Yifan Wang

Stanford Energy Postdoctoral Fellow ● Department of Materials Science and Engineering, Stanford University
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EDUCATION

2016.09 – 2022.09 **Ph. D. & M. Sc. in Mechanical Engineering**
School of Engineering, Stanford University, California, USA
Advisor: Wei Cai
Thesis (Mechanics & Computation Group): *Thermally activated defect processes in metallic solids – from rate theory to mechanical properties*

2013.09 – 2016.07 **M. Sc. in Petroleum Engineering**
School of Earth Sciences, Stanford University

2009.09 – 2013.07 **B. Sc. in Chemical Engineering** / **Minor in Computer Science and Technology**
Department of Chemical Engineering, Tsinghua University, Beijing, China

RESEARCH AND WORK EXPERIENCES

2023.04 – Present **Stanford Energy Postdoctoral Fellow**, Stanford University
Dresselhaus-Marais group, Department of Materials Science and Engineering
Xiaolin Zheng group, Department of Mechanical Engineering
Molecular dynamics simulations and in-situ high-resolution transmission electron microscope (HRTEM) of atomic mechanisms during iron-oxide nanoparticles sintering

2023.01 – Present **Researcher**, SLAC National Accelerator Laboratory
Photon Ultrafast Laser Science & Engineering (PULSE) Research Department
Develop scalable simulation algorithm of dark-field X-ray microscopy (DFXM) to study complex dislocation structures from large-scale molecular dynamics (MD) and discrete dislocation dynamics (DDD) simulations

2022.10 – 2023.03 **Postdoctoral Researcher**, Stanford University
2023.01 – 2023.03 Dresselhaus-Marais group, Materials Science and Engineering
2022.10 – 2022.12 Wei Cai group, Department of Mechanical Engineering

2016.09 – 2022.09 **Graduate Researcher**, Stanford University
Wei Cai group, Department of Mechanical Engineering

2013.09 – 2016.07 **Graduate Researcher**, Stanford University
SUPRI-B group, Department of Energy Resources Engineering

2012.10 – 2013.06 **Undergraduate Researcher**, Tsinghua University, Beijing, China
State Key Laboratory, Department of Chemical Engineering

2012.07 – 2012.08 **Undergraduate Visiting Researcher**, UC Davis
Ristenpart Group, Department of Chemical Engineering & Materials Science

2012.01 – 2012.02 **Undergraduate Visiting Researcher**, Melbourne University, Victoria, Australia
Department of Chemical Engineering, Melbourne School of Engineering

2011.07 – 2011.08 **Student-Intern Engineer**, Yanshan Petro-chemical Company, Beijing, China

TEACHING EXPERIENCES

ME346A. Introduction to Statistical Mechanics	2021 (Win), 2020 (Spr), 2018 (Spr)
ME346B. Introduction to Molecular Simulations	2021 (Spr), 2019 (Spr)
ME209. Imperfections in Crystalline Solids	2019 (Win)
ME340. Mechanics - Elasticity and Inelasticity	2018 (Win)

PUBLICATIONS (GOOGLE SCHOLAR LINK)

