

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Vikram Gavini, assistant professor of mechanical engineering, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2007	California Institute of Technology, Mechanical Engineering, Pasadena, CA
M.S.	2004	California Institute of Technology, Applied Mechanics, Pasadena, CA
B.Tech	2003	Indian Institute of Technology, Mechanical Engineering, Madras, India

Professional Record:

2007 – present	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2009 – present	Full Member, Michigan Center for Theoretical Physics, University of Michigan
2008 – present	Faculty, Program in Applied Physics, University of Michigan

Summary of Evaluation:

Teaching: Professor Gavini has demonstrated that he is an effective teacher and excellent advisor. He has taught a core sophomore level course ME 211, “Introduction to Solids Mechanics.” He has also revised and taught ME 501 “Analytical Methods I,” adding a strong mathematical component to the course. In addition, he has developed a new graduate class in Materials Physics, an important class not only to Mechanical Engineering but to several other departments as well. The focus of this course is to provide a fundamental understanding of the various materials theories used in computational materials science, the approximations in these theories, and their validity. His Q1/Q2 student evaluations are consistently high. Student letters indicate that Professor Gavini is a caring and helpful teacher. He has advised one M.S. student to graduation and is currently advising five Ph.D. students with two of them being on schedule to graduate in 2013. Letters from his graduate students show that he is an excellent mentor and an inspiration to them. His mentorship is also demonstrated through the publications with his graduate students in high quality journals.

Research: Professor Gavini’s research is in computational materials physics. His special technical emphasis is on developing computational techniques for predictive modeling of complex materials systems. He is performing high quality scholarly work and has built a strong research program at Michigan. He has secured external funding from NSF, AFOSR, and ARO and fostered an active long-term collaboration with scientists in the Army Research Labs. He has been publishing his research findings in some very prestigious and high impact journals in his field. A recent highlight would be the publication of a single-authored cover article in *Physical Review Letters*, a privilege reserved for work of compelling quality and potential impact. His papers are well cited by scholars in his field. Professor Gavini has given invited talks in various departmental seminars and symposia at top national and international research institutions. His research accomplishment is also demonstrated by the prestigious awards he received, including the NSF CAREER Award and the Humboldt Research Fellowship. External reference letters praise the quality, originality and impact of his work and refer to him as a top researcher and leader in his field. Professor Gavini has developed a strong research record with excellent potential for continued success and impact.

Recent and Significant Publications:

- Balachandran, J., Reddy, P., Dunietz, B. and Gavini, V., "End-group induced charge transfer in molecular junctions: Effect on electronic structure and thermopower," *Journal of Physical Chemistry Letters* (in press, 2012).
- Motamarri, P., Iyer, M., Knap, J. and Gavini, V., "Higher-order adaptive finite-element methods for orbital-free density functional theory," *Journal of Computational Physics* (in press, 2012).
- Blesgen, T., Gavini, V. and Khoromskaia, V., "Approximation of the Electron Density of Aluminum Clusters in Tensor-Product Format," *Journal of Computational Physics*, 231, 2551-2564 (2012).
- Tan, A., Balachandran, J., Sadat, S., Gavini, V., Dunietz, B., Jang, S.-Y. and Reddy, P., "Effect of length and contact chemistry on the electronic structure and thermoelectric properties of molecular junctions," *Journal of the American Chemical Society (Communications)* 133, 8838-8841 (2011).
- Gavini, V. and Liu, L., "A homogenization analysis of the field theoretical approach to the quasi-continuum method," *Journal of the Mechanics and Physics of Solids*, 59, 1536-1551 (2011).
- Iyer, M. and Gavini, V., "A field theoretical approach to the quasi-continuum method," *Journal of the Mechanics and Physics of Solids*, 59, 1506-1535 (2011).
- Radhakrishnan, B. and Gavini, V., "Effect of cell size on the energetics of vacancies in aluminum studied via orbital-free density functional theory," *Physical Review B*, 82, 094117 (2010).
- Suryanarayana, P., Gavini, V., Blesgen, T., Ortiz, M. and Bhattacharya, K., "Non-periodic finite element formulation of Kohn Sham Density functional theory," *Journal of the Mechanics and Physics of Solids*, 58, 256-280 (2010).
- Gavini, V., "Role of the defect-core in energetics of vacancies," *Proceedings of the Royal Society A*, 465, 3239-3266 (2009).
- Gavini, V., "Role of macroscopic deformations on energetics of vacancies in aluminum," *Physical Review Letters*, 101, 205503 (2008). (Cover article)

Service: Professor Gavini has an active service record. He has co-organized the department seminar series, and is currently serving on the department's information technology committee. He also served as the University of Michigan coordinator of the Midwest Mechanics Seminar Series. This is a prestigious seminar series which brings together universities across the midwest to co-sponsor the most outstanding lecturers in the field of mechanics in a lecture tour spanning multiple universities. Professor Gavini has served on the Elasticity Committee within the Applied Mechanics Division of ASME, and has been a co-organizer for technical symposia in his field. He has served as guest editor of a special issue for the *International Journal of Multiscale Computational Engineering*.

External Reviewers:

Reviewer A: "Dr. Gavini substantially improved his original model over the years, and the group he leads at the University of Michigan has developed a multiscale simulation platform for materials (one of the very few in the world), opening new prospects for computer-aided design of materials, with many potential applications."

Reviewer B: "...he has built a sound corpus of work related to computational methods and is well-known for this work via his talks and published papers - he enjoys a good reputation in the community. It should also be noted that he publishes in top line engineering and physics journals."

Reviewer C: "I am still very impressed by the fact that, during the past few years, he has published 5 papers in *Journal of Mechanics and Physics of Solids (JMPS)*, which is the best journal in solid mechanics. I am not aware of any other assistant professors in the States as well as in the world who have published so many in JMPS."

Reviewer D: "Among people of various backgrounds who are currently trying to do this, I think that Gavini is most likely to succeed...Gavini is the top scientist [of his cohort] in his area."

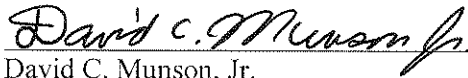
Reviewer E: "Vikram's work is of an extremely high quality and greatly significant...I regard Vikram Gavini as an emerging leader in computational mechanics and computational materials science, with seminal breakthroughs to his credit."

Reviewer F: "Prof. Gavini has great future potential and his motivation, perseverance, and vision will allow him to rise to the top of his field making further important scientific contributions."

Reviewer G: "Vikram's work is absolutely top notch: genuinely original, technically rock solid, hugely impactful...Among his contemporaries working to develop better ways of doing quantum mechanical materials calculations, Vikram is clearly at the top of the list...I cannot imagine a more solid candidate to promote. He is top of the top."

Reviewer H: "I consider him to be one of the leaders in the field of multiscale modeling and first principles calculations."

Summary of Recommendation: In summary, Professor Gavini is a great asset to the University of Michigan. He has been recognized as an emerging leader and top researcher in his field, an effective teacher and excellent advisor, and a great citizen in service. It is with the support of the College of Engineering Executive Committee that I recommend Vikram Gavini for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.



David C. Munson, Jr.

Robert J. Vlasic Dean of Engineering
College of Engineering

May 2013