Muyu Zhang

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Department of Mechanics and Aerospace Engineering, Southern University of Science and Technology

EDUCATION

Southern University of Science and Technology (SUSTech) Shenzhen, China
Department of Mechanics and Aerospace Engineering Sept 2019 - Jun 2023
Bachelor of Theoretical and Applied Mechanics

Tsinghua University Shenzhen International Graduate School Shenzhen, China
Exchange Student Sept 2023 - Feb 2024

Relevant Coursework: Advanced Electron Microscopy

Southern University of Science and Technology (SUSTech) Shenzhen, China
Department of Mechanics and Aerospace Engineering Sept 2023 - Jun 2026
Academic Master of Theoretical and Applied Mechanics (Expected)

PUBLICATIONS

Zhang, M., Li, Z., Zhang, L. "Thermally Assisted Nanoscratching of Monocrystalline Silicon up to 800℃: Tribology and Subsurface Transformations."

Manuscript under revision, **Tribology International**.

Zhang, L., Gain, A.K., **Zhang, M.**, Huang, X. "Densification-dominated Plasticity in Fused Silica under Nanoscale Thermo-mechanical Deformation."

Manuscript in preparation, targeting **Nature Communications**.

Huang, Y., Zeng, Y., Ruan, H., **Zhang, M.**, Xue, Q., Zhou, W., Hong, W., Yang, C. "Polyelectrolyte elastomer-based ionotronic electro-mechano-optical devices."
DOI:10.1002/smll.202502225 **Small**.

PATENTS

A Method and System for Characterizing Densification of Amorphous Materials under Mechanical Deformation. (Invention Patent Application Under Review (2025).)

RESEARCH EXPERIENCE

Shenzhen Key Laboratory of Soft Mechanics & Smart Manufacturing (SUSTech)
—advised by Prof. Canhui Yang Sept 2021 - Jun 2023

- Hydrogel Microsphere Development
  - Synthesized and characterized functional hydrogel microparticles
  - Optimized fabrication parameters for controlled material properties
- Variable-Focus Polyelectrolyte Elastomer Fresnel Lenses
  - Developed tunable optical systems using responsive polymer materials
  - Investigated electro-mechanical coupling in soft smart materials

Shenzhen Key Laboratory of Cross-scale Manufacturing Mechanics(SUSTech)
—advised by Chair Prof. Liangchi Zhang Sept 2023 - Present

- National Natural Science Foundation of China (NSFC) Major Program
  - High-Performance Manufacturing Fundamentals for Critical Optical Components
  - Total Funding: ¥3.28 million RMB ($\sim$ 450,000 USD)
  - Graduate Student Researcher on multi-field optical material characterization
- Thermally-Assisted Nanoscratching of Monocrystalline Silicon
  - Revealed the mechanisms of material removal and subsurface defect of Si under thermo-mechanical coupling conditions
  - Identified the brittle-to-ductile transition behaviour of Si undergoing nanoscratching from ambient to 800°C
  - Confirmed that scratching in the neighborhood of 600°C leads to minimal subsurface damaging
- Nanoscale Characterization of Fused Silica Densification Using NBED
  - Employed nano-beam electron diffraction to characterize subsurface structure of scratched fused silica at RT, 400°C, and 800°C with $\sim$1 nm spatial resolution
  - Established spatial distribution patterns of densification and identified yield surface configurations across temperature range
- Stress-Corrosion Behavior of Silicon in Chemical Environments (Current)
  - Investigating environmental effects on material fracture mechanisms
- Thermal-Ultrasonic Coupled Nanoscratching of Monocrystalline Silicon (Current)
  - Applying ultrasonic vibrations (amplitude <100 nm, frequency $\sim$100 kHz) in both contact normal direction and scratching direction
  - Evaluating thermo-mechanical-vibrational coupling effects on silicon deformation behavior
  - Optimizing process parameters for enhanced machining efficiency and reduced subsurface damage

TEACHING EXPERIENCE

Southern University of Science and Technology Shenzhen, China
Teaching Assistant of Career Planning for University Students Jan 2022 - Jun 2022

· Facilitated weekly tutorials and office hours for career development guidance
· Coordinated industry partnerships and organized company visits to leading enterprises including BYD, Mindray Medical, and Huawei

Teaching Assistant of Elasticity Feb 2024 - Jun 2024

Graded homework assignments, providing detailed technical feedback

Supervised final projects on advanced metamaterial design: negative Poisson's ratio structures

Coordinated additive manufacturing processes using photopolymerization 3D printing for student prototypes

Guided students through complete design-fabrication-testing cycles including mechanical characterization

Teaching Assistant of Elasticity Feb 2025 - Jun 2025

Graded homework assignments, providing detailed technical feedback

Supervised final projects on advanced metamaterial design: stress concentration reduction materials

Coordinated additive manufacturing processes using metal 3D printing for student prototypes

Guided students through complete design-fabrication-testing cycles including mechanical characterization

ACADEMIC ACHIEVEMENTS

Honor SUSTech

· Excellent Graduation Thesis (Design) for Undergraduates 2023
· Most Improved Student Award 2020 - 2021

Scholarship SUSTech

· Third Class of the Merit Student Scholarship 2021 - 2022
· Graduate Student First-Class Scholarship 2023 - 2024
· Graduate Student First-Class Scholarship 2023 - 2025

LANGUAGES

English: IELTS 6.5 (currently preparing for higher score), **Chinese:** Native

SKILLS

Programming Languages: Python, MATLAB, Java

Simulation Software: ANSYS, COMSOL Multiphysics, ABAQUS, LAMMPS (Molecular Dynamics)

Experimental Equipment:

- **FIB-SEM:** Helios 600i Focused Ion Beam (>200 hours) - Sample preparation, cross-sectional analysis
- **SEM:** ZEISS Merlin - EDX, EBSD, TKD
- **TEM:** Titan Themis G2 & Talos F200X (>200 hours) - HRTEM, EDX, EELS, iDPC, NBED, CBED, BF/DF imaging across diverse materials including semiconductors, amorphous glass, metallic glass, high-entropy alloys (HEA), and carbon nanotubes
- **Nanoindentation:** Bruker TI - Nanomechanical property characterization, calibrate the instrument
- **Tribometer:** Rtec/MFT-5000 - High-temperature nanoscratching, mechanical testing
- **Universal Testing Machine:** Tensile, compression, and flexural testing
- **3D Printing:** Photopolymerization and metal additive manufacturing systems

INTERNSHIP EXPERIENCE

China Aero Engine Research Institute, Hunan Power Machinery Institute Hunan, China
Research Intern - Combustor Design Department Jun 2022 - Aug 2022

· Completed design of annular combustor for aviation gas turbine engines
· Conducted aerodynamic and thermal performance analysis of combustor components
· Applied computational fluid dynamics principles to optimize combustion chamber parameters
· Designed combustor shell structure using 32SiMnMoV ultra-high strength alloy steel
· Performed structural reliability analysis and safety verification using ANSYS finite element simulation
· Calculated optimal combustor dimensions and verified design against strength requirements