

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Mechanical Engineering

Donald J. Siegel, associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, and associate professor of materials science and engineering, without tenure, Department of Materials Science and Engineering, College of Engineering, is recommended for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, and professor of materials science and engineering, without tenure, Department of Materials Science and Engineering College of Engineering.

Academic Degrees:

Certificate	2001	University of Illinois, Computational Science and Engineering, Urbana-Champaign, IL
Ph.D.	2001	Case Western Reserve University, Physics, Cleveland, OH
B.S.	1995	University of Illinois, Physics, Urbana-Champaign, IL

Professional Record:

2015 – present	Associate Professor (with tenure), Department of Mechanical Engineering, University of Michigan
2015 – present	Associate Professor (without tenure), Department of Materials Science & Engineering, University of Michigan
2009 – 2015	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2005 – 2009	Technical Expert and Group Leader, Ford Research and Advanced Engineering, Ford Motor Company, Dearborn, MI
2004 – 2005	NRC Post-Doctoral Fellow, National Academy of Sciences/National Research Council, U.S. Naval Research Lab, Washington, DC
2001 – 2004	Post-Doctoral Researcher, Department of Energy, Sandia National Laboratories, Livermore, CA, United States of America

Summary of Evaluation:

Teaching: Professor Siegel is an outstanding teacher and mentor, and a recent recipient of the Mechanical Engineering (ME) Achievement Award, which recognizes excellence in teaching. He teaches several courses at the graduate and undergraduate levels, including Thermodynamics I, which is one of the highest attended core prerequisite courses on campus. His highly rated teaching evaluation scores for this course are a clear indicator of his exceptional classroom leadership. Professor Siegel is committed to teaching and has parlayed his passion for research into developing a new, advanced undergraduate/graduate-level course covering the fundamentals of atomic-scale computational methods, ME 507 *Atomistic Computer Modeling of Materials*. He is also the co-developer of ME 599, *Vehicle Electrification: Hydrogen and Fuel Cells*, a course that covers the fundamentals of fuel cell vehicle technology, hydrogen fueling infrastructure

storage, and benefits and barriers to the use of hydrogen as a vehicular fuel. He is dedicated to his students and has mentored seven Ph.D. students to graduation, along with six master's students. He is currently mentoring seven Ph.D. students. He is actively engaged in UM undergraduate research programs, including UROP, SROP, SURE, and MI-LSAMP. His students consistently praise his availability, approachability, and patience in and out of the classroom.

Research: Professor Siegel's research focuses on atomistic computational modeling of battery materials ranging from Li-ion to metal-air and metal-organic frameworks. He has also developed a new research direction in thermal energy storage using solid hydrates. He has published over 70 full articles in prominent journals, including the *Journal of Materials Chemistry, Energy & Environmental Science, Chemistry of Materials, ACS Applied Materials & Interfaces*, and *Ionics*. His funding sources are just as top rated as the journals in which he is published. His funding sources include the National Science Foundation, Department of Energy, U.S. Army, Advanced Research Projects Agency – Energy (ARPA-e), and U.S. China Clean Energy Research Center for Clean Vehicle. The concurrence among Professor Siegel's reviewers is that he is considered as a nationally and internationally known leader in the field of energy storage, whose research is exceptional and impactful. Proof of how impactful his research is may be found in the numerous national awards he has received, one being the U.S. Department of Energy, Secretary of Energy's Achievement Award. He is also the recipient of the American Chemical Society's Editors' Choice Article designation: *Chemistry of Materials*, and 'Most Read Article' designation.

Professor Siegel's research has clarified the atomic scale mechanisms that underlie the performance of several classes of energy storage materials, including those that comprise electrochemical, thermal, and chemical storage systems. Predictions from his computational studies have resulted in the discovery and experimental demonstration of new materials with optimized properties. He has delivered over 90 invited lectures at international conferences and departmental seminars; his publications have appeared in high-impact journals and have been widely cited (over 4800 citations, h-index of 38).

