

# Yazhuo Liu

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## Education

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<b>Southern University of Science and Technology</b> , Shenzhen, China	Sep. 2017 – Jun. 2021
<i>B.Sc. in Theoretical and Applied Mechanics</i>	
<b>Georgia Institute of Technology</b> , Atlanta, USA	Jan. 2022 – Now
<i>Ph.D. in Mechanical Engineering</i>	

## Experience

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<b>Cornell University</b> , Ithaca, New York	Jun. 2020 – Sep. 2020
<i>Summer Research Intern. Advisor: Prof. Chung-Yuen Hui</i>	
<b>Southern University of Science and Technology</b> , Shenzhen, China	Jul. 2021 – Dec. 2021
<i>Research Assistant. Supervisor: Prof. Wei Hong</i>	
<b>Georgia Institute of Technology</b> , Atlanta, USA	Aug. 2025 – May. 2026
<i>Instructor. Teaching COE3001 - Deformable Bodies</i>	

## Publications

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**Liu, Y.**, Zhang, Y., Ding, K., Yang, Y., Barrios, A., Maeder, X., Pierron, O., Liu, X.\* & Zhu, T.\* (2026). Phase-field modeling of abnormal grain growth. *Acta Materialia* (in progress)

**Liu, Y.**, Ding, K., Birnbaum, A. J., Rawlings, A., Sun, A., Chen, W., McDowell, D. L., Michopoulos, J. G., & Zhu, T.\* (2026). Surface plasticity in laser scanning of metals. *Acta Materialia*, 302, 121667.

**Liu, Y.**, Feng, X., & Hong, W.\* (2023). Non-affine dissipation in polymer fracture. *Extreme Mechanics Letters*, 59, 101955.

**Liu, Y.**, Hui, C.-Y., & Hong, W.\* (2021). A clean cut. *Extreme Mechanics Letters*, 46, 101343.

## Patents

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**CN Patent No. CN202020206173.X**: “Logistics Unmanned Aerial Vehicle”, October 27, 2020. (Shared)

## Presentations

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**TMS 2024 Annual Meeting & Exhibition** - oral presentation. “Crystal plasticity modeling of thermo-elastic-plastic deformation during laser-based additive manufacturing”, Orlando, Florida, USA

**2025 SES Annual Technical Meeting** - oral presentation. “Abnormal grain growth under cyclic loading”, Atlanta, Georgia, USA

**2025 Physical Metallurgy Gordon Research Conference** - poster. “Driving force of abnormal grain growth”, Easton, Massachusetts, USA

## Awards & Honors

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- *SUSTech Summa Cum Laude Graduates*, 2021.
  - *CSTAM Finite Element Modeling Competition*, Third Prize, 2019.
  - *COMAC 3D Printing Structure Optimization Competition*, Third Prize, 2018.
  - *SUSTech Excellent Student*, First Class, 2018, 2019, 2020.

## Projects

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### **Dislocation-defect interaction in irradiated low alloy steel** Aug. 2025 - now

- Reviewed the radiation embrittlement in low alloy steel
- Project details are confidential.

### **Stress induced phase separation of Li dendrite in LLZTO solid-state electrolyte** Apr. 2025 - now

- Identified an early-stage, mesh-pattern morphology of Li dendrite growth in LLZTO under low-current short-circuit conditions through experimental observations.
- Developed a phase-field model to capture the stress-assisted phase separation and self-organization of Li and the subsequent evolution of the dendritic network structure.
- Revealed that the formation of the mesh-pattern arises from the minimization of elastic energy and the surface energy due to dendrite growth.

### **Laser-scanning-induced plastic deformation in metal 3D printing** Apr. 2023 - Aug. 2025

- Investigated the influence of laser scanning on stress and plastic strain evolution in Ni single crystals, visualizing plastic deformation through surface slip traces and dislocation patterns.
- Developed a temperature-dependent crystal plasticity finite element (CPFE) model to simulate thermal effects and plastic deformation during laser scanning along various directions.
- Validated the CPFE model with experimental data, providing insights into controlling thermo-mechanical responses in laser-based additive manufacturing.

### **Abnormal grain growth in ultra-fine grained metals** Sep. 2022 - Aug. 2025

- Developed a micromechanics-based analytical solution to predict grain boundary motion in thin-film metals using local stress-strain and crystallographic data.
- Utilized continuum phase field modeling to simulate multi-grain systems, capturing spatial and temporal evolution of grain structures under various loading conditions.
- Validated the phase field model through comparisons with analytical predictions and experimental data, demonstrating its accuracy in predicting grain growth behavior.

### **Energy dissipation mechanism in polymer fracture** Feb. 2021 – Dec. 2021

- Revealed a significant energy dissipation mechanism in polymeric fracture, attributed to non-affine deformation near the crack tip, beyond traditional viscoelastic hysteresis.
- Demonstrated that reducing inter-chain friction through methods like lateral stretching or solvent dilution lowers fracture energy to intrinsic thresholds, while cyclic training maintains high fracture toughness.
- Identified non-affine dissipation as a key factor for developing soft materials with superior elasticity and fracture resistance, offering new design principles for advanced materials.

### **Effect of Friction in Cutting Soft Solids** Jun. 2020 – Jun. 2021

- Investigated the role of friction and slicing motion in cutting soft solids, revealing how friction influences stress distribution and fracture initiation during the process.
- Developed a numerical model to analyze frictional contact and stress diversion, demonstrating how slicing minimizes vertical resistance and facilitates clean cutting.
- Studied the energetics of cutting by computing the energy landscape, showing that friction reduction lowers the energy barrier for crack opening and enhances cutting efficiency.