

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

Emmanouil S. Kioupakis, associate professor of materials science and engineering, with tenure, Department of Materials Science and Engineering, College of Engineering, is recommended for promotion to professor of materials science and engineering, with tenure, Department of Materials Science and Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2008 University of California- Berkeley, Physics, Berkeley, CA  
Dipl. 2001 University of Crete, Physics, Heraklion, Greece

Professional Record:

2017 – present Associate Professor with tenure, Department of Materials Science and Engineering, University of Michigan  
2011 – 2017 Assistant Professor, Department of Materials Science and Engineering, University of Michigan  
2003 – 2004 Post-Doctoral Fellow, Materials, University of California- Santa Barbara, Santa Barbara, CA

Summary of Evaluation:

Teaching: Professor Kioupakis' contribution to teaching is outstanding. He regularly teaches MSE 242 (Physics of Materials), a core course on modern physics within the context of MSE. He also teaches MSE 400 (Electronic, Magnetic, and Optical Materials for Modern Device Technology) where he focuses on the science of the functional properties of materials with an emphasis on semiconductors. He applies evidence-based methods to train the next generation of scholars and engineers. He employs diverse instructional tools and active-learning techniques to engage students with the course material. He has developed a new course (MSE 193, Materials Innovation for a Sustainable Energy Future) aimed to broaden awareness about the MSE field and energy research by non-MSE majors. He teaches a graduate-level course, MSE 532 (Advanced Thermodynamics of Materials), which is taken by students from diverse engineering backgrounds and research emphases. He has consistently received high scores in all undergraduate and graduate classes taught since joining UM. Professor Kioupakis has served as an outstanding educator and mentor to his undergraduate students and graduate students. He not only trains his students in conducting research but also helps undergraduate students with their selection and application to graduate school as well as helping current graduate students secure funding by supporting their application for prestigious fellowships. He has graduated 17 Ph.D. students as chair or co-chair and has another 11 students in progress.

Research: Professor Kioupakis' research develops and applies new predictive atomistic computational methods to understand quantum phenomena in materials, interpret experimental data, and guide the discovery of new semiconductors. His group develops new first-principles methods and codes to study quantum processes in materials mediated by the interaction of

electrons with phonons, photons, alloy disorder, and other electrons. He has created a vibrant research program on theoretical predictions of quantum-material properties in diverse systems. His approach is based on density-functional theory combined with many-body perturbation theory that together can be applied to make quantitative predictions for new materials, never tested before. Professor Kioupakis has over 90 publications, with many since his last promotion. Many of these works have been published in extremely high-quality and competitive journals (impact factors exceeding 10) and these papers have been recognized broadly by the research community. As evidence of Professor Kioupakis' research excellence, he has gained broad recognition in terms of dozens of conference invitations and eight active research grants (NSF, Keck, ARO, Krell, UT Austin).

#### Recent and Significant Publications:

- Deng, Z, Olvera, A, Casamento, J, Lopez, JS, Williams, L, Lu, R, Shi, G, Poudeu, PFP, Kioupakis, E, "Semiconducting High-Entropy Chalcogenide Alloys with Ambi-ionic Entropy Stabilization and Ambipolar Doping," *Chemistry of Materials*, 07/28/2020; 32(14): 6070-6077.
- Kioupakis, E, Chae, S, Bushick, K, Pant, N, Zhang, X, Lee, W, "Theoretical characterization and computational discovery of ultra-wide-band-gap semiconductors with predictive atomistic calculations," *Journal of Materials Research*, 12/14/2021; 36(23): 4616-4637.
- Chae, S, Mengle, K, Bushick, K, Lee, J, Sanders, N, Deng, Z, Mi, Z, Poudeu, PFP, Paik, H, Heron, JT, Kioupakis, E, "Toward the predictive discovery of ambipolarly dopable ultra-wide-band-gap semiconductors: The case of rutile GeO<sub>2</sub>," *Applied Physics Letters*, 06/28/2021; 118(26).
- Sanders, N, Bayerl, D, Shi, G, Mengle, KA, Kioupakis, E, "Electronic and Optical Properties of Two-Dimensional GaN from First-Principles," *Nano Letters*, 12/13/2017; 17(12): 7345-7349.
- Shi, G, Kioupakis, E, "Anisotropic Spin Transport and Strong Visible-Light Absorbance in Few-Layer SnSe and GeSe," *Nano Letters*, 10/14/2015; 15(10): 6926-6931.

Service: Professor Kioupakis has a strong record of contributions to the MSE Department and the College of Engineering, as well as key contributions to the scientific community. He serves as the chair of the MSE Ph.D. program, overseeing program policies, manages Ph.D. admissions, advises students, and organizes events for career development and well-being. He has made a major impact on the department's inclusive culture. As the chair of the Graduate Committee, he sought to build a sense of community by hosting events for graduate students, including weekly cohort meetings to provide frequent opportunities for mentorship. Professor Kioupakis redesigned the admission process to increase diversity in the MSE graduate student population and provide more equitable access to admission by emphasizing qualities such as research potential and creativity while de-emphasizing traditional metrics. He serves the community by participating in workshops of US funding agencies that shape US funding priorities (e.g., the 2022 Materials Genome Initiative PI meeting, the 2018 Network for Computational Nanotechnology Workshop on Electronics, Photonics, and Magnetics, and the annual DOE LED R&D meeting) and by organizing focus sessions at international scientific conferences such as the APS March Meeting, Electronic Materials and Applications, and CLEO.

External Reviewers:

Reviewer A: "...I am very impressed by the research portfolio, contribution to service, and active mentorship of students and postdocs of Dr. Emmanouil Kioupakis. He has produced and is likely to continue to create a strong and coherent body of quality research in the field of computational materials science...he has established himself as a recognized leader in the field, worthy of promotion to full professor at any university."

Reviewer B: "You've got a winner! [Professor Kioupakis] is superbly qualified to be promoted to full professor at the University of Michigan or any other university in the country...Kioupakis meets all the requirements for promotion to full professor."

Reviewer C: "I find that Prof. Kioupakis easily meets and exceeds the criteria for promotion, as he is a highly productive and innovative scholar...I would be very happy to count Emmanouil as a colleague at the full professor level at [my institution], and I think that this would be true for any top-tier university."

Reviewer D: "...it is clear to me that Dr. Kioupakis is an established and internationally respected scientist working at the forefront of modern semiconductor physics. I think this case for promotion to full professor would be a straightforward one if it arose here in our department at [my institution] ..."

Reviewer E: "...he is an excellent researcher, a nice colleague, a deep and creative thinker, and a good mentor to young researchers....If Prof. Kioupakis were at my home department, I would expect that he would be promoted to full professor. Therefore, I strongly recommend his promotion to full professor without reservation."

Summary of Recommendation: Professor Kioupakis is a very prominent and accomplished leader in the field of semiconducting materials. It is with the support of the College of Engineering Executive Committee that I recommend Emmanouil S. Kioupakis for promotion to professor of materials science and engineering, with tenure, Department of Materials Science and Engineering, College of Engineering.



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

May 2023