

Yuan-Chao HU

CONTACT INFORMATION

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Affiliation: Songshan Lake Materials Laboratory
Address: Pingdong Road, Dongguan, China

EDUCATION

Ph.D in Computational Materials Science and Applied Physics

Institute of Physics, Chinese Academy of Sciences, Beijing, China

Advisor: Prof. Wei-Hua WANG

Sept. 2013 – May 2018

City University of Hong Kong, Hong Kong, China

Advisor: Prof. Yong YANG

Sept. 2015—May 2018

B. E. in Materials Science and Engineering

Jilin University, Changchun, Jilin, China

Advisor: Prof. Yong-Sheng HU

Sept. 2009 – June 2013

WORK EXPERIENCES

Songshan Lake Materials Laboratory Group Leader

Dongguan, China
Aug. 2023 - Present

Yale University, Dept. Mechanical Engineering and Materials Science,

New Haven, CT, US

Associate Research Scientist

Oct. 2021 – May 2022

Postdoctoral Research Associate

June 2018 – Sept. 2019

Advisor: Prof. Corey S. O'HERN

The University of Tokyo, Institute of Industrial Science

Meguro, Tokyo, Japan

JSPS Postdoctoral Fellow

Sept. 2019 – Sept. 2021

Advisor: Prof. Hajime TANAKA

RESEARCH ACHIEVEMENTS

- Publish **>35** academic peer-reviewed papers in high-impact international journals
- Google Scholar Profile: **1741** citations; h-index: **22**
- **16** domestic and international rewards from research excellence
- **12** invited oral presentations in international conferences
- **3** best talk prizes from the American Physical Society, Australia, and China
- Peer reviewers for more than **16** journals and serviced **> 100** voluntary peer reviews
- Research outcomes highlighted in several media, including Editorial, News and Views, Nature Physics Podcast, Science Daily, Phys.org, Materials Today etc.

RESEARCH INTERESTS

- Materials Science
- Soft Matter Physics
- Computer Simulations
- Data Science & Artificial Intelligence
- Software Development

PUBLICATIONS

First/Corresponding-author publications

1. S. Ishino*, **Y. C. Hu***, H. Tanaka,
Microscopic structural origin of slow dynamics in glass-forming liquids.
Nature Materials 24, 268-277 (2025)
2. **Y. C. Hu***, L. Jiang*,
Activating supercooled electrolytes.
Materials Futures 3, 047601 (2024)