PEER-REVIEWED JOURNAL ARTICLES

1. **Yifan Wang**, Jing Liu, Jian-Zhong Jiang, and Wei Cai. Anomalous Temperature Dependence of Elastic Limit in Metallic Glasses. *Nat Commun* **15** (1): 171 (2024). (DOI).
2. Jianan Chen, Chang Liu, **Yifan Wang**, Wangwang Ding, Qiying Tao, Gang Chen, Wei Cai, Mingli Qin, and Xuanhui Qu. Strong and Ductile Niobium-Based Refractory Alloy via Deformable Zirconia Nanoparticles. *International Journal of Refractory Metals and Hard Materials* **118**: 106451 (2024). (DOI).
3. Xueli Zheng, Subhechchha Paul, Lauren Moghimi, **Yifan Wang**, Rafael A. Vilá, Fan Zhang, Xin Gao, Junjing Deng, Yi Jiang, Xin Xiao, Chaolumen Wu, Louisa C. Greenburg, Yufei Yang, Yi Cui, Arturas Vailionis, Ivan Kuzmenko, Jan llavsky, Yadong Yin, Yi Cui, and Leora Dresselhaus-Marais. Correlating Chemistry and Mass Transport in Sustainable Iron Production. *Proceedings of the National Academy of Sciences* **120** (43): e2305097120 (2023). (DOI).
4. **Yifan Wang** and Wei Cai. Stress-Dependent Activation Entropy in Thermally Activated Cross-Slip of Dislocations. *Proceedings of the National Academy of Sciences* **120** (34): e2222039120 (2023). (DOI).
5. Chang Liu, Jianan Chen, **Yifan Wang**, Wangwang Ding, Qiying Tao, Gang Chen, Wei Cai, Mingli Qin, and Xuanhui Qu. Strong and Ductile Nanoscale Ti-1Fe Dual-Phase Alloy *via* Deformation Twinning. *Scripta Materialia* **237**: 115720 (2023). (DOI).
6. Kento Katagiri, Tatiana Pikuz, Lichao Fang, Bruno Albertazzi, Shunsuke Egashira, Yuichi Inubushi, Genki Kamimura, Ryosuke Kodama, Michel Koenig, Bernard Kozioziemski, Gooru Masaoka, Kohei Miyanishi, Hirotaka Nakamura, Masato Ota, Gabriel Rigon, Youichi Sakawa, Takayoshi Sano, Frank Schoofs, Zoe J. Smith, Keiichi Sueda, Tadashi Togashi, Tommaso Vinci, **Yifan Wang**, Makina Yabashi, Toshinori Yabuuchi, Leora E. Dresselhaus-Marais, and Norimasa Ozaki. Transonic Dislocation Propagation in Diamond. *Science* **382** (6666): 69–72 (2023). (DOI).
7. Xiaoyang Wang, **Yifan Wang**, Wei Cai, and Haixuan Xu. Discovery of Multimechanisms of Screw Dislocation Interaction in Bcc Iron from Open-Ended Saddle Point Searches. *Phys. Rev. Mater.* **6** (12): 123602 (2022). (DOI).
8. Daan Vorselen, Sarah R Barger, **Yifan Wang**, Wei Cai, Julie A Theriot, Nils C Gauthier, and Mira Krendel. Phagocytic 'Teeth' and Myosin-II 'Jaw' Power Target Constriction during Phagocytosis. *eLife* **10**: e68627 (2021). (DOI).
9. Daan Vorselen, **Yifan Wang**, Miguel M. de Jesus, Pavak K. Shah, Matthew J. Footer, Morgan Huse, Wei Cai, and Julie A. Theriot. Microparticle Traction Force Microscopy Reveals Subcellular Force Exertion Patterns in Immune Cell–Target Interactions. *Nat Commun* **11** (1): 20 (2020). (DOI).
10. William P. Kuykendall, **Yifan Wang**, and Wei Cai. Stress Effects on the Energy Barrier and Mechanisms of Cross-Slip in FCC Nickel. *Journal of the Mechanics and Physics of Solids* **144**: 104105 (2020). (DOI).
11. **Yifan Wang**, Xiaohan Zhang, and Wei Cai. Spherical Harmonics Method for Computing the Image Stress Due to a Spherical Void. *Journal of the Mechanics and Physics of Solids* **126**: 151–167 (2019). (DOI).
12. Mehrdad T. Kiani, **Yifan Wang**, Nicolas Bertin, Wei Cai, and X. Wendy Gu. Strengthening Mechanism of a Single Precipitate in a Metallic Nanocube. *Nano Lett.* **19** (1): 255–260 (2019). (DOI).

