani teaches two courses per year: “Thermodynamics of materials” held in the fall term, and “Kinetics, phase transformations, and transport” held in the winter. The former course is required for undergraduate students, while the latter course is compulsory for graduate students. The backbone of Professor Shahani’s pedagogical approach in both courses is experiential or problem-based learning (PBL). Professor Shahani believes that critical thinking skills can only be cultivated when the students solve real-world problems. Since joining the University of Michigan in 2016, Professor Shahani’s teaching rating (Q2) has been consistently high. This positive student feedback is due in large part to the dynamic classroom environment, wherein the lectures are interspersed with collaborative problem solving. Professor Shahani has graduated three Ph.D. students as the chair or co-chair and has another three in progress, with one student expected to graduate this year. He has also served as a member on several other Ph.D. committees. In addition, he is active in advising M.S. and undergraduate students as well as mentoring post-doctoral scholars. Professor Shahani is an effective teacher and mentor as evident in the comments provided in student letters.

Research: Professor Shahani’s group specializes in the application of non-destructive and in situ characterization methods to understand the emergence of patterns in nature. More specifically, his group investigates the solidification and processing pathways of a wide range of materials - from quasicrystals to eutectics to polycrystals to metal-matrix nanocomposites - with a focus on novel approaches for imaging across the relevant length and time-scales. In the short time that he has been at Michigan, he has defined novel and creative approaches to studying important scientific problems, garnered significant funding to attack these problems, recruiting a high-

quality group of students and post-doctoral fellows to conduct this research, and developed effective collaborations with UM and national lab researchers. He has documented his work in high-quality papers accepted for publication in top journals in the field. Professor Shahani has won three prestigious grants, namely, the DOD AFOSR Young Investigator Award, the NSF CAREER Award, and the DOD ARO Young Investigator Award. External review letters are all supportive of his promotion, referring to him as a rising star and leader.

Recent and Significant Publications:

- R. Keinan, H. Bale, N. Gueninchault, E.M. Lauridsen, A.J. Shahani, “Integrated imaging in three dimensions: Providing a new lens on grain boundaries, particles, and their correlations in polycrystalline silicon,” *Acta Materialia*, 148(2018)225-234.
- N. Lu, J. Kang, N. Senabulya, R. Keinan, N. Gueninchault, A. Shahani, “Dynamics of particle-assisted abnormal grain growth revealed through integrated three-dimensional microanalysis,” *Acta Materialia*, 195(2020)1-12.
- I. Han, J. T. McKeown, L. Tang, C. Wang, H. Parsamehr, Z. Xi, Y. Lu, M. J. Kramer, A. J. Shahani, “Dynamics Observation of Dendritic Quasicrystal Growth upon Laser-Induced Solid-State Transformation,” *Physical Reviews Letters*, 125, 195503 (2020).
- S. Moniri, H. Bale, T. Volkenandt, Y. Wang, J. Gao, T. Lu, K. Sun, R.O. Ritchie, A.J. Shahani, “Multi-step Crystallization of Self-Organized Spiral Eutectics,” *Small*, 2020, 16, 1906146.
- I. Han, K.L. Wang, A.T. Cadotte, Z. Xi, H. Parsamehr, Z. Xiao, S.C. Glotzer, A.J. Shahani, “Formation of a single quasicrystal upon collision of multiple grains,” *Nature Communications*, 12,5790 (2021).

Service: Professor Shahani has established a solid record of UM service, particularly at the departmental level. Within his department, he has served on the undergraduate committee, Ph.D. admissions committee, and seminar series committee. Importantly, he has also served as the faculty advisor for the undergraduate materials society (Michigan Materials Society (MMS)). In this capacity, he has worked to enhance MMS activities and ensure the UM chapter was in good standing with the international Materials Advantage program, a multi-materials society (TMS, ASM, ACERS, etc.) program. He has motivated undergraduate students to seek funding to attend national professional society meetings, something that has not been accomplished for several years. He has also worked with MMS to establish new outreach and professional development activities. This is particularly important for departmental efforts to attract new undergraduates into MSE. Professor Shahani has also been active in professional societies and has organized many sessions and workshops at national conferences. One such example was a new workshop held at Argonne National Laboratory in May 2017 (“X-ray Characterization of Materials Evolution: The State-of-the-Art”) bringing together experts in synchrotron-based technique development and application. The event attracted a large number (>100) of attendees and thus will likely remain a permanent fixture at subsequent user meetings. Professor Shahani has played an exemplary role in developing activities for motivating women and minority children to pursue science. He developed and directed a hands-on, problem-based learning activity (“The Magic and Mystery of Crystal Growth”) for the Females Excelling More in Math, Engineering, and the Sciences (FEMMES) capstone. Due to his diligent efforts, this capstone has become a regular event and held each year for the past few years.

External Reviewers:

Reviewer A: "...based on my own trajectory through three academic institutions, as well as all the tenure cases that I have reviewed to date, Prof. Shahani's accomplishments and promise of future achievements meet the standards for promotion to Associate Professor with tenure."

Reviewer B: "... Dr. Shahani is an excellent researcher and teacher. His career is on an upward trajectory. I recommend him for tenure and promotion at UM with the utmost enthusiasm."

Reviewer C: "Based on Prof Shahani's record of scholarly achievement, establishment of a unique and impactful area of research, grantsmanship, and professional and educational service, I believe that he is highly deserving of the promotion."

Reviewer D: "It is my opinion that he would be promoted to tenured Associate Professor at [my institution] and I would be happy to have him as a colleague. I believe that he is working on projects of great interest to the materials science community."

Reviewer E: "...I am convinced that Professor Shahani has developed the research profile one would expect for a tenured faculty member in your department. In short: he is a talented and visionary scientist who is already a leader."

Summary of Recommendation: Professor Shahani is a very prominent and accomplished leader in the field of phase transformations and materials microstructure in metallic systems. He has proven himself to be an excellent educator in every respect. He has excelled in a broad range of service activities, both internal and external. It is with the support of the College of Engineering Executive Committee that I recommend Ashwin J. Shahani for promotion to associate professor of materials science and engineering, with tenure, Department of Materials Science and Engineering, and associate professor of chemical engineering, without tenure, Department of Chemical Engineering, College of Engineering.



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Alec D. Gallimore, Ph.D.  
Robert J. Vlasic Dean of Engineering  
College of Engineering

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