3. L. Jiang*, S. Han*, **Y. C. Hu***, Y. Yang, Y. Lu, Y. Lu, J. Zhao, L. Chen, Y. Hu,
Rational Design of Anti-Freezing Electrolytes for Extremely Low-Temperature Aqueous Batteries.
Nature Energy 9, 839 (2024)
4. **Y. C. Hu***, H. Bai, W. H. Wang,
Accessing Versatile Tensile Ductility of Amorphous Materials by Fractal Nanoarchitecture Design.
Acta Materialia 276, 120100 (2024)
5. J. Liu, L. Song, Z. He, S. Wang, W. Zhang, H. Yang, F. Li, S. Li, J. Wang, H. Xiao, D. Xu, Y. Liu, Y. Wu, J. Wang, X. Shui, **Y. C. Hu***, J. Shang, R. Li,
Size Dependent Phase Transformation of Liquid Gallium.
Small 20(9), 2305798 (2023)
6. **Y. C. Hu**, Hajime Tanaka,
Universality of stringlet excitations as the origin of the boson peak of glasses with isotropic interactions.
Physical Review Research 5, 023055 (2023)
7. **Y. C. Hu**, Jiachuan Tian,
Data-driven prediction of the glass-forming ability of modeled alloys by supervised machine learning.
Journal of materials Informatics 3, 1 (2023) (Invited Article)
8. **Y. C. Hu**, Hajime Tanaka,
Origin of the boson peak in amorphous solids.
Nature Physics 18, 669-677 (2022) (Impact Factor: 19.68) –Editorial highlight: A classy material
–News and Views: Locality resolved
–Nature Physics Podcast “On Your Wavelength”: Behind the glass
–IIS Press release, The University of Tokyo
9. **Y. C. Hu**, Hajime Tanaka,
Revealing the role of liquid preordering in crystallisation of supercooled liquids.
Nature Communications 13, 4519 (2022) (Impact Factor: 17.69)
–IIS Press release, The University of Tokyo
10. **Y. C. Hu**, Hajime Tanaka,
Physical origin of glass formation from multi-component systems.
Science Advances 6, eabd2928 (2020) (Impact Factor: 14.14)
–IIS Press release, The University of Tokyo
11. **Y. C. Hu**, Y.W. Li, Y. Yang, P.F. Guan, H.Y. Bai, W.H. Wang,
Configuration correlation governs slow dynamics of supercooled metallic liquids.
Proceedings of the National Academy of Sciences of the United States of America 115 (25), 6375 - 6380 (2018) (Impact Factor: 12.78)
12. **Y. C. Hu**, Y. Z. Wang, R. Su, C. R. Cao, F. Li, C. W. Sun, Y. Yang, P. F. Guan, D. W. Ding, Z. L. Wang, W. H. Wang,
A Highly Efficient and Self-stabilizing Metallic Glass Catalyst for Electrochemical Hydrogen Generation.
Advanced Materials 28 (46), 10293-10297 (2016) (Impact Factor: 32.09) –Featured as Cover Story of the Journal Physics 45 (12), 2016
13. **Y. C. Hu**, F. X. Li, M. Z. Li, H. Y. Bai, W. H. Wang,
Five-fold symmetry as indicator of dynamic arrest in metallic glass-forming liquids.
Nature Communications 6: 8310 (2015) (Impact Factor: 17.69)
–ESI highly cited paper
–Highlight by Nature Communications in the Metallurgy Collection
14. **Y. C. Hu**, W. W. Jin, J. Schroers, M. D. Shattuck, C. S. O’Hern,
Glass-forming ability of binary Lennard-Jones systems.
Physical Review Materials 6, 075601 (2022) (Impact Factor: 3.78)
15. **Y. C. Hu**, K. Zhang, S. A. Kube, J. Schroers, M. D. Shattuck, C. S. O’Hern,
Glass formation in binary alloys with different atomic symmetries.
Physical Review Materials 4, 105602 (2020) (Impact Factor: 3.78)

16. Z. Ding, J. Bian, S. Shuang, X. Liu, **Y. C. Hu***, C. Sun*, Y. Yang*,
High Entropy Intermetallic–Oxide Core–Shell Nanostructure as Superb Oxygen Evolution Reaction Catalyst.
Advanced Sustainable Systems 4 (5), 1900105 (2020) –Top Cited Article Awarded by Wiley
17. **Y. C. Hu**, J. Schroers, M. D. Shattuck, C. S. O’Hern,
Tuning the glass-forming ability of metallic glasses through energetic frustration.
Physical Review Materials 3, 085602 (2019) (Impact Factor: 3.78)
18. **Y. C. Hu**, C. Sun, C.W. Sun,
Functional Applications of Metallic Glasses in Electrocatalysis.
ChemCatChem 11 (10), 2401-2414 (2019) [Invited mini-review] (Impact Factor: 5.497)
19. **Y. C. Hu***, Hajime Tanaka, W.H. Wang*,
Impact of spatial dimension on structural ordering in metallic glass.
Physical Review E 96 (2), 022613 (2017)
20. **Y. C. Hu**, P. F. Guan, Q. Wang, Y. Yang, H. Y. Bai, W. H. Wang,
Pressure effects on structure and dynamics of metallic glass-forming liquid.
The Journal of Chemical Physics 146 (2), 024507 (2017)
21. **Y. C. Hu**, P. F. Guan, M. Z. Li, C. T. Liu, Y. Yang, H. Y. Bai, W. H. Wang,
Unveiling atomic-scale features of inherent heterogeneity in metallic glass by molecular dynamics simulations.
Physical Review B 93 (21), 214202 (2016) (Impact Factor: 3.91)
–featured as “Kaleidoscope” of Physical Review B
22. **Y. C. Hu**, B. S. Shang, P. F. Guan, Y. Yang, H. Y. Bai, W. H. Wang,
Thermodynamic scaling of glassy dynamics and dynamic heterogeneities in metallic glassforming liquid.
The Journal of Chemical Physics 145 (10), 104503 (2016)
23. **Y. C. Hu**, F. X. Li, M. Z. Li, H. Y. Bai, W. H. Wang,
Structural signatures evidenced in dynamic crossover phenomena in metallic glass-forming liquids.
Journal of Applied Physics 119 (20), 205108 (2016)