UNDER-REVIEW JOURNAL ARTICLES & PREPRINTS

1. **Yifan Wang**[*], Wu-Rong Jian[*], and Wei Cai. Room-temperature vacancy emission from the jog on edge dislocation in FCC nickel under glide force. *in review*. arXiv. (link)
2. Wu-Rong Jian[*], **Yifan Wang**[*], and Wei Cai. Non-linear jog-dragging effect on dislocation mobility in single-crystal FCC nickel. *submitted*.
3. **Yifan Wang**, Nicolas Bertin, Dayeeta Pal, Kento Katagiri, Sara J. Irvine, Robert E. Rudd, and Leora E. Dresselhaus-Marais. Compute virtual dark-field X-ray microscopy images from discrete dislocation networks. *in review*. arXiv. (link)

*: equal contribution

4. Shaswat Mohanty, **Yifan Wang**, and Wei Cai. Generalizability of Graph Neural Network Force Fields for Predicting Solid-State Properties. *in review.* arXiv. (link)
5. Darshan Chalise, **Yifan Wang**, Mariano Trigo, and Leora E. Dresselhaus-Mara0is. Formalism to Image the Dynamics of Coherent and Incoherent Phonon with Dark-Field X-Ray Microscopy Using Kinematic Diffraction Theory. *in review*. arXiv. (link)
6. Dayeeta Pal, **Yifan Wang**, Ramya Gurunathan, and Leora Dresselhaus-Marais. Measuring the Burgers Vector of Dislocations with Dark-Field X-Ray Microscopy. *in review*. arXiv. (link).
7. Jihyun Baek, Yue Jiang, Dongwon Ka, Yuzhe Li, **Yifan Wang**, Sungsoon Kim, Adam Potter, Zengqing Zhuo, Jinghua Guo, and Xiaolin Zheng. Ultrafast Photoflash Synthesis of High-Entropy Oxide Nanoparticles. *in review*.
8. Sara J. Irvine, Kento Katagiri, Trygve M. Ræder, Darshan Chalise, Dayeeta Pal, Jade I. Stanton, Gabriele Ansaldi, Ulrike Boesenberg, Felix Braußе, Jon H. Eggert, Lichao Fang, Eric Folsom, Jörg Hallmann, Morten Haubro, Theodor S. Holstad, Anders Madsen, Johannes Möller, Martin M. Nielsen, Henning F. Poulsen, Jan-Etienne Pudel, Angel Rodriguez-Fernandez, Frank Schoofs, Frank Seiboth, **Yifan Wang**, Jo Wonhyuk, Mohamed Youssef, Alexey Zozulya, Kristoffer Haldrup, and Leora E. Dresselhaus-Marais. Dark-Field X-Ray Microscopy for 2D and 3D Imaging of Microstructural Dynamics at the European X-Ray Free Electron Laser. *in review*. arXiv (link).
6. Kento Katagiri, Bernard Kozioziemski, Eric Folsom, Sebastian Göde, **Yifan Wang**, Karen Appel, Darshan Chalise, Philip K. Cook, Jon Eggert, Marylesa Howard, Sungwon Kim, Zuzana Konôpková, Mikako Makita, Motoaki Nakatsutsumi, Martin M. Nielsen, Alexander Pelka, Henning F. Poulsen, Thomas R. Preston, Tharun Reddy, Jan-Patrick Schwinkendorf, Frank Seiboth, Hugh Simons, Bihan Wang, Wenge Yang, Ulf Zastrau, Hyunjung Kim, and Leora E. Dresselhaus-Marais. X-Ray Induced Grain Boundary Formation and Grain Rotation in Bi2Se3. *Scripta Materialia (in press)* **256**: 116416 (2025).

ARTICLES IN PREPARATION

1. Adam Potter, **Yifan Wang**, and Xiaolin Zheng. A-Site Entropy-Driven Tunability of Oxygen Vacancies in High-Entropy Perovskites. *in preparation*.
2. Lichao Fang, **Yifan Wang**, Zane Taylor, Tharun Reddy, et al., Leora Dresselhaus-Marais. Resolving Nano-H_2 Bubble Nucleation in Additive Manufacturing of Aluminum Alloy with *In-Operando* Nano Microscopes. *in preparation*.

