

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

Emmanouil S. Kioupakis, assistant professor of materials science and engineering, Department of Materials Science and Engineering, College of Engineering, is recommended for promotion to associate 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, Physics, Berkeley, CA  
B.S. 2001 University of Crete, Physics, Heraklion, Greece

Professional Record:

2011 – present Assistant Professor, Department of Materials Science and Engineering,  
University of Michigan  
2008 – 2011 Post-Doctoral researcher, Materials, University of California, Santa Barbara,  
CA

Summary of Evaluation:

Teaching: Professor Kioupakis is an excellent instructor and mentor. Student letters remarked upon his kindness, enthusiasm and depth of knowledge in both the classroom setting and within his research group. Professor Kioupakis was noted for his ability to take initially intimidating material and make it accessible and understandable, and his sincere interest in mentoring his students with regard to their future career goals. He has graduated two Ph.D. students as chair and currently serves as chair or co-chair for another seven Ph.D. students. In addition, he served as a co-chair for an additional six students when two of our faculty members left the university. He has been recognized with the Jon R. and Beverly S. Holt Award for Excellence in Teaching in 2014 and 2016.

Research: Professor Kioupakis' research develops and uses electronic structure methods (first-principles, quantum-mechanically informed methods) to predict and understand materials properties in electronic, optoelectronic and thermoelectric devices. His approach is both in developing new computational algorithms, and in applying those methods to complex materials problems. His most influential work to date is in determining the mechanism for the observed "efficiency droop" in InGaN, an important material in solid-state lighting applications. Since arriving at Michigan, he has diversified his research to study how the optoelectronic properties of materials can be altered by confining two or more dimensions to length scales on the order of tens of nanometers. In another line of inquiry, Professor Kioupakis has predicted unusually strong optical absorbance of 2D materials, a new class of materials consisting of sheets that are only a single atom thick. His overall publication record is very strong, encompassing over 35 research papers (many of those with UM students). A large fraction of his papers are published

in high-impact journals like *Nature Materials* and *Nano Letters*. His research is well-funded, with three current grants from the NSF, one of which is a CAREER Award.

#### Recent and Significant Publications:

- E. Kioupakis, P. Rinke, K. T. Delaney and C. G. Van de Walle, “Indirect Auger recombination as a cause of efficiency droop in nitride light-emitting diodes,” *Applied Physics Letters* 98, 161107 (2011).
- D. Bayerl and E. Kioupakis, “Visible-wavelength polarized light emission with small-diameter InN nanowires,” *Nano Letters* 14 (7), 3709 (2014).
- E. Kioupakis, D. Steiauf, P. Rinke, K. T. Delaney and C. G. Van de Walle, “First-principles calculations of indirect Auger recombination in nitride semiconductors,” *Physical Review B*. 92, 035207 (2015).
- G. Shi and E. Kioupakis, “Anisotropic spin transport and strong visible-light absorbance in few-layer SnSe and GeSe,” *Nano Letters* 15, 6926 (2015).
- J. M. Rondinelli and E. Kioupakis, “Predicting and Designing Optical Properties of Inorganic Materials,” *Annual Review of Materials Research* 45, 491-518 (2015).

Service: Professor Kioupakis is a good citizen of the university and scientific community. He serves on a number of departmental committees, and served as the faculty advisor of the Michigan Materials Society. On the national scale, he reviews manuscripts for 25 journals, regularly reviews proposals, and co-organized seven sessions at national conferences.

#### External Reviewers:

Reviewer A: “The balance in Prof. Kioupakis’ research, combining core efforts in theory and method development with an expanding number of collaborative projects in applications-driven research, is excellent and provides the foundation for increasing impact of his work in the broader materials community going forward.”

Reviewer B: “Prof. Kioupakis’ most cited paper (over 200 citations) is on nitride light emitting diodes [*Applied Physics Letters* 98, 161107 (2011)]. Web of Science has tagged this as a ‘highly cited paper’ receiving enough citations to place it in the top 1% of the academic field of physics. It is clear that this work is absolutely first rate.”

Reviewer C: “He is without any doubt one of the most promising young academics worldwide in the area of electronic structure theory and computational materials science.”

Reviewer D: “Hallmarks of this aspect of Manos’ program are the fearless focus on complex materials – and complex materials architectures – of interest to experiments for properties in which DFT is insufficient, and where more advanced methods are required.”

Reviewer E: “At the University of Michigan, he is excelling at everything. It is especially impressive that he develops new computer codes – which is not very common in the U.S. – and uses them to tackle complex materials physics problems.”

Summary of Recommendation: Professor Kioupakis is a prominent scientist in the fields of Condensed Matter Theory and Computational Materials Science. He has published very important and highly cited papers elucidating the mechanisms of light emission, and is building an international reputation in other applications. He is a gifted teacher and is beloved by his students. He is also an active member in the department and scientific community. It is with the support of the College of Engineering Executive Committee that I recommend Emmanouil S. Kioupakis for promotion to associate 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

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