Menglin Zhu

Curriculum Vitae with References

Department of Materials Science and Engineering
Massachusetts Institute of Technology
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Research Interest

- Advancing (scanning) transmission electron microscopy techniques for material analysis
- Probing structure/chemistry correlations in 3D using multilslice electron ptychography
- Exploring material behavior and emergent phenomena with *in situ* electron microscopy
- Extracting insights from microscopy data using statistical analysis and machine learning

Education and Training

2023–present **Postdoctoral Researcher**, *Massachusetts Institute of Technology*, Prof. James M. LeBeau.

2018–2023 **Ph.D.in Materials Science and Engineering**, *Ohio State University*, Prof. Jinwoo Hwang.

2014–2017 **B.S. in Materials Science and Engineering**, *Ohio State University*, Prof. Jinwoo Hwang.

Honors & Awards

2025 ***PARADIM user proposal #366*** *Probing Dynamic Polar Structures in Relaxors*, 10 days of microscope time at Cornell PARADIM center

2023 ***Postdoctoral Scholar*** of Microscopy Society of America, awarded as a postdoctoral researcher for the paper submitted for the Microscopy and Microanalysis conference 2023

2022 ***Student Scholar*** of Microscopy Society of America, awarded as a Ph.D. candidate for the paper submitted for the Microscopy and Microanalysis conference 2022

2021 ***Presidential Fellow*** of Ohio State University, the most prestigious award given by the Graduate School to outstanding Ph.D. candidates

2017 ***The Mars Fontana Scholarship*** by Ohio State University, awarded to the most outstanding senior student in the Department of Material Science and Engineering

2016 ***Summer Research Fellow*** of Ohio State University

Markworth-Woolley Scholarship by Ohio State University

Publications *Equal Contribution, Citations: 1003, h-Index: 15

[43] *2025* **Menglin Zhu***, Michael Xu*, Yu Yun, Liyan Wu, Or Shafir, Colin Gilgenbach, Lane W Martin, Ilya Grinberg, Jonathan E Spanier, and James M LeBeau. Insights into chemical and structural order at planar defects in Pb2MgWO6 using multislice electron ptychography. *ACS Nano*, DOI:10.1021/acsnano.4c14833.

[42] *2025* **Menglin Zhu**, Joseph Lanier, Sevim Polat Genlik, Jose G Flores, Victor da Cruz Pinha Barbosa, Mohit Randeria, Patrick M Woodward, Maryam Ghazisaeidi, Fengyuan Yang, and Jinwoo Hwang. Emergent ferromagnetism at $LaFeO_3/SrTiO_3$ interface arising from a strain-induced spin-state transition. *Adv. Mater. Interfaces*, DOI:10.1002/admi.202500169.

[41] *2025* Jith Sarker, Prachi Garg, Abrar Rauf, Ahsiur Rahman Nirjhar, Hsien-Lien Huang, **Menglin Zhu**, A F M Anhar Uddin Bhuiyan, Lingyu Meng, Hongping Zhao, Jinwoo Hwang, Eric Osei-Agyemang, Saquib Ahmed, and Baishakhi Mazumder. Microscopic and spectroscopic investigation of (AlxGa1–X)2O3 films: Unraveling the impact of growth orientation and aluminum content. *Adv. Mater. Interfaces*, DOI:10.1002/admi.202301016.

[40] 2025 Hao Pan, Liyan Wu, John Carroll, **Menglin Zhu**, Zishen Tian, Dongfang Chen, Hongrui Zhang, Xianzhe Chen, Xiaoxi Huang, Irina Baraban, Sreekeerthi Pamula, Cedric J G Meyers, R Ramesh, Kathleen Coleman, Brendan Hanrahan, James M LeBeau, Jonathan E Spanier, and Lane W Martin. Highly tunable relaxors developed from antiferroelectrics. *Adv. Mater.*, DOI:10.1002/adma.202505376.

[39] 2025 Jieun Kim, Yubo Qi, Abinash Kumar, Yun-Long Tang, Michael Xu, Hiroyuki Takenaka, **Menglin Zhu**, Zishen Tian, Ramamoorthy Ramesh, James M LeBeau, Andrew M Rappe, and Lane W Martin. Size-driven phase evolution in ultrathin relaxor films. *Nat. Nanotechnol.*, DOI:10.1038/s41565-025-01863-x.

[38] 2025 I-Hsuan Kao, Junyu Tang, Gabriel Calderon Ortiz, **Menglin Zhu**, Sean Yuan, Rahul Rao, Jiahan Li, James H Edgar, Jiaqiang Yan, David G Mandrus, Kenji Watanabe, Takashi Taniguchi, Jinwoo Hwang, Ran Cheng, Jyoti Katoch, and Simranjeet Singh. Unconventional unidirectional magnetoresistance in heterostructures of a topological semimetal and a ferromagnet. *Nat. Mater.*, DOI:10.1038/s41563-025-02175-0.