Collaborative research publications

1. L. Jiang, **Y. C. Hu**, F. Ai, Z. Liang, Y.-C. Lu
Rational design of anti-freezing electrolyte concentrations via freeze concentration process.
Energy & Environmental Science 17 (8), 2815-2824 (2024)
2. J. Tian, **Y. C. Hu**, W. Lu, J. Zhu, X. Liu, J. Shen, G. Wang, J. Schroers,
Dealloying of amorphous TiCuRu alloy to prepare nanostructured electrocatalyst for hydrogen evolution reaction in alkaline.
Carbon Energy e322, 1 (2022)
3. J.T. Zhai, W.J. Gao, H.K. Dong, **Y. C. Hu**, T. Zhang, X.G. Zhu, W.W. Zhang, C. Yang, L.H. Liu,
Novel metal matrix composites reinforced with Zr-based metallic glass lattices.
Applied Materials Today 29, 101649 (2022)
4. Y.Q. Zhang, L.Y. Zhou, S.Y. Tao, T.Z. Jiao, J.F. Li, K.M. Zheng, **Y. C. Hu**, K.X. Fang, C. Song, X.Y. Zhong, L. Xu, K.F. Yao, Z.J. Zhang, Na Chen,
Widely tunable optical properties via oxygen manipulation in an amorphous alloy.
Science China Materials 64, 2305–2312 (2021)
5. D.P. Wang, A.D. Wang, **Y. C. Hu**, B.A. Sun, C.T. Liu,
Quasi-work-hardening at sites of shear band interactions in a Cu50Zr50 metallic glass.
Materials Letters 281, 128655 (2020)
6. Y. Li, J. Li, Z. Huan, **Y. C. Hu**,
Quantitative characterization of mechano-biological interrelationships of single cells.
The International Journal of Advanced Manufacturing Technology 105, 4967 (2019)

7. Y. T. Sun, C. Wang, Y. M. Lu, **Y. C. Hu**, P. Luo, M. Liu, H. J. Xian, D. Q. Zhao, D. W. Ding, B. A. Sun, M. X. Pan, P. Wen, H. Y. Bai, Y. H. Liu, W. H. Wang,
Recent progress of the glassy materials and physics.
Acta Physica Sinica 67 (12), 126101 (2018) (equally contributed paper)
8. L. Q. Shen, P. Luo, **Y. C. Hu**, H. Y. Bai, Y. H. Sun, B. A. Sun, Y. H. Liu, W. H. Wang,
Shear-band affected zone revealed by magnetic domains in a ferromagnetic metallic glass.
Nature Communications 9, 4414 (2018)
9. S. M. An, R. Su, **Y. C. Hu**, J. Liu, Y. Yang, B. Liu, P. Guan,
Common mechanism for controlling polymorph selection during crystallization in supercooled metallic liquids.
Acta Materialia 161, 367-373 (2018)
10. H. J. Xian, C. R. Cao, J. A. Shi, X. S. Zhu, **Y. C. Hu**, Y. F. Huang, S. Meng, L. Gu, Y. H. Liu, H. Y. Bai, W. H. Wang,
Flexible strain sensors with high performance based on metallic glass thin film.
Applied Physics Letters 111, 121906 (2017)
11. J. G. Wang, **Y. C. Hu**, P. F. Guan, K. K. Song, L. Wang, G. Wang, Y. Pan, B. Sarac, J. Eckert,
Hardening of shear band in metallic glass.
Scientific Reports 7, 7076 (2017)
12. M. Z. Li, H. L. Peng, **Y. C. Hu**, F. X. Li, H. P. Zhang, W. H. Wang,
Five-fold local symmetry in metallic liquids and glasses.
Chinese Physics B 26 (1), 016104 (2017)
13. Y. C. Wu, B. Wang, **Y. C. Hu**, Z. Lu, Y. Z. Li, B. S. Shang, W. H. Wang, H. Y. Bai, P. F. Guan
The critical strain - A crossover from stochastic activation to percolation of flow units during stress relaxation in metallic glass.
Scripta Materialia 134, 75-79 (2017)
14. P. F. Guan, B. Wang, Y. C. Wu, Z. Shan, B. S. Shang, **Y. C. Hu**, R. Su, Q. Liu,
Heterogeneity: the soul of metallic glasses.
Acta Physica Sinica 66 (17), 176112 (2017)
15. B. A. Sun, **Y. C. Hu**, D. P. Wang, Z. G. Zhu, P. Wen, W. H. Wang, C. T. Liu, Y. Yang,
Correlation between local elastic heterogeneities and overall elastic properties in metallic glasses.
Acta Materialia 121, 266-276 (2016)
16. C. Liang, C. Li, J. An, M. Yu, **Y. C. Hu**, W. H. Lin, F. Liu, Y. H. Ding,
Effect of Microstructural Evolution and Hardening in Subsurface on Wear Behavior of Mg-3Al-1Zn Alloy.
Journal of Materials Engineering and Performance 22(12), 3783-3791 (2013)