CODE & DATASETS

1. **Yifan Wang** and Leora Dresselhaus-Marais. pyDFXM: A Python simulator for dark-field X-ray microcopy (DFXM) (GitHub). Accessed 2 October 2024
2. **Yifan Wang** and Wei Cai. Dataset for "Anomalous Temperature Dependence of Elastic Limit in Metallic Glasses." (GitLab). Accessed 2 February 2024
3. **Yifan Wang** and Wei Cai. Nickel cross-slip simulation scripts and data. MD++ simulation package. (GitLab). Accessed 1 August 2023.
4. **Yifan Wang**, Xiaohan Zhang, and Wei Cai. ShElastic package in "Spherical Harmonics Method for Computing the Image Stress Due to a Spherical Void." (2019). (GitLab).

SUCCESS PROPOSALS, GRANTS, AND AWARDS

PROPOSALS & GRANTS

2024.11 Brookhaven National Laboratory, National Synchrotron Light Source II (NSLS-II) General User Proposal: Kinetics of Light-Assisted Iron Ore Reduction for Sustainable Steelmaking. For Beamline 28-ID-2 – *in-situ* X-ray Powder Diffraction (XPD).

2024.07 SLAC National Laboratory, Linac Coherent Light Source (LCLS) Run 23 Proposal: A New View of Defect Dynamics in Materials. For X-ray Coherent Spectroscopy (XCS) Hutch 4 – Dark-field X-ray diffraction (DFXM).

2024.05	Lawrence Berkeley National Laboratory, Advanced Light Source (ALS) Proposal: Understanding Formation, Catalytic Activity, and Structural Stability of High-Entropy Materials through Ex-situ and Operando XAS Studies. For beamline 7.3.1 and 8.0.1.4.
2024.03	Brookhaven National Laboratory, National Synchrotron Light Source II (NSLS-II) General User Proposal: Investigating the Science in Light-Driven Carbon-Zero Steelmaking Processes. For Beamline 28-ID-2 – *in-situ* X-ray Powder Diffraction (XPD).
2023.11	Stanford University Shared Facility c-ShaRP Voucher Proposal ($10k).
2022.11	Argonne National Laboratory, Advanced Photon Source (APS) General User Proposal: Visualization of dislocation dynamics in Al and Mg single crystals. For beamline 6-ID-B, DFXM.

AWARDS

2023.04	Inaugural Stanford Energy Postdoctoral Fellow, Doerr School of Sustainability, Stanford University (link)
2022.06	Juan C. Simo Thesis Award, Mechanics and Computation Division, Department of Mechanical Engineering, Stanford University (link)
2020.03	ME Rising Stars, Academic Career Workshop for Mechanical Engineering, University of California, Berkeley
2012.10	Cao Xuejian Scholarship, Tsinghua University, Beijing, China
2011.10	New Fortune Holding Co. Ltd Jiangmen Scholarship, Tsinghua University
2010.10	Department of Chemical Engineering Scholarship, Tsinghua University
2010.08	First Prize, Sino-US joint volunteer teaching program, Tsinghua University
2010.05	Freshman Prize, Chemical Product Design Contest, Tsinghua University