[37] 2024 **Menglin Zhu***, Michael Xu*, Yubo Qi, Colin Gilgenbach, Jieun Kim, Jiahao Zhang, Bridget R Denzer, Lane W Martin, Andrew M Rappe, and James M LeBeau. Bridging experiment and theory of relaxor ferroelectrics at the atomic scale with multislice electron ptychography, DOI: arXiv2408.11685.

[36] 2024 **Menglin Zhu**, Joseph Lanier, Jose Flores, Victor da Cruz Pinha Barbosa, Daniel Russell, Becky Haight, Patrick M Woodward, Fengyuan Yang, and Jinwoo Hwang. Structural degeneracy and formation of crystallographic domains in epitaxial $LaFeO_3$ films revealed by machine-learning assisted 4D-STEM. *Sci. Rep.*, DOI:10.1038/s41598-024-54661-1.

[35] 2024 Sujan Shrestha, Yongseong Choi, Maximilian Krautloher, **Menglin Zhu**, Jinwoo Hwang, Bernhard Keimer, Ambrose Seo, and Jong-Woo Kim. Exploring magnetic anisotropy and robustness of the J_{eff} state under substantial orthorhombic distortion in Sr_2IrO_4 thin films. *Phys. Rev. B Condens. Matter*, DOI:10.1103/PhysRevB.109.104415.

[34] 2024 Jith Sarker, Prachi Garg, Abrar Rauf, Ahsiur Rahman Nirjhar, Hsien-Lien Huang, **Menglin Zhu**, A F M Anhar Uddin Bhuiyan, Lingyu Meng, Hongping Zhao, Jinwoo Hwang, Eric Osei-Agyemang, Saquib Ahmed, and Baishakhi Mazumder. Microscopic and spectroscopic investigation of $(Al_xGa_{1-X})_2O_3$ films: Unraveling the impact of growth orientation and aluminum content. *Adv. Mater. Interfaces*, DOI:10.1002/admi.202301016.

[33] 2024 Hao Pan*, **Menglin Zhu***, Ella Banyas, Louis Alaerts, Megha Acharya, Hongrui Zhang, Jiyeob Kim, Xianzhe Chen, Xiaoxi Huang, Michael Xu, Isaac Harris, Zishen Tian, Francesco Ricci, Brendan Hanrahan, Jonathan E Spanier, Geoffroy Hautier, James M LeBeau, Jeffrey B Neaton, and Lane W Martin. Clamping enables enhanced electromechanical responses in antiferroelectric thin films. *Nat. Mater.*, DOI:10.1038/s41563-024-01907-y.

[32] 2024 Gabriel A Calderón Ortiz, **Menglin Zhu**, Andrew Wadsworth, Letian Dou, Iain McCulloch, and Jinwoo Hwang. Unveiling nanoscale ordering in amorphous semiconducting polymers using four-dimensional scanning transmission electron microscopy. *ACS Appl. Mater. Interfaces*, DOI:10.1021/acsami.4c11198.

[31] 2023 Kaitian Zhang, Chenxi Hu, Vijay Gopal Thirupakuzi Vangipuram, Lingyu Meng, Christopher Chae, **Menglin Zhu**, Jinwoo Hwang, Kathleen Kash, and Hongping Zhao. Effect of varying threading dislocation densities on the optical properties of InGaN/GaN quantum wells with intentionally created V-shaped pits. *J. Vac. Sci. Technol. B Nanotechnol. Microelectron.*, DOI:10.1116/6.0003141.

[30] 2023 Jith Sarker, Prachi Garg, **Menglin Zhu**, Christofer M Rouleau, Jinwoo Hwang, Eric Osei-Agyemang, and Baishakhi Mazumder. Understanding the Structural–Chemical Evolution of Epitaxial $NbN/Al_2O_3/NbN$ Trilayers with Varying NbN Thickness. *ACS Appl. Eng. Mater.*, DOI:10.1021/acsaenm.3c00555.