GRANTS
PARTICIPATION

- National Natural Science Foundation of China
- Japan JSPS Grant-in-Aid project No. P19021: Structural mechanisms of crystallization and complex-liquid behaviors of phase change materials
Spet. 2019 - Sept. 2021

PEER-REVIEW
JOURNALS

Nature, Nature Physics, Nature Communications, Communication Physics, PNAS, Physical Review Letters, Advanced Functional Materials, Physical Review Materials, Scientific Reports, Computational Materials Science, Intermetallics, Materials and Design, Journal of Physics: Condensed Matter, Materials Research Express, Journal of Alloys and Compounds, Journal of Applied Physics, Electrochemical Energy Reviews, Composites Communications, Journal of Nanoscience and Nanotechnology etc.

CONFERENCE ORAL
PRESENTATIONS

1. Designing nanoarchitecture glasses with tunable mechanical properties for extreme environments. MRS 2023
2023, Nov.26-Dec.01, Boston, MA, USA
2. Computational studies of glass formation in binary alloys. TMS 2022
2022, Feb. 27-Mar. 3, Anaheim, CA, USA (**Session Chair**)

3. Bulk metallic glass design: What properties determine the glass-forming ability of multi-component alloys? American Physical Society (APS) March Meeting 2019, March 4-8, Boston, MA, USA (**Invited oral talk**)
4. APS “Topical Group on Statistical and Nonlinear Physics” (GSNP) 2019 Postdoctoral Speaker Award 2019.03
5. Probing the Glass-Forming Ability of Binary Alloys by Tuning the Energetic Frustration. Yale Institute for Nanoscience and Quantum Engineering (YINQE Seminar 2018) 2018, September 07, Yale University, New Haven, USA
6. A highly efficient and self-stabilizing metallic glass catalyst for electrochemical hydrogen generation. The 18th International Union of Materials Research Societies, International Conference in Asia (IUMRS-ICA 2017) 2017, November 06-09, Taipei, Taiwan, China
7. Density Scaling of Glassy Dynamics and Dynamic Heterogeneities in Metallic Glass-forming Liquids. 8th International Discussion Meeting on Relaxations in Complex Systems 2017, July 23-28, Wisla, Poland
8. A Highly Efficient and Self-Stabilizing Metallic Glass Catalyst for Electrochemical Hydrogen Generation. City University of Hong Kong, 11th PhD Student Workshop 2017 2017 May 04-05, Suzhou, China (**Certification for Outstanding Presentation**)
9. Functional Properties of Metallic Glass as Catalyst for Electrochemical Hydrogen Generation. Visiting Prof. Peter Harrowell 2016, December 01-04, School of Chemistry, University of Sydney, Sydney, Australia (Seminar)
10. Density Scaling of Glassy Dynamics and Dynamic Heterogeneities in Glass-forming Liquids. Statistical Mechanics of Soft Matter 2016 2016, November 28-29, University of Melbourne, Melbourne, Australia (**Prize for Best Talk by a Student or Recent Graduate**)
11. Thermodynamic scaling of glassy dynamics and dynamic heterogeneities in metallic glass-forming liquid. The 23rd international symposium on metastable, amorphous and nanostructured materials (ISMANAM) 2016, July 03-08, Nara, Japan
12. Unveiling atomic-scale features of inherent heterogeneity in metallic glass by molecular dynamics simulations. The 11th International Conference on Bulk Metallic Glasses (BMG XI) 2016, June 04-09, St. Louis, Missouri, USA