Yishen Zhang

Rice University, 6100 Main Street, MS-126, Houston, TX 77005, USA

yishen.zhang@rice.edu · www.eazzzon.github.io

EDUCATION

2019–2024	Ph.D. in Geology — KU Leuven, Leuven, Belgium
2018–2019	Visiting Scholar — University of Liège, Liège, Belgium
2016–2019	M.Sc. in Geology — China University of Geosciences (Beijing), China
2012–2016	B.Sc. in Geology — China University of Geosciences (Beijing), China

ACADEMIC APPOINTMENTS

2024-	CLEVER Planet Postdoctoral Associate, Department of Earth, Environmental and Planetary Sciences, Rice University
2019–2024	Teaching Assistant, Department of Earth and Environmental Sciences, KU Leuven, Belgium

GENERAL RESEARCH INTERESTS

My research is rooted in igneous petrology, and I am broadly interested in the physical and chemical processes that govern interior evolution, volcanic activity, and magmatic differentiation on Earth and other rocky planets. I focus particularly on 1) mantle melting, differentiation and volatile evolution in the context of large-scale mantle heterogeneity, 2) the growth habits of crystals and their response to magmatic dynamics, and 3) the mechanisms of metal enrichment in magmatic ore-forming systems.

To carry out my research, I integrate geochemical datasets, experimental petrology, field observations, thermodynamics, computational modelling, and geophysical constraints to quantitatively interrogate natural samples and experimental products in a multidisciplinary framework

GRANTS & FELLOWSHIPS

2026–2028	IPD–STEMA Postdoctoral Fellowship, Exoplanet Geology, University of Liège, Belgium (€82k)
2023–2024	ECR Postdoctoral Fellowship, Diffusion in olivine, University of Münster, Germany (declined, €30k)
2020	Europlanet Transnational Access Grant, ion probe at CRPG Nancy, France

TEACHING

2025	Cosmochemistry — Guest lecturer, Rice University
2024	Igneous Petrology — Guest lecturer, Rice University
2022	Soil Science & Geology (practical), KU Leuven
2021	Soil Science & Geology (practical), KU Leuven

PUBLICATIONS

Peer-reviewed journal publications (15 total; 5 first-author, 1 equal-contribution as second author)

2026

15. Bai Y, Su BX, Xiao Y, He YS, **Zhang Y**, Charlier B (2026). Magnesium isotopes constraint on the origin of stratiform chromitite. *Accepted in Mineralium Deposita*.

2025

14. **Zhang Y**, Dasgupta R, Ji D, Lee C.T., Peng Y, Charlier B, Jin Z, Chen J, Namur O. (2025). Mantle melting conditions of mare lavas on South Pole–Aitken basin of lunar farside. *Geophysical Research Letters 52, e2024GL112418*.
13. Saracino F, Charlier B, **Zhang Y**, Lécaille M, Lin Y, Namur O. (2025). The role of sulfur on the liquidus temperature and olivine–orthopyroxene equilibria in highly reduced magmas. *Chemical Geology, 683, 122777*.
12. Jin Z, Hou T, Zhu M.H., **Zhang Y**, Namur O. (2025). Late-stage microstructures in Chang'E-5 basalt and implications for the evolution of lunar ferrobasalt. *American Mineralogist, 110(4), pp.560-569.*
11. Li W, Shorttle O, Maclennan J, Matthews S, **Zhang Y**, Namur O, Soderman C, Geist D. (2025). Taking the temperature of ocean islands: a petrological approach. *Journal of Petrology, 66(5), egaf033*.

2024

10. **Zhang Y**, Charlier B, Krein S.B., Grove T.L., Namur O, Holtz F. (2024). The very late-stage crystallization of the lunar magma ocean and the composition of immiscible urKREEP. *Earth and Planetary Science Letters 646, 118989*.
9. Jin Z, **Zhang Y**, Bose M, Glynn S, Couffignal F. (2024). Petrogenesis of Erg Chech 002 Achondrite and Implications for an Altered Magma Ocean. *The Astrophysical Journal 965(1), 24*.
8. Xu Y, Lin Y, Wu P, Namur O, **Zhang Y**, Charlier B. (2024). A diamond-bearing core–mantle boundary on Mercury. *Nature Communications 15(1), 5061*.
7. Dekoninck A, de Putter T, Ruffet G, Mees F, **Zhang Y**, Namur O, Kapoma J. (2024). Depositional setting and hydrothermal alteration of Paleoproterozoic manganiferous metasedimentary rocks in the Ampanihy district (Southern Madagascar). *Journal of Geochemical Exploration, 107579*.