[29] 2023 Hyunseok Kim, Yunpeng Liu, Kuangye Lu, Celesta S Chang, Dongchul Sung, Marx Akl, Kuan Qiao, Ki Seok Kim, Bo-In Park, **Menglin Zhu**, Jun Min Suh, Jekyung Kim, Junseok Jeong, Yongmin Baek, You Jin Ji, Sungsu Kang, Sangho Lee, Ne Myo Han, Chansoo Kim, Chanyeol Choi, Xinyuan Zhang, Hyeong-Kyu Choi, Yanming Zhang, Haozhe Wang, Lingping Kong, Nordin Noor Afeefah, Mohamed Nainar Mohamed Ansari, Jungwon Park, Kyusang Lee, Geun Young Yeom, Sungkyu Kim, Jinwoo Hwang, Jing Kong, Sang-Hoon Bae, Yunfeng Shi, Suklyun Hong, Wei Kong, and Jeehwan Kim. High-throughput manufacturing of epitaxial membranes from a single wafer by 2D materials-based layer transfer process. *Nat. Nanotechnol.*, DOI:10.1038/s41565-023-01340-3.

[28] 2023 Xiaolei Guo, Hsien-Lien Huang, **Menglin Zhu**, Karthikeyan Hariharan, Szu-Chia Chien, Ngan Huynh, Jinwoo Hwang, Wolfgang Windl, Christopher D Taylor, Eric J Schindelholz, and Gerald S Frankel. Interstitial elements created via metal 3D printing. *Mater. Today*, DOI:10.1016/j.mattod.2023.04.020.

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[26] 2022 Wenyi Zhou, Alexander J Bishop, **Menglin Zhu**, Igor Lyalin, Robert Walko, Jay A Gupta, Jinwoo Hwang, and Roland K Kawakami. Kinetically Controlled Epitaxial Growth of Fe_3GeTe_2van der Waals Ferromagnetic Films. *ACS Applied Electronic Materials*, DOI:10.1021/acsaelm.2c00185.

[25] 2022 Kaitian Zhang, Chenxi Hu, A F M Anhar Uddin Bhuiyan, **Menglin Zhu**, Vijay Gopal Thirupakuzi Vangipuram, Md Rezaul Karim, Benthara Hewage Dinushi Jayatunga, Jinwoo Hwang, Kathleen Kash, and Hongping Zhao. Pulsed-Mode MOCVD Growth of ZnSn(Ga)N_2 and Determination of the Valence Band Offset with GaN. *Cryst. Growth Des.*, DOI:10.1021/acs.cgd.2c00511.

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[22] 2022 Hyunseok Kim, Yunpeng Liu, Kuangye Lu, Celesta S Chang, Kuan Qiao, Ki Seok Kim, Bo-In Park, Junseok Jeong, **Menglin Zhu**, Jun Min Suh, Yongmin Baek, You Jin Ji, Sungsu Kang, Sangho Lee, Ne Myo Han, Chansoo Kim, Chanyeol Choi, Xinyuan Zhang, Haozhe Wang, Lingping Kong, Jungwon Park, Kyusang Lee, Geun Young Yeom, Sungkyu Kim, Jinwoo Hwang, Jing Kong, Sang-Hoon Bae, Wei Kong, and Jeehwan Kim. Multiplication of freestanding semiconductor membranes from a single wafer by advanced remote epitaxy, DOI:10.48550/arxiv.2204.08002.

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[20] 2022 Md Rezaul Karim, Benthara Hewage Dinushi Jayatunga, Kaitian Zhang, **Menglin Zhu**, Jinwoo Hwang, Kathleen Kash, and Hongping Zhao. Band Structure Engineering Based on $InGaN/ZnGeN_2$ Heterostructure Quantum Wells for Visible Light Emitters. *Cryst. Growth Des.*, DOI:10.1021/acs.cgd.1c00630.

[19] 2022 I Hsuan Kao, Ryan Muzzio, Hantao Zhang, **Menglin Zhu**, Jacob Gobbo, Sean Yuan, Daniel Weber, Rahul Rao, Jiahan Li, James H Edgar, Joshua E Goldberger, Jiaqiang Yan, David G Mandrus, Jinwoo Hwang, Ran Cheng, Jyoti Katoch, and Simranjeet Singh. Deterministic switching of a perpendicularly polarized magnet using unconventional spin–orbit torques in WTe_2. *Nature Materials 2022 21:9*, DOI:10.1038/s41563-022-01275-5.

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[16] 2021 Soohyun Im, Yunzhi Yuchi Wang, Pengyang Zhao, Geun Hee Yoo, Zhen Chen, Gabriel Calderon, Mehrdad Abbasi Gharacheh, **Menglin Zhu**, Olivia Licata, Baishakhi Mazumder, David A Muller, Eun Soo Park, Yunzhi Yuchi Wang, and Jinwoo Hwang. Medium-range ordering, structural heterogeneity, and their influence on properties of Zr-Cu-Co-Al metallic glasses. *Physical Review Materials*, DOI:10.1103/PhysRevMaterials.5.115604.

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[14] 2020 Tiancong Zhu, Dante J O'Hara, Brenton A Noesges, **Menglin Zhu**, Jacob J Repicky, Mark R Brenner, Leonard J Brillson, Jinwoo Hwang, Jay A Gupta, and Roland K Kawakami. Coherent growth and characterization of van der Waals 1T-VSe_2 layers on GaAs (111) B using molecular beam epitaxy. *Physical Review Materials*, DOI:10.1103/PhysRevMaterials.4.084002.

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[10] 2020 Md Rezaul Karim, Benthara Hewage Dinushi Jayatunga, **Menglin Zhu**, Rebecca A Lalk, Olivia Licata, Baishakhi Mazumder, Jinwoo Hwang, Kathleen Kash, and Hongping Zhao. Effects of cation stoichiometry on surface morphology and crystallinity of $ZnGeN_2$ films grown on GaN by metalorganic chemical vapor deposition. *AIP Adv.*, DOI:10.1063/1.5137767.

[9] 2020 Micah S Haseman, Md Rezaul Karim, Daram Ramdin, Brenton A Noesges, Ella Feinberg, Benthara Hewage Dinushi Jayatunga, Walter R L Lambrecht, **Menglin Zhu**, Jinwoo Hwang, Kathleen Kash, and Others. Deep level defects and cation sublattice disorder in $ZnGeN_2$. *J. Appl. Phys.*, DOI:10.1063/1.5141335.

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[6] 2020 A F M Anhar Uddin Bhuiyan, Zixuan Feng, Jared M Johnson, Hsien-Lien Huang, Jith Sarker, **Menglin Zhu**, Md Rezaul Karim, Baishakhi Mazumder, Jinwoo Hwang, and Hongping Zhao. Phase transformation in MOCVD growth of $(Al_xGa_{1-x})_2O_3$ thin films. *APL Materials*, DOI:10.1063/1.5140345.

[5] 2019 Baishakhi Mazumder, Jith Sarker, Yuewei Zhang, Jared M Johnson, **Menglin Zhu**, Siddharth Rajan, and Jinwoo Hwang. Atomic scale investigation of chemical heterogeneity in β-$(Al_xGa_{1-x})_2O_3$ films using atom probe tomography. *Appl. Phys. Lett.*, DOI:10.1063/1.5113627.

[4] 2019 Md Rezaul Karim, Zixuan Feng, Jared M Johnson, **Menglin Zhu**, Jinwoo Hwang, and Hongping Zhao. Low-Pressure Chemical Vapor Deposition of In_2O_3 Films on Off-Axis c-Sapphire Substrates. *Cryst. Growth Des.*, DOI:10.1021/acs.cgd.8b01924.

[3] 2019 Zhiyuan Feng, Belinda Hurley, **Menglin Zhu**, Zi Yang, Jinwoo Hwang, and Rudolph Buchheit. Corrosion Inhibition of AZ31 Mg Alloy by Aqueous Selenite (SeO_3^{2-}). *J. Electrochem. Soc.*, DOI:10.1149/2.0911914jes.

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[1] 2019 Yang Cheng, Sisheng Yu, Adam S Ahmed, **Menglin Zhu**, You Rao, Maryam Ghazisaeidi, Jinwoo Hwang, and Fengyuan Yang. Anisotropic magnetoresistance and nontrivial spin Hall magnetoresistance in Pt/α-Fe_2O_3 bilayers. *Phys. Rev. B: Condens. Matter Mater. Phys.*, DOI:10.1103/PhysRevB.100.220408.

Teaching Experience

Fall, 2023 ***3.34 Imaging of Materials***, guest lecturer, Massachusetts Institute of Technology

Fall, 2020 ***MSE3151 Transport Phenomonon and Kinetics***, teaching assistant, Ohio State University

Fall, 2019 ***MSE3332 Undergraduate Lab II***, laboratory assistant and instructor, Ohio State University

Synergistic Activities

2023-present ***Mentor of two graduate students*** on project *Collaborative for Hierarchical Agile and Responsive Materials (CHARM) under cooperative agreement W911NF-19-2-011*

2023 ***Co-organize Microscopy and Microanalysis conference P08 symposium*** entitled *Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena*

2023 ***Mentor of two REU Students*** on porject *NFO Thin Films Grown via an Off-Axis Sputtering Method; STEM Characterization of $NdFeO_3/SrTiO_3$ Thin Films*

2022 ***Mentor of one REU Student*** on porject *Effects of Octahedral Tilting and Lattice Strain on $LaFeO_3$*

References

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Advisor **Prof. James M. LeBeau**, Associate Professor
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