Recent and Significant Publications:

- J. Yang, A. Sudik, C. Wolverton, D. J. Siegel, "High capacity hydrogen storage materials: Attributes for automotive applications and techniques for materials discovery," *Chemical Society Reviews*, 39: 656, 2010.
- M. D. Radin, D. J. Siegel, "Charge Transport in Lithium Peroxide: Relevance for Rechargeable Metal-Air Batteries," *Energy & Environmental Science*, 6: 2370, 2013.
- A. Ahmed, Y. Liu, J. Purewal, L.D. Tran, A.G. Wong-Foy, M. Veenstra, A.J. Matzger, D. J. Siegel, "Balancing Gravimetric and Volumetric Hydrogen Density in MOFs," *Energy & Environmental Science*, 10: 2459-2471, 2017.
- A. Sharafi, E. Kazyak, A. L. Davis, S. Yu, T. Thompson, D. J. Siegel, N. P. Dasgupta, J. Sakamoto, "Surface Chemistry Mechanism of Ultra-Low Interfacial Resistance in the Solid-State Electrolyte LLZO," *Chemistry of Materials*, 29: 7961-7968, 2017.
- K. Kim, D. J. Siegel, "Tuning Ionic Mobility in Solid Electrolytes via Lattice Disorder," *Energy & Environmental Science*, 2018.

Service: Professor Siegel is an excellent citizen and has an exceptional record of service to the institution, including significant leadership service to Mechanical Engineering. He is currently serving as the associate chair for graduate education, chair of the ME Graduate Program Committee, member of the ME Planning Committee, and as a faculty advisor to the UM Society of Automotive Engineers Student Chapter. He previously served as the chair of the ME Faculty Search Committee. His dedication to both outreach and DEI is forthright, having co-developed the UM Women in Science and Engineering – Girls in Science and Engineering (WISE-GISE) summer camp program, and serving within the MI-LSAMP programs. His outreach to social media has gone viral – his You Tube video for lay audiences on “Batteries of the Future” has been viewed approximately 155,000 times. He has served his scientific community having completed approximately 150 paper reviews, most of which were for journals published by the *American Chemical Society*. He has served as a review panelist for DOE and NSF, among others, and has served as an invited participant in activities organized by DOE, ARPA-E, and NIST.

External Reviewers:

Reviewer A: “Prof. Siegel’s research has had an impressive growth and a clear impact on the scientific and industrial community. ... Prof. Siegel has emerged as one of the leaders ... Prof. Siegel’s excellent work is highly recognized by the most selected theoreticians and experimentalists...”

Reviewer B: “...Prof. Siegel has managed to move to the forefront of the energy storage area. ... Providing this guidance marks Prof. Siegel as a leader in setting the direction of the field. ... I would rate Prof. Siegel as an outstanding researcher in the field of computational materials science as it relates to energy storage.”

Reviewer C: “There is a tremendous number of laboratories in the world following Dr. Donald Siegel’s research path and the world is looking intensively at his work. I consider Dr. Donald Siegel as the presently most innovative person in the field of battery materials. ... Dr. Donald Siegel is a premier candidate for the world’s most leading Universities or research organizations.”

Reviewer D: “Professor Siegel is an exemplary mid-career scientist [of his cohort] whose excellent contributions to the advancement of computational materials research over the past decade are recognized worldwide.”

Reviewer E: “Advanced battery materials and hydrogen storage media are critical for satisfying the dizzying rise of our energy needs, and Dr. Siegel is a world-class expert in both these topics”

Reviewer F: “...I consider him a leader [of his cohort] in the growing field of first-principles materials modeling. . . . It should be noted that even in 2014 Siegel had established himself as prominent figure in the computational materials world.”

Reviewer G: “Don’s service to the community is also excellent with contributions to review, service on professional organizations, and organization of conferences. ... Don is the ideal faculty

member with a balance of outstanding contributions in research, education, and service.”

Summary of Recommendation: Professor Siegel is a very prominent and ambitious teacher and mentor, who is making significant impact with his research. It is with the support of the College of Engineering Executive Committee that I recommend Donald J. Siegel for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, and professor of materials science and engineering, without tenure, Department of Materials Science and Engineering, College of Engineering.



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

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