

Alexandra Zevalkink

3519 Engineering Building • East Lansing, MI 48824 • E-Mail: alexzev@msu.edu

Professional Appointments

2022-present ***C. Robert and Kathryn M. Weir Endowed Associate Professor***, Department of Chemical Engineering & Materials Science | Michigan State University, East Lansing, MI

2016-2022 ***Assistant Professor***, Department of Chemical Engineering & Materials Science | Michigan State University, East Lansing, MI

Education and training

2015-2016 ***Postdoctoral research,*** Max Planck Institute for Chemical Physics of Solids — Dresden, Germany
Topic: High-pressure synthesis of metastable intermetallic compounds
Advisor: Yuri Grin

2014-2015 ***Postdoctoral research*** at NASA Jet Propulsion Laboratory — Pasadena, CA
Topic: Ab-initio calculations of materials for radioisotope thermoelectric generators
Advisor: Jean Pierre Fleurial

2014 ***Ph.D***. in Materials Science, California Institute of Technology — Pasadena, CA
Thesis: Chain-forming Zintl antimonides as novel thermoelectric materials
Advisor: G. Jeffrey Snyder

2008 ***B.S***. in Materials Science and Engineering, Michigan Technological University — Houghton, MI
-Aerospace Enterprise Program, NASA's zero gravity program 2005-2008
-Internship at National Energy Technology Laboratory

Selected Recent Publications

- A. K. M. Shawon, W. Guetari, K. Ciesielski, R. Orenstein, J. Qu, S. Chanakian, M. T. Rahman, E. Ertekin, E. Toberer, A. Zevalkink, ***Alloying-Induced Structural Transition in the Promising Thermoelectric Compound CaAgSb,*** Chem. Mater. 36 (4), 1908-1918 (2024).
- M. Calderón-Cueva, E. Isotta, M. Rylko, B. Mukherjee, P. Scardi, A Zevalkink, ***Influence of Ge Lone Pairs on the Elasticity and Thermal Conductivity of GeSe–AgBiSe$_2$ Alloys***, Chem. Mater. 35 (21), 8984-8994 (2023).
- E. Isotta, S. Jiang, G. Moller, A. Zevalkink, G. J. Snyder, O. Balogun, ***Microscale Imaging of Thermal Conductivity Suppression at Grain Boundaries,*** Adv. Mater., 2302777 (2023).
- S. Chanakian, W. Peng, V. Meschke, A. K. M. Shawon, J. Adamczyk, V. Petkov, E.S. Toberer, A. Zevalkink, ***Investigating the Role of Vacancies on the Thermoelectric Properties of EuCuSb-Eu2ZnSb2 Alloys***, Angew. Chem. Int. Ed., e202301176 (2023).
- E. Isotta, MY Toriyama, AH Adekoya, R Shupp, GJ Snyder, A Zevalkink, ***Effect of Sn oxides on the thermal conductivity of polycrystalline SnSe***, Mater. Today Phys., 100967 (2023).
- E. Isotta, W. Peng, A. Balodhi, A. Zevalkink, ***Elastic moduli: a tool for understanding chemical bonding and thermal transport in thermoelectric materials***, Angew. Chem., 135 (12), e202213649 (2023).

- D. M. Smiadak, R. Claes, N. Perez, M. Marshall, W. Peng, W. Chen, G. Hautier, G. Schierning, A. Zevalkink, ***Quasi-1D electronic transport and isotropic phonon transport in the Zintl $Ca_5In_2Sb_6$,*** Materials Today Physics, 100597 (2022).
- M. Calderon-Cueva, W. Peng, S. M. Clarke, J. Ding, B. Brugman, G. Levental, A. Balodhi, M. Rylko, O. Delaire, J. P. S. Walsh, S. M. Dorfman, and A. Zevalkink, ***Anisotropic structural collapse of Mg_3Sb_2 and Mg_3Bi_2 at high pressure***, Chem. Mater. 33 (2021) 567–573.
- S. Chanakian, D. Uhl, D. Neff, F. Drymiotis, J. Park, V. Petkov, A. Zevalkink, S. Bux, ***Exceptionally-high electronic mobility in defect-rich $Eu_2ZnSb_{2-x}Bi_x$ alloys***, J. Mater. Chem. A, 8 (2020), 6004-6012.
- W Peng, G Petretto, GM Riganese, G Hautier, A. Zevalkink, ***An unlikely route to low lattice thermal conductivity: small atoms in a simple layered structure,*** Joule, 2 (2018) 021303.
- B. R. Ortiz, W. Peng, L. C. Gomes, T. Zhu, P. Gorai, D. M. Smiadak, G. J. Snyder, V. Stevanovi, E. Ertekin, A. Zevalkink, E. S. Toberer, ***Ultra-low thermal conductivity in diamond-like semiconductors: selective scattering of phonons from anti-site defects***, Chem. Mater., 30 (2018) 3395-3409.
- W. Peng, S. Chanakian, and A. Zevalkink, ***Crystal chemistry and thermoelectric transport of layered AM_2X_2 compounds***, Inorg. Chem. Front., 5 (2018) 1744-1759.
- A. Zevalkink, D. M. Smiadak, J. L. Blackburn, A. J. Ferguson, M. L. Chabinyc, O. Delaire, J. Wang, K. Kovnir, J. Martin, L. T. Schelhas, T. D. Sparks, S. D. Kang, M. T. Dylla, G. J. Snyder, B. Ortiz, E. Toberer***, A practical field guide to thermoelectrics: fundamentals, synthesis, and characterization***, Appl. Phys. Rev., 05 (2018) 021303.

Service within the Thermoelectric Community:

My engagement with the thermoelectric community began in 2008, when I joined Jeffrey Snyder's research group as a graduate student working on Zintl thermoelectric materials. Now a faculty member at Michigan State University, my research focuses on the relationship between structure and thermal transport, with particular emphasis on how bond stiffness and elasticity influence these properties. I have contributed to the community through co-organizing thermoelectric-focused sessions at MRS meetings, various workshops, and the 2016 International Conference on Thermoelectrics (ICT) in Pasadena. One of my most meaningful service efforts was conceptualizing and organizing the ***Virtual Conference on Thermoelectrics*** (VCT) in 2020, 2021, and 2022. These events, created in response to the cancellation of ICT during the COVID-19 pandemic, provided critical opportunities for early-career researchers to share their work at a time when few alternatives existed. Since 2019, I have served on the ITS board, and in 2023 I assumed the role ***of ITS treasurer***. Additional details about my involvement in the field are provided below.

Workshop and Conference Organization

- Co-organizer, 2024 Spring Materials Research Conference, Thermoelectrics session
- Lead organizer of the ***2022 Virtual Conference on Thermoelectrics*** (attended by 600+ people)
- Lead organizer of the ***2021 Virtual Conference on Thermoelectrics*** (attended by 900+ people)
- Lead organizer of the ***2020 Virtual Conference on Thermoelectrics*** (attended by 900+ people)
- Co-organizer, 2019 Fall Materials Research Conference, Thermoelectrics session
- Co-organizer, 2017 International Conference on Thermoelectrics in Pasadena, CA
- Lead organizer of technical content of 1-day Thermoelectric Short Course, Pasadena, CA
- Co-organizer, 2016 Thermoelectric Summer School, Golden, CO

Professional Society Membership and Leadership

- International Thermoelectric Society Board member from 2019-present, Treasurer 2023 - present
- International Thermoelectric Society member since 2008
- Materials Research Society member since 2008-2012, 2016-present