2023

6. **Zhang Y**, Namur O, Li W, Shorttle O, Gazel E, Jennings E.S., Thy P, Grove T.L., Charlier B. (2023). An extended calibration of the olivine–spinel aluminum exchange thermometer: Application to the melting conditions and mantle lithologies of large igneous provinces. *Journal of Petrology 64(11), egad077*.
5. **Zhang Y**, Namur O, Charlier B. (2023). Experimental study of high-Ti and low-Ti basalts: liquid lines of descent and silicate liquid immiscibility in large igneous provinces. *Contributions to Mineralogy and Petrology 178(1): 1–24*.
4. Pirotte H, Cartier C, Pommier A, Namur O, **Zhang Y**, Berndt J, Klemme S, Charlier B. (2023). Internal differentiation and volatile budget of Mercury inferred from trace element partitioning experiments at highly reduced conditions. *Icarus 115699*.
3. Vlieghe M., Rochez G., Pire-Stevenne S., Storme J.Y., Dekoninck A., Vanbrabant Y., Namur O., **Zhang Y**, Van Ham-Meert A., Donnadieu J.P., Berbigé M. (2023). Ni-rich mineral nepouite explains the exceptional green color of speleothems. *Scientific Reports 13(1), 15017*.

2022

2. Dekoninck A., Rufet G., Baptiste J., Wyns R., Philippo S., **Zhang Y**, Namur O. (2022). Petrogenesis and $^{40}Ar/^{39}Ar$ dating of epithermal romanechite from the subaerial fault-related Romanèche Mn deposit (France). *Chemical Geology 121280*.

2018

1. **Zhang Y**, Hou T, Veksler I.V., Lesher C.E., Namur O. (2018). Phase equilibria and geochemical constraints on the petrogenesis of high-Ti picrite from the Paleogene East Greenland flood basalt province. *Lithos 300–301, 20–32*.

Manuscripts under review & in revision

6. **Zhang Y**, Dasgupta R. (under review in *Geochimica et Cosmochimica Acta*). The effects of sulfur on near-liquidus phase relations of highly reduced mafic silicate melts with implications on magmatism in Mercury.
5. L. Gu, **Zhang Y**, Haupt C., Klemme S., Li W., Jin Z. (under review in *EPSL*). New lunar clinopyroxene-based thermobarometers and implications for magma storage in the Moon.
4. Lee CT, Zhang J, Keller D, **Zhang Y**, Ji D, Mou J, (under review in *Lithos*).The enigma of silicic magmatism and the missing cumulates: extreme magmatic differentiation without low melt fractions.
3. Karki B.B., **Zhang Y**, Dasgupta R. (submitted to *Geochimica et Cosmochimica Acta*). Incorporation of sulfur in silicate melts under pressure from first-principles simulations.
2. Saracino F., Charlier B., **Zhang Y**, Namur O. (under review in *AGC*). Crystallization of Mercury's magma ocean and the formation of its primordial mantle structure.
1. Kat Shepherd, Namur O., Neave D., **Zhang Y**, van Gerve T., van Acker T., van Helden T., Vanhaecke F., Klemme S., Berndt-Gerdes J., Charlier B. (under review in *Volcanica*). Insights into the magma plumbing system architecture beneath an off-ridge ocean island (Terceira, Azores) from crystal zoning.

Manuscripts to be submitted

5. Lee CT, **Zhang Y**, Mou J, Keller D, Namur O. (to be submitted to *PNAS*). Layered mafic intrusions, magmatic turbidites, and the making of platinum ores.
4. **Zhang Y**, Gupta A., Dasgupta R. (to be submitted to *GCA*). Partial melting of hybridized lunar mantle at 3 GPa.
3. **Zhang Y**, Dasgupta R. (to be submitted to *GCA*). Reaction between Ti-rich cumulate-derived melts and lunar mantle and generation of lunar basalts.
2. **Zhang Y**, Namur O., Hakim K., Dasgupta R., Shorttle O. (to be submitted to *MNRAS*). Forming Mercury-analog exoplanets in the solar neighborhood.
1. **Zhang Y**, Namur O., Charlier B., Shorttle O., Holness M.B. (to be submitted to *Contributions to Mineralogy and Petrology*). An experimental and thermodynamic model for olivine growth rate and morphology.

