

Hanhan Zhao

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Reference:

- Chair Prof. Liangchi Zhang (SUSTECH) – Ph. D. advisor - zhanglc@sustech.edu.cn
- Prof. Asit Kumar Gain (SUSTECH) - Associate Research Professor - a.gain@sustech.edu.cn

Education:

2014-2018	B.S.	Materials Forming and Control Engineering, Nanchang University, Nanchang, China
2018-2021	M.Eng.	Materials Engineering, Nanchang University, Nanchang, China
2021-2025	Ph. D.	Mechanics, Southern University of Science and Technology, Shenzhen, China

Research Interest:

- Optical Materials & AI-Assisted Computation
- Surface Patterning for Vision Lenses
- Additive Manufacturing for Contact Lenses

Research Experience:

A. Ph. D. Phase (2021-2025)

Thesis Topic: Mold-Glass Interface Adhesion Mechanisms in Thermal forming

Advisor: Liangchi Zhang

Description: We conducted both qualitative and quantitative analyses of mold-glass adhesion mechanisms, integrating adhesion work calculations with dimensionless analysis and atomistic-level adhesion process evaluation. Molding temperature emerged as the key factor influencing adhesion during demolding, possibly attributed to increased atomic contact. Utilizing a custom-designed adhesion force measurement system, we developed parameter-matched glass-mold-process selection for glass molding technologies. Additionally, we explored interface contact mechanics and the evolution of adhesion distribution, extending this analytical approach to coatings like diamond-like carbon (DLC) to optimize thermal forming strategies.

B. Undergraduate Phase (2018-2021)

Thesis Topic: First-principle Calculations at the Phase Interface of Mg-Gd-Y Alloys

Advisor: Yong Liu

Description: We performed first-principles calculations based on density-functional theory to investigate the phase interfaces of rare-earth element alloys, focusing on Mg_{24}Y_5 and Mg_3Gd with the Mg matrix. The atomic bonding and electronic structures were analyzed using orbital hybridization theory, and interfacial separation work was calculated to quantify bond strength. We proposed four variables—mismatch degree, interfacial spacing, crystal structure, and terminating atoms—to describe interfacial separation work as $W_{\text{int}}=F(\theta, \mu, d, \varepsilon)$, illustrating how rare-earth elements enhance metal strength and corrosion resistance.

Research Skills:

A. Instrumentation Design

- 2D/3D Modeling (Materials Studio, VASP, LAMMPS, Ovito)
- Analysis Software (e.g., MATLAB, Digital Micrograph, Jade, MultiPak)

B. Thermal forming

- Precision molding, Probe tack
- Material Preparation (e.g., CVD, Sputtering, PVD)
- Flexible Specimen Development (e.g., PMMA, Infrared glass)

Personal Website

[Google Scholar](#)

[Web of Science](#)

C.

Publications:

A. First author publications:

[A5] Hanhan Zhao, Liangchi Zhang, “**Mold-Glass Interface Adhesion Mechanisms in Precision Glass Molding**” [In preparation](#) (Invited Review)

[A4] Hanhan Zhao, Liangchi Zhang, Asit Kumar Gain, Zhen Li, “**Assessment of CrN/WC Molds: Surface Adhesion in Precision Glass Molding**” [WEAR](#) (Under Review)

[A3] Hanhan Zhao, Liangchi Zhang, “**Predicting the Mold-Glass Interface Adhesion in Thermal Molding**” [International Journal of Mechanics Science](#) (Under Review)

[A2] Hanhan Zhao, Liangchi Zhang, “**Evaluating the Demolding Adhesion in Glass Molding**” The 25th International Symposium on Advances in Abrasive Technology, 10 – 13, Dec, 2023.

[A1] Hanhan Zhao, Asit Kumar Gain, Zhen Li, Liangchi Zhang, “**Wear of Mold Surfaces: Interfacial Adhesion in Glass Molding**” [WEAR](#) 204847, 524-525, 2023.

B. Other cooperative publications:

[B2] Weicheng Wang, Jinlong Liu, [Hanhan Zhao](#), et al. “**Enhanced Mg/graphene interface adhesion using intermediate MgO layers: First-principles prediction and analysis**” [T NONFERR METAL SOC](#) 472 - 482, 32(2), 2022.

[B1] Yuhao Guo, Weicheng Wang, Hanqing Huang, [HanHan Zhao](#), et al. “**Effect of doping Zn atom on the structural stability, mechanical and thermodynamic properties of AlLi phase in Mg–Li alloys from firstprinciples calculations**” [Philosophical Magazine](#) 1849 -1867, 100(14), 2020.

Patents:

[1] Liangchi Zhang, [Hanhan Zhao](#), Zhen Li. “**characterization of adhesion in thermal molding processes**”, Chian Patent, CN116872474A, 2023-06-13.

[2] Liangchi Zhang, [Hanhan Zhao](#), Zhen Li. “**automatic force measurement system**”, China Patent, CN219838090U, 2023-10-17.

Awards and Honors:

- Outstanding Graduate Student, Southern University of Science and Technology (2022-2023)
- Second "Star of the School of Engineering" Award, Southern University of Science and Technology
- Outstanding Graduate Teaching Assistant, Southern University of Science and Technology (2022)
- Outstanding Youth League Member, Southern University of Science and Technology (2021-2022)
- Second-class Graduate Academic Scholarship, Nanchang University (2019-2020)

- Second-class Undergraduate Scholarship, Nanchang University (2016-2017)
- First-class Undergraduate Scholarship, Nanchang University (2015-2016)