Approved by the Regents
May 19, 2022

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

John T. Heron, 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.	2013	University of California, Materials Science and Engineering, Berkeley, CA
M.S.	2011	University of California, Materials Science and Engineering, Berkeley, CA
B.S.	2007	University of California, Physics, Santa Barbara, CA

Professional Record:

2016 – present	Assistant Professor, Department of Materials Science and Engineering, University of Michigan
2013 – 2016	Post-doctoral researcher, Department of Materials Science and Engineering, Cornell University, Ithaca, NY

Summary of Evaluation:

Teaching: Professor Heron has taught a large introductory course MSE 220 (Introduction to Materials and Manufacturing), and the graduate course MSE 500 (The Physics and Chemistry of Materials) each several times. He has also developed and taught a new graduate course that he developed, MSE 593 (Fundamentals of Quantum Materials). He developed this course in response to the National Quantum Initiative. Professor Heron strives to prepare students to lead in the field of quantum materials and devices. This course covers Berry phases in ferroic correlated electron systems, topological memory, and logic, (M-, Fe-, ME-, STT-) RAM, and NC-FETs. Student letters indicate their appreciation and value of the class. He regularly consults with CRLT and has implemented many active learning strategies in his classroom, as well as using Writing to Learn concepts in his teaching. Professor Heron has graduated four Ph.D. students (one as chair and one as co-chair) and has another four in progress. He is also a member of several other Ph.D. committees and is actively advising M.S. and undergraduate students.

Research: Professor Heron has established a productive and visible research program at Michigan. During his time in rank, he has focused on three areas of research: (a) emergent phenomena resulting from the coupling of electricity, magnetism, and strain in solid-state materials (b) utilizing entropy to stabilize complex oxides otherwise not attainable according to thermodynamics (NSF CAREER 2019), and (c) realization of novel oxide materials for power devices. This new work is being noticed by senior researchers in these fields and beyond, as evidenced by the review letters and by the growing citations to his independent research. Since his time in rank, Professor Heron has published 33 journal articles, with at least 15 of those published in high impact journals with his UM students as first authors. Professor Heron is well

recognized nationally and internationally having delivered more than 20 invited talks at a variety of venues worldwide. In addition to his NSF CAREER Award, he has won three grants from the Semiconductor Research Corporation, and he is a co-PI for the NSF MRSEC (Center for Nanoscale Science grant) with Penn State as the lead institution.

Recent and Significant Publications:

Vu, N.M., Meisenheimer, P.B., Heron, J.T., "Tunable magnetoelastic anisotropy in epitaxial (111) Tm3Fe5O12 thin films," *Journal of Applied Physics* 127, 153905, 2020.

Meisenheimer, P.B., Steinhardt, R.A., Sung, S.H., et al., "Engineering new limits to magnetostriction through metastability in iron-gallium alloys," *Nat Commun* 12, 2757, 2021.

Chae, S., Paik, H., Vu, N.M., Kioupakis, E., Heron, J.T., "Epitaxial stabilization of rutile germanium oxide thin film by molecular beam epitaxy," *Appl. Phys. Lett*. 117, 072105, 2020.

Meisenheimer, P.B., Williams, L.D., Sung, S.H., Gim, J., Shafer, P., Kotsonis, G.N., Maria, Trassin, J.P., Hovden, R., Kioupakis, E., Heron, J.T., "Magnetic frustration control through tunable stereochemically driven disorder in entropy-stabilized oxide," *Phys. Rev. Materials,* 3, 104420, 2019.

S. Novakov, B. Jariwala, N. M. Vu, A. Kozhakhmetov, J.A. Robinson, J. T. Heron, "Interface Transparency and Rashba Spin Torque Enhancement in WSe2 Heterostructures," *ACS Applied Materials and Interfaces*, 13: 13744-13750, 2021.

Service: Professor Heron has invested significant time and effort in undergraduate education as well as various other department and college committees involving faculty recruiting and graduate admission. Professor Heron has also volunteered his time and efforts in community outreach. In the past few years, he and his research group have contributed to several local community groups and events for K12 and underrepresented minority students including Females Excelling More in Math Engineering and Science (FEMMES), Science Olympia, ASM Teachers Camp, and Xplore Engineering. Notably, he and two students from his research group developed activities to promote STEM education for female students at the elementary school level as part of the collaborations with FEMMES.

External Reviewers:

Reviewer A: "In considering his distinct creativity and high-quality science, in my opinion, John is undoubtedly one of the strongest up and coming scientists of his generation. I believe that there is a substantial risk in delaying consideration of promoting him."

Reviewer B: "…I think John Heron is off to a very strong start at Michigan and his track record suggests he will be a very successful and high-impact scholar. I thus support his promotion with tenure at this time."

Reviewer C: "Among his broader peer group, I would rate him in the top 2% in the world, in terms of the quality and creativity of his work…Michigan should do everything possible to try to retain him and keep him there."

Reviewer D: "Combined with his attentive teaching and strong service record, Prof. Heron

seems well placed to continue to grow his efforts and impact at the University of Michigan. As such, I recommend Prof. Heron for promotion to Associate Professor, with Tenure."

Reviewer E: "There is no question that Prof. Heron has satisfied the criteria for tenure of producing impactful publications, in addition to high-quality teaching and student mentoring and contributions to the professional community…I enthusiastically recommend him for promotion to Associate Professor with Tenure, and look forward to his future discoveries."

Summary of Recommendation: Professor Heron is a very prominent and accomplished leader in the field of growth and properties of transition metal complex oxides. It is with the support of the College of Engineering Executive Committee that I recommend John T. Heron for promotion to associate professor of materials science and engineering, with tenure, Department of Materials Science and Engineering, College of Engineering.

Alec Gallimore

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

May 2022