

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

Jeff S. Sakamoto, associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, associate professor of materials science and engineering, without tenure, Department of Materials Science and Engineering, and associate professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering, is recommended for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, professor of materials science and engineering, without tenure, Department of Materials Science and Engineering, and professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering.

Academic Degrees:

Ph.D. 2001 University of California, Materials Science and Engineering, Los Angeles, CA
B.S. 1996 California Polytechnic State University Materials Engineering, San Luis Obispo, CA

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 and Engineering, University of Michigan
2015 – present Associate Professor (without tenure), Program in Macromolecular Science and Engineering, University of Michigan
2012 – 2014 Associate Professor, Department of Chemical Engineering and Material Science, Michigan State University, East Lansing, MI
2007– 2012 Assistant Professor, Department of Chemical Engineering and Material Science, Michigan State University, East Lansing, MI
2005 – 2007 Senior Staff Scientist, Microdevice and Technology Group y, California Institute of Technology, Pasadena, CA
2002 – 2005 Staff Scientist, Microdevice and Technology Group, California Institute of Technology, Pasadena, CA
2001 – 2002 Post-Doctoral Scholar, Microdevice and Technology Group, California Institute of Technology, Pasadena, CA

Summary of Evaluation:

Teaching: Professor Sakamoto is a dedicated teacher who is making significant contributions in both the undergraduate and graduate level courses he teaches. ME 382 (Mechanical Behavior of Materials), is a required undergraduate, core course, and ME 599, (Fundamental Concepts in Electrochemical Energy) is a new graduate course. In both courses, Professor Sakamoto has expanded the curriculum by using demonstrations and examples from his research to enhance the students' learning experience. Professor Sakamoto has mentored 16 Ph.D. students, four M.S.

students, and 34 undergraduate students between UM and Michigan State University. He has also co-chaired 10 Ph.D. students. Professor Sakamoto's student letters expressed sincere appreciation for his impact as a mentor and how they have experienced personal, scientific, and career growth under his guidance.

Research: Professor Sakamoto's research focuses on solid-state electrolytes to enable safe, high-energy density, solid-state batteries. He has consistently published some of the most important papers in this field in high-quality journals such as *Solid State Ionics*, *Journal of Materials Chemistry A*, *Ceramics International*, *Material Sciences*, and the *Journal of Nanoscience and Nanotechnology*. He has secured research funding from a diverse set of funding agencies and industry sponsors and has engaged in significant technology transfer activities. Professor Sakamoto's research and scholarly work has helped to shape the field of energy storage by correlating processing, structure, and property relationships of the new and rapidly expanding field of solid-state batteries. Contributions from his research group have helped overcome technological challenges such as achieving high ionic conductivity, electrochemical stability, and mitigating the brittle nature of ceramic electrolytes.

Recent and Significant Publications:

- Rangasamy, Ezhiyl, Jeff Wolfenstine, and Jeffrey Sakamoto, "The role of Al and Li concentration on the formation of cubic garnet solid electrolyte of nominal composition $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$," *Solid State Ionics*, 206 (2012): 28-32.
- Sharafi, Asma, Eric Kazzyak, Andrew L. Davis, Seungho Yu, Travis Thompson, Donald J. Siegel, Neil P. Dasgupta, and Jeff Sakamoto, "Surface chemistry mechanism of ultra-low interfacial resistance in the solid-state electrolyte $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$," *Chemistry of Materials*, 29, no. 18 (2017): 7961-7968.
- Cheng, E. J., A. Sharafi, and J. Sakamoto, "Intergranular Li metal propagation through polycrystalline $\text{Li}_6.25\text{Al}_0.25\text{La}_3\text{Zr}_2\text{O}_{12}$ ceramic electrolyte," *Electrochimica Acta*, 223 (2017): 85-91.
- Koffler, Jacob, Wei Zhu, Xin Qu, Oleksandr Platoshyn, Jennifer N. Dulin, John Brock, Lori Graham et al, "Biomimetic 3D-printed scaffolds for spinal cord injury repair," *Nature medicine*, 25, no. 2 (2019): 263-269.
- Masias, Alvaro, Nando Felten, Regina Garcia-Mendez, Jeff Wolfenstine, and Jeff Sakamoto, "Elastic, plastic, and creep mechanical properties of lithium metal," *Journal of materials science*, 54, no. 3 (2019): 2585-2600.

Service: Professor Sakamoto is a good citizen, having served the department, the college, and the university. He has been a member of the ME Graduate Admissions Committee and has served on two faculty Launch Committees. He has previously served as visioning and director search chair and as a review committee member at UM's Energy Institute. Professor Sakamoto is committed to upholding UM's mission on diversity, equity, and inclusion. As part of a team of faculty and students, he received a CoE DEI Faculty Grant to create the Undergraduate Engineering Collaborative Growth Series and has published a paper in the *IEEE Frontiers in Education* detailing the empowerment of marginalized students through his program. Professor Sakamoto's external service to the scientific community has been extensive. He has had significant impact through his leadership roles as a conference chair, organizing committee member, and invited speaker for HAS/NAE programs. He also serves on the editorial board of

International Journal of Ionics and has organized numerous symposia at Materials Research Society meetings, in addition to providing service as a DOE panel lead and NASA Technology Board Member.

External Reviewers:

Reviewer A: “This work has profoundly affected the way I think of solid-electrolyte-lithium interface... A hallmark of Jeff’s work is elegance and impact.”

Reviewer B: “It is clear that he is one of the leading lights in solid state ionics in the United States today ... He can justifiably lay claim to be an intellectual leader in this emerging area and his fundamental insights have been pivotal to considerable technological advancement.”

Reviewer C: “Prof. Sakamoto’s work is very much the definition of excellence. ... In my department at [my institution], I am quite confident he would be promoted at this stage of his career.”

Reviewer D: “I have no doubt that Prof. Sakamoto will continue to garner international respect and acclamation for his research contributions in the energy storage field. He would be promoted at my institution.”

Reviewer E: “His work is making important contributions... Dr. Sakamoto is well recognized in the field. ... I have little doubt that Dr. Sakamoto, with the outstanding quality of his research, would receive promotion to Professor in any university and certainly would receive it here at [my institution].”

Summary of Recommendation: Professor Sakamoto is a dedicated teacher and researcher, making impactful strides in the field of Solid State Ionics. It is with the support of the College of Engineering Executive Committee that I recommend Jeff S. Sakamoto for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, professor of materials science and engineering, without tenure, Department of Materials Science and Engineering, and professor of macromolecular science and engineering, without tenure, Macromolecular Science and Engineering Program, College of Engineering.



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

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