PROMOTION RECOMMENDATION
The University of Michigan
College of Literature, Science, and the Arts

Dominika K. Zgid, associate professor of chemistry, with tenure, and associate professor of physics, without tenure, College of Literature, Science, and the Arts, is recommended for promotion to professor of chemistry, with tenure, and professor of physics, without tenure, College of Literature, Science, and the Arts.

Academic Degrees:
Ph.D.   2008   Waterloo University, Waterloo, Canada
B.S.   2003   Warsaw University, Warsaw, Poland

Professional Record:
2018-present   Associate Professor, Department of Chemistry, University of Michigan
2018-present   Associate Professor (courtesy), Department of Physics, University of Michigan
2018-2019   Sabbatical Visitor, Flatiron Institute, Center for Computational Quantum Physics
2017- 2018   Dow Corning Assistant Professor of Chemistry, University of Michigan
2012-2018   Assistant Professor, Department of Chemistry, University of Michigan
2011-2012   Post-doctoral Fellow, Columbia University
2008-2011   Post-doctoral Fellow, Cornell University

Summary of Evaluation:
Teaching: Professor Zgid is a dedicated teacher of undergraduate and graduate students. She has taught chemistry courses to students in a variety of disciplines. She successfully implemented a flipped classroom format for her physical principles in chemistry class—required for all chemistry majors—during the pandemic to resounding success among the students. She also introduced biographies of scholars who made key discoveries in physical chemistry to broaden these students' appreciation for the history and identity of these scientists. She patiently teaches both undergraduate and graduate students to code and to use mathematical models that she has developed for solving problems in the electronic structure of solids. Professor Zgid was awarded the LSA Class of 1923 Memorial Teaching Award for her impressive contributions to undergraduate education.

Research: Professor Zgid has gained national and international recognition in the field of physical chemistry. Her specific contributions are in developing theory for calculating the electronic structure of strongly correlated and extended systems. She questions how electrons behave when they communicate strongly with one another due to relativity and disorder, a question she has answered in many publications in high-quality, high-impact journals. This work is crucial for predicting how real materials function for technologies such as batteries, semiconductors, and superconductors. Many external reviewers comment on her research leadership and resolve in tackling difficult scientific challenges in real materials. She has been

recognized for her outstanding accomplishments with the International Academy of Quantum Molecular Science medal.

Recent and Significant Publications:

Rusakov, A.A., Iskakov, S., Nguyen, L.T., & Zgid, D. (2019). Self-energy embedding theory (SEET) for periodic systems. *Journal of Chemical Theory and Computation*, *15*(1), 229–240.

Shee, A. & Zgid, D. (2019). Coupled cluster as an impurity solver for Green's function embedding methods. *Journal of Chemical Theory and Computation*, *15*(11), 6010-6024.

Yeh, C.-N., Shee, A., Iskakov, S., & Zgid, D. (2021). Testing the Green's function coupled cluster singles and doubles impurity solver on real materials within the framework of self-energy embedding theory. *Physical Review B*, *103*(15), 155158.

Pokhilko, P., Iskakov, S., Yeh, C.-N., & Zgid, D. (2021). Evaluation of two-particle properties within finite-temperature self-consistent one-particle Green's function methods: Theory and application to GW and GF2. *Journal of Chemical Physics*, *155*, 024119.

Service: Professor Zgid has made outstanding contributions to service within the university as well as both nationally and internationally within the theoretical chemistry community. She co-chaired the Department of Chemistry's DEI committee, where she organized a NextProf Science panel. She is a founding member of the Academic Freedom Alliance, and she serves on the Board of Directors at the Molecular Science Software Institute.

External Reviewers:

Reviewer (A): "An important aspect of her work is its interdisciplinary aspect combining chemistry and physics. I am particularly impressed by her careful analysis of the complex methods she is developing and in her systematic approach to validating them. In my opinion, Prof. Zgid is an accomplished computational chemist and adds a great deal to your department."

Reviewer (B): "I consider Dr. Zgid to be one of the best theoretical chemist [sic] in her generation. She has already distinguished herself by her creative independent work at the University of Michigan and I expect her to continue to deliver high-quality high-impact work…
Dr. Zgid is the leading expert in many-body methods for extended systems, such as solids…
Dr. Zgid has become a recognized leader and trail-blazer in the area of strongly correlated extended systems."

Reviewer (C): "Professor Zgid's research lies in the broad theme of electronic structure theory with a focus on Green's function embedding method. This type of research aims to illustrate underpinnings of local molecular interactions in condensed matter materials. [Professor Zgid's] theory development focuses on extending computational chemistry methods, such as the coupled-cluster theory, to studies of condensed matter phenomena…In my point of view, this is a very creative and unique research direction that represents a paradigm shift in computational methods for condensed matters."

Reviewer (D): "[Professor Zgid] is one of the top theoretical and computational chemists in the world. She has made major contributions to multiple areas of theoretical chemistry including the development of an *ab initio* Greens function embedding theory for quantum molecules and
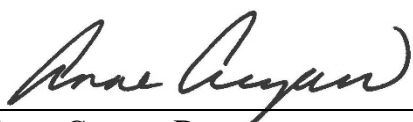
materials at zero and finite temperatures. Her research is widely recognized as one of the most creative and important efforts at the interface of chemical theory, electronic structure, and quantum information."

Reviewer (E): "I am delighted to have the opportunity to comment on Professor Zgid's credentials, since she is among the best scientists of her generation advancing electronic structure theory for molecules and solids…[T]he intellectual depth of her work, which addresses some of the most important challenges in modern electronic structure theory, and her overall contributions to the computational chemistry and physics communities and education are outstanding. Her [self-energy embedding theory] work is a game changer in the area of strongly correlated electronic materials, which she can examine at finite temperatures, accurately determining and helping interpret experimentally relevant quantities."

Reviewer (F): "Dominika Zgid has begun, very successfully, to work on a synthesis of all state-of-the-art methods that she had studied before in chemistry and physics in order to overcome still unsolved problems. The result was a new and efficient theory — called self-energy embedding theory (SEET) — for electron correlation. This achievement is truly remarkable and she has worked out the whole theory in the time up to her promotion to the rank of tenured associate professor. This work is highly interesting and innovative."

Summary of Recommendation:
Professor Zgid is a nationally and internationally renowned scholar in theoretical physical chemistry. She is a dedicated scholar with a strong commitment to teaching and service. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Dominika K. Zgid be promoted to the rank of professor of chemistry, with tenure, and professor of physics, without tenure, College of Literature, Science, and the Arts.

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Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

May 2023