PRESENTATIONS

CONFERENCE PRESENTATIONS

- "Compute virtual dark-field X-ray microscopy images from discrete dislocation networks," *Oral Presentation,* The 11th International Conference on Multiscale Materials Modeling (MMM11), Prague, Czech Republic, Sep 22–27, 2024.
- "Compute virtual dark-field X-ray microscopy images from discrete dislocation networks," *Oral Presentation,* The Minerals, Metals & Materials Society (TMS) Annual Meeting & Exhibition 2024, Orlando, Florida, USA, Mar 3–7, 2024.
- "The mesh method: accurate determination of 2D energy landscape of screw dislocations in body-centered cubic (BCC) metals and alloys," *Oral Presentation,* Materials Research Society (MRS) Spring Meeting & Exhibit, San Francisco, California, Apr 10–14, 2023
- "Entropic effect in thermally activated dislocation cross-slip," *Poster Presentation,* The 10th International Conference on Multiscale Materials Modeling, Baltimore, Maryland, Oct 2–7, 2022.
- "Predict the temperature dependence of the elastic limit in metallic glasses from the energy-strain landscape picture," *Oral Presentation,* Materials Research Society (MRS) Spring Meeting & Exhibit, Honolulu, Hawaii, May 8–13, 2022.
- "Entropic effect in thermally activated dislocation cross-slip," *Oral Presentation,* The Minerals, Metals & Materials Society (TMS) Annual Meeting & Exhibition, Anaheim, California, Feb 27–Mar 3, 2022.
- "Spherical Harmonic Method for Linear Elasticity: Applications to Dislocation-Void Interaction and Hydrogel Deformation by Cell-Intaking," *Oral Presentation,* 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, Illinois, Jun 4 – 9, 2018.

INVITED TALKS

- "Scale-Bridging in Sustainable Iron Extraction and Processing," *Invited Talk*, Precourt Institute of Energy, Stanford University, 2024/1/31.
- "Thermally activated defect processes in metallic solids: From rate theory to mechanical properties," *Invited talk (remote)*, Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf, Germany, 2022/8/10.
- "The Defect Genome Database for Plasticity," *Invited talk (remote)*, Pacific Northwestern National Laboratory, 2022/1/19.

LEADERSHIP, SERVICE, & OUTREACH

2021 – present	**Reviewed journal articles for:** *Acta Materialia, Computational Materials Science, Chem Catalysis, Nature Communications, Science Advances*
2023	**Postdoc Representative & Volunteer**, Diversity, Equity, & Inclusion (DEI) committee of the Mechanical Engineering faculty search
2022	**Volunteer**, "Heteropatriarchy and Academia," Conference series, The Clayman Institute of Gender Research, Stanford University
2020	**Research Mentor** for Local Public High-School Teacher Research Training, "Turning a physics class into a virtual lab," Summer Ignited Fellowship Research Program for Teachers & Teaching Engineering & Design Innovation (TEDI)
2015 – 2017	**President**, Stanford Chinese Music Ensemble
2013	**Volunteer Teacher**, EMPower – A Bridge for Children (ABC) International Spring Volunteer TALENT Program: Science, Sports, Arts, and Music Classes for Undocumented Orphans and Migrant Worker's Children, Beijing, China
2010 – 2011	**Vice President** (Publicity), Chinese Traditional Music Orchestra, Tsinghua University
2010	**Volunteer Teacher**, Sino-US Joint Volunteer Teaching Program for Advancing Education Equity and Alleviating Poverty in Rural China, Zunyi, Guizhou, China

MENTORING EXPERIENCES

2022 - Present	**Mentoring Ph.D. Students in the Lab** Candidate(s): Dayeeta Pal, Lauren Moghimi, Subhechchha Paul (Dresselhaus-Marais Group), Adam Potter (Zheng Group)
2024.07	**Summer High School Research Program** Candidate(s): Eytan Goldhaber-Fiebert Project: *Atomic mechanisms of sintering in direct iron reduction with transmission electron microscopy and molecular dynamics simulation*
2020.07	**2020 Ignited Fellowship for High-School Teacher Research Training** Candidate(s): Alfonso Garcia Project: *Turning a Physics Class into a Virtual Lab: Coding Physics Virtual Labs in Python*
2019.08	**Stanford-HUST Joint Summer Undergraduate Research Program** Candidate(s): Yichun Xu, Minming He, Huijie Zhang Project: *Machine learning for physical and materials science problems: generative adversarial network for the Ising model*
2019.01	**Stanford-HUST Joint Winter Undergraduate Research Program** Candidate(s): Jichang Yang, Siqi Wang, Yuqi Meng Project: *Machine learning predictive model: investigating atomic behavior during elastic deformation in metallic glasses*