**Zhengwu Fang**

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**Research Experience**

**Postdoctoral Researcher, Oak Ridge National Laboratory** Oct. 2023 – present

* Advanced Microscopy study on ionic conduction mechanism and chemical stability of sodium solid-state electrolyte.

**Research Assistant, University of Pittsburgh** Sept. 2018 – Sept. 2023

* Investigated the grain boundary (GB) deformation behavior in face-centered cubic (FCC) nanocrystals by using in-situ high-resolution transmission electron microscopy (HRTEM) combined with molecular dynamics simulation.
* Developed the strategies to fabricate FCC metallic bi-crystals with designed GB structures inside the TEM; Revealed the shear-coupled migration behavior of faceted GBs and mixed tilt-twist GBs at atomic scale; Uncovered the atomistic mechanisms of the deformation-induced formation and annihilation of high-angle GB.
* Gained in-depth understanding on atomic structure and deformation mechanism of various metallic materials including FCC metals such as Au, Ag and Pt; BCC metals and alloys such as W and refractory high-entropy alloys; and HCP metals such as Ti, Ru, and Re.
* Applied FIB to prepare TEM lamella and micro/nano-pillar samples for TEM characterization and nanomechanical testing; Characterized the atomic structure and elemental distribution of various metal-based catalysts by using HRTEM and STEM/EDS.
* Collaborated with a team of researchers and communicated findings through written reports and academic presentations; Presented research findings at conferences and published research papers in high-impact peer-reviewed journals

**Research Assistant, Central South University** Sept. 2015 – Jun. 2018

* Conducted research on microstructure optimization and mechanical property enhancement of magnesium alloys.
* Prepared magnesium alloys from smelting into deforming; Designed and executed experiments on hot compression, tensile deformation, and creep testing of magnesium alloys.
* Investigated the creep behavior of magnesium alloys through the combination of creep kinetics and microstructural characterization, the microstructure development and mechanical properties of magnesium alloys subjected to hot compression, and the dynamic precipitation and its effect on grain refinement and mechanical properties of magnesium alloy.
* Published papers in peer-reviewed journals.

**Education**

**Ph.D., Mechanical Engineering, University of Pittsburgh** 2018 – 2023

*Atomic-scale in situ TEM investigation of grain boundary deformation behavior in FCC gold.*

Co-advisors: Guofeng Wang & Scott Mao

**M.E., Materials Science and Engineering, Central South University**, **China**  2015 – 2018

*Study on creep behavior of hot compressed Mg-4Y-2Nd-0.2Zn-0.5Zr alloy*

Advisor: Xuyue Yang

**B.S., Materials Science and Engineering, Central South University, China** 2011– 2015

**Skills**

* Expertise in various sample preparation techniques such as electrochemical polishing, ion milling, and FIB lift-out machining.
* Proficient in various material characterization techniques such as TEM, STEM/EDS, SEM/EBSD, XRD and optical microscopy.
* Expertise in designing and executing experiments, analyzing data, and interpreting results; Strong understanding of processing-structure-property relationship of materials;
* Strong analytical and problem-solving skills; Ability to work effectively and independently.
* Excellent written and verbal communication skills, including the ability to present technical information to both academic and non-academic audiences.
* Proficient in using Microsoft Office suite and other data processing tools such as origin lab, TIA, Velox, ImageJ, Digital Micrograph, MATLAB, and Python.

**Selected Publications (**)

* Atomic-scale observation of dynamic grain boundary structural transformation during shear-mediated migration. **Z. Fang**, et al., (2022) Science Advances, 8(45), eabn3785.
* Revealing shear-coupled migration mechanism of a mixed tilt-twist grain boundary at atomic scale. **Z. Fang**, et al., (2023) Acta Materialia, 258, 119237.
* In-situ observation of formation and annihilation of high-angle grain boundary in Au nanocrystal.

**Z. Fang**, et al. In revision.

* Plasticity accommodation via sequential phase transitions mediated lattice reorientation in HCP crystals. Y. He, **Z. Fang** (co-first author), et al. Under review.
* In-situ TEM on interfacial phase transition during shear-mediated grain boundary migration

**Z. Fang** & S. Mao (2021) Microscopy and Microanalysis 27 (S1), 2402-2403

* Atomistic processes of surface-diffusion-induced abnormal softening in nanoscale metallic crystals.

X. Wang, S. Zheng, S. Shinzato, **Z. Fang**, et at., (2021) Nature communication 12 (1), 1-9

* Creep behaviors of hot compressed Mg-4Y-2Nd-0.2Zn-0.5Zr alloy with and without aging.

**Z. Fang**, et al. (2017) Materials Science and Engineering: A 708, 460-468

**Selected Presentations**

* Atomistic processes of grain boundary phase transformation during shear-mediated migration.

**Z. Fang** & S. Mao, MRS Spring Virtual Meeting & Exhibit. April 17-23, 2021

* Experimental molecular dynamics through in-situ Cs-corrected high-resolution transmission electron microscopy.

**Z. Fang** & S. Mao, Society for Experimental Mechanics Annual Conference. June 14-17, 2021

* In situ TEM observation on the two distinct shear-coupled migration behaviors of one mixed grain boundary.

**Z. Fang**, et al., Materials Science & Technology, October 9-12, 2022.