CONFERENCE ABSTRACTS

14. **Zhang Y**, Dasgupta R. (2025). Effects of sulfur on phase stability and melt generation in highly reduced planetary interiors. *AGU 2025* — poster.
13. **Zhang Y**, Dasgupta R., Ji D., Lee C.T., Peng Y., Charlier B., Jin Z., Chen J., Namur O. (2025). Mantle melting conditions of South Pole–Aitken basin of lunar farside. *56th Lunar and Planetary Science Conference* — oral.
12. **Zhang Y**, Namur O., Hakim K., Dasgupta R., Shorttle O. (2024). Forming Mercury-analog exoplanets in the solar neighborhood. *Goldschmidt 2024, Chicago* — poster; *Geologica Belgica 2024, Liège* — oral.
11. **Zhang Y**, Charlier B., Grove T.L., Brown S.M., Namur O., Holtz F. (2024). The very late-stage crystallization of the lunar magma ocean and the composition of immiscible urKREEP. *Rocky Worlds III, Zürich* — poster.
10. **Zhang Y**, Namur O., Charlier B. (2023). Magmatic differentiation and silicate liquid immiscibility in large igneous province. *EMPG-XVIII 2023* — oral.
9. **Zhang Y**, Namur O., Charlier B., Holness M.B. (2023). A general model for olivine growth rate and morphology. *Goldschmidt 2023* — poster.

8. Namur O., Tosi N., Shorttle O., Cartier C., Lin Y., **Zhang Y**, Saracino F., Liado L., Pirotte H., Charlier B. (2023). Mercury's mantle as constrained by its crust. *Goldschmidt 2023* — keynote talk.
7. Saracino F., Charlier B., **Zhang Y**, Namur O. (2023). The role of sulfur on liquidus temperature and olivine–orthopyroxene equilibria in highly reduced magmas. *Goldschmidt 2023* — poster.
6. Pirotte H., Cartier C., Pommier A., Namur O., **Zhang Y**, Berndt J., Klemme S., Charlier B. (2023). Investigating Mercury's internal structure and volatile budget using trace element partitioning experiments. *Goldschmidt 2023* — poster.
5. Shepherd K., Namur O., Bachmann O., **Zhang Y**, Hendrickx T., Charlier B. (2022). Timescales and petrological processes in an area of plume–ridge interaction: Insights from the islands of Terceira and Flores, Azores. *AGU 2022* — oral.
4. **Zhang Y**, Namur O., Charlier B., Li W., Shorttle O., Gazel E., Jennings E.S., Thy P., Grove T.L. (2022). A re-evaluation of Al-in-Olivine geothermometer. *Goldschmidt 2022* — oral.
3. **Zhang Y**, Namur O., Charlier B. (2020). Experimental liquid lines of descent and silicate liquid immiscibility for low-Ti and high-Ti basalts of the Emeishan Large Igneous Province, SW China. *AGU 2021* — poster.
2. **Zhang Y**, Namur O., Charlier B. (2020). Experimental liquid lines of descent for low-Ti and high-Ti basalts of the Emeishan Large Igneous Province, SW China. *EMPG-XVII 2020* — poster.
1. **Zhang Y**, Hou T., Veksler I.V., Lesher C.E., Namur O. (2018). Phase equilibria and geochemical constraints on the petrogenesis of high-Ti picrite from the Paleogene East Greenland flood basalt province. *Goldschmidt 2018* — oral.

INVITED TALKS

2026	University of Washington, Petrolunch talk
2025	Brown University, Geochemistry, Mineralogy, and Petrology "Lunch Bunch" series
2025	University College London
2025	The University of Hong Kong
2024	RiMG Workshop — *Exoplanets: Compositions, Mineralogy, Evolution*, keynote talk (with O. Shorttle)
2024	Earth and Environmental Sciences, University of Manchester (with O. Namur and T. van Gerve)
2023	Guangzhou Institute of Geochemistry, Chinese Academy of Sciences
2023	Department of Physics and Astronomy, KU Leuven (with O. Namur, B. Charlier, C. Cartier, et al.)
2023	Goldschmidt Conference — keynote talk (with O. Namur, N. Tosi, O. Shorttle, C. Cartier, Y. Lin, et al.)

PRACTICAL AND ANALYTICAL PROFICIENCY

- Experimental petrology: Extensive experience with high-temperature and high-pressure experiments, including >300 runs in 1 atm gas-mixing furnaces (high- to low-temperature and kinetic cooling experiments) and piston-cylinder experiments at 1–2 GPa (half-inch assemblies, capsule and assemblage preparation)
- Electron microprobe analysis (EPMA): >1000 hours of operation, including instrument calibration, analytical method development, high-precision measurements, and quantitative compositional mapping
- Scanning electron microscopy (SEM): Backscattered- and secondary-electron imaging for textural and microstructural characterization
- X-ray tomography (nanotom system): Three-dimensional scanning of geomaterials and subsequent data recon-

struction and processing
- NanoSIMS: Analytical experience including mapping-based trace element analysis and data reduction
- LA-ICP-MS: Trace-element data reduction and interpretation
- Raman spectroscopy: Spectral acquisition, baseline correction, calibration, and compositional interpretation

