

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

Nathaniel K. Szymczak, associate professor of chemistry, with tenure, College of Literature, Science, and the Arts, is recommended for promotion to professor of chemistry, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2007	University of Oregon, Eugene, OR
B.S.	2002	University of Illinois, Urbana-Champaign, IL

Professional Record:

2017–present	Associate Professor of Chemistry, University of Michigan
2012–2017	Dow Corning Assistant Professor of Chemistry, University of Michigan
2010–2017	Assistant Professor of Chemistry, University of Michigan
2009–2010	Post-doctoral Associate, California Institute of Technology
2007–2009	Post-doctoral Associate, Massachusetts Institute of Technology

Summary of Evaluations:

Teaching: Since his last promotion, Professor Szymczak has taught one undergraduate lecture, one undergraduate laboratory three times, and one graduate course. Professor Szymczak teaches his undergraduate laboratory as an “Authentic Research Design” (ARD) class where students are given a problem and use their knowledge to develop a hypothesis and plan experiments to test the hypothesis. His thoughtful implementation of ARD is exciting and a real innovation for this course. Professor Szymczak is a highly dedicated instructor. His student evaluations have largely been above 4 for Q1/Q2 and within the range of other very successful teachers. Professor Szymczak has been highly active in working with undergraduates in research. He provides exceptional mentoring to his graduate students resulting in their high achievement as recognized by his colleagues. Overall, Professor Szymczak has an excellent teaching record.

Research: Professor Szymczak is an inorganic chemist interested in using metals to catalyze reactions. The reactions that metals catalyze can be strongly influenced by the ligands that are bound to them. Most effort in designing catalysts has focused on the primary or first coordination sphere, i.e. the effect of the atom bound directly to the metal. Professor Szymczak has taken the novel approach of developing ligands where the secondary coordination sphere, i.e. atoms distal from the metal binding region, also influences the catalytic reaction through interactions such as hydrogen bonding. In his post-tenure work, he has expanded on this area and focused on designing catalysts for activation (i.e., modifying to be useful for later reactions) of important small molecules including dinitrogen, dioxygen, and carbon dioxide. Such reactions are of high fundamental and industrial significance. In a new area since tenure, Professor Szymczak been involved in development of novel fluoroalkylating reagents. Such reagents enable reactions of importance in the pharmaceutical industry. His approach is considered innovative due to the use of novel catalyst designs.

Recent and Significant Publications:

Dahl, E. W., Kiernicki, J. J., Zeller, M.; Szymczak, N. K. (2018). Hydrogen Bonds Dictate O₂ Capture and Release within a Zinc Tripod. *Journal of the American Chemical Society*, *140*, 10075-10079.

Geri, J. B., Wade Wolfe, M. M., Szymczak, N. K. (2018). The Difluoromethyl Group as a Masked Nucleophile: A Lewis Acid/Base Approach. *Journal of the American Chemical Society*, *140*, 9404-9408.

Shanahan, J. P., Szymczak, N. K. (2019). Hydrogen Bonding to a Dinitrogen Complex at Room Temperature: Impacts on N₂ Activation. *Journal of the American Chemical Society*, *141*, 8550-8556.

Shanahan, J. P., Mullis, D. M., Zeller, M., Szymczak, N. K. (2020). Reductively Stable Hydrogen-Bonding Ligands Featuring Appended CF₂-H Units. *Journal of the American Chemical Society*, *142*(19), 8819-8827.

Service: Professor Szymczak's service commitments include work on several chemistry department committees including Executive, Faculty Search, and Safety committees. A signature achievement has been his updating of the department's safety strategy with a tiered safety plan. Safety is by necessity a top priority of the Department of Chemistry. Professor Szymczak is recognized by the faculty for his attention and leadership to improve our safety culture. He was also an enthusiastic participant during our most recent successful faculty search. Professor Szymczak has a strong track record in outreach. He and his research team have volunteered at a Young Scientists' Expo (Forsythe Middle School) and have leadership positions in the Association for Women in Science at the University of Michigan, which aims to increase participation of young women in STEM fields. He has been active in the field including organizing the Michigan Inorganic Chemistry Symposium (MICS), a student-centered meeting that brings together students from around the state. His service is extensive and meaningful with positive impacts on the university.

External Reviewers:

Reviewer (A): "The research from Nate's group is wildly creative, thorough, and especially timely given the drive to making group transfer catalysis in both inorganic and organic methods more facile ... In a short amount of time, Nate has built a strong research effort, making significant contributions to the field of biomimetic inorganic, organometallic, and now, organic chemistry."

Reviewer (B): "He is highly creative and has designed some wonderful systems to probe fundamental questions in transition metal chemistry. Another strength of his program is the thoroughness of his studies; even his Communications (short but impactful reports) are extremely detailed and represent impressive works."

Reviewer (C): "...since tenure, Nate has added significant new lines of inquiry to his portfolio. Particularly creative and impactful is his new program on fluoroalkane utilization ... Nate is

highly active in terms of service to his broader scientific community and also to the University of Michigan.”

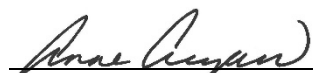
Reviewer (D): “Dr. Szymczak’s research program over the past four years has continued to explore uncharted areas of chemistry ... When considering the broader context of Lewis acidic borane chemistry, Dr. Szymczak’s work emerges as highly original.”

Reviewer (E): “He has clearly continued his positive trajectory since [tenure and promotion] and his work continues to inspire and impress. His program has expanded significantly in breadth since his last promotion while maintaining the strong depth for which he is recognized. He has also firmly established himself as one of the world’s leaders in the area of secondary coordination sphere interactions...”

Reviewer (F): “Prof. Szymczak is seen in a very positive light in the inorganic chemistry community, with a variety of projects in ligand design, small-molecule activation, and organometallic chemistry (incorporation of fluorinated groups). These are frontier fields, and Nate has made signature contributions to each.”

Summary of Recommendation:

Professor Szymczak has developed a creative approach to catalyze chemical reactions that activate small molecules based on ligands that bind to metals and control the reaction from both the first and second coordination sphere. He has been a dedicated teacher and mentor at all levels and evolved his innovative lab course design with success. He has developed leadership through service, especially for improving our safety culture. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Nathaniel K. Szymczak be promoted to the rank of professor of chemistry, with tenure, College of Literature, Science, and the Arts.



Anne Curzan, Dean
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