COMPUTER SKILLS

- Python: package development, numerical modelling, data analysis, and multivariate statistics (including PCA)
- MATLAB: numerical modelling and data analysis
- Shell scripting, Julia, and web development (Django framework, HTML, CSS); regular Vim user
- Thermodynamic modelling software: `alphaMELTS` family, MAGEMin, PerpleX
- Scientific writing and typesetting: Word, LaTeX, Overleaf
- Figure preparation and media editing: Adobe Illustrator, Photoshop, Premiere

FIELD WORK EXPERIENCE

2023	Eifel volcano, Germany — 2 days
2022	Fogo volcano, Cape Verde — 1 week
2018	Changbai Mountain, Tianchi volcano, North China — 2 weeks
2018	Tengchong volcano, Yunnan, China — 2 weeks
2018	Emeishan Province, China — 2 weeks
2018	Yaojiazhuang complex, Zhangjiakou, North China — 1 week
2014	Akesu, Xinjiang, China — gold deposits, 3 weeks
2013	Zhoukoudian, China — field mapping course, 4 weeks
2012	Beidaihe, China — excursion, 3 weeks

RESEARCH VISITS

2025	University of Texas at Austin — 2 days, microprobe analysis
2025	University of Cambridge — 1 day, research discussion
2024	University of Cambridge — 2 days, research discussion
2024	German Aerospace Center (DLR) — 3 days, ESA BepiColombo Mercury mission workshop
2024	ETH Zürich — 1 week, conference and laboratory visit
2024	University of Lausanne — 1 week, ion probe workshop
2023	Royal Observatory of Belgium — 2 days, research discussion
2023	Open University — 2 weeks, NanoSIMS analysis session
2019–2020	University of Münster — 3 weeks, microprobe analysis
2019–2020	University of Hannover — 1 week, microprobe analysis

CURRENT & RECENT COLLABORATORS

- *Rajdeep Dasgupta*, Rice University
- *Cin-Ty Lee*, Rice University

– *Bijaya Karki*, Louisiana State University
– *Anne Pommier*, Carnegie EPL
– *Timothy Grove*, MIT
– *Oliver Shorttle*, University of Cambridge
– *Marian Holness*, University of Cambridge
– *Bernard Charlier*, University of Liège
– *Jacqueline Vander Auwera*, University of Liège
– *Olivier Namur*, KU Leuven
– *Kaustubh Hakim*, KU Leuven
– *Stephan Klemme*, University of Münster
– *Anne-Sophie Bouvier*, University of Lausanne
– *Yanhao Lin*, HPSTAR
– *Weiran Li*, The University of Hong Kong
– *Ziliang Jin*, Macau University of Science and Technology

SUPERVISION & MENTORSHIP

– *Yale Zhang* — Lunar mantle melting (High school intern, 2025)
– *Ayush Gupta* — Lunar mantle melting (Master's student, 2024)
– *Soetkin Willemyns* — Mantle melting and mantle mineralogy in exoplanets (Master's student, 2023)
– *Kinjal Ganguly* — Interior structure and mineralogy of exoplanets (Master's student, 2023)
– *Lander Cuypers* — Experimental study of olivine morphology (Bachelor student, 2021)
– *Sarah Stammen* — Experimental study of olivine and spinel equilibrium (Master's student, 2020)

PRIZES & AWARDS

2023	Belgian FWO travel grant for Rocky Worlds III, Zürich (€500)
2023	Belgian FWO travel grant for Goldschmidt, Lyon (€500)
2018	Institute travel grant for attending Goldschmidt 2018 (¥12,000 ≈ USD 1,700)
2018	National Award for Excellent Graduate Students (¥30,000 ≈ USD 4,300, top 1%)
2014.12	Third prize in professional course (top 15%)
2014.06	Third prize in professional course (top 15%)
2014.05	Fourth prize in Institute Scientific Research Activity

SERVICE

2025	Member, ECR-Net Working Group, IAVCEI
2023	Primary convenor, Goldschmidt 2023 session *"Dynamics and timescales in magmatic reservoirs, conduits and dikes"* (proposal preparation and session convening)
2024–present	Journal reviewer: *Nature Astronomy (×1), Nature Communications(×1), Science Advances(×1), Geology(×1), American Mineralogist(×2), Geochimica et Cosmochimica Acta(×3), Communications Earth & Environment(×2), Icarus(×1), Contributions to Mineralogy and Petrology(×1), Geophysical Research Letters(×1), Bulletin of Volcanology(×1)*
2024–present	Thesis reviewer, KU Leuven *Soetkin Willemyns* — Master thesis: Mantle melting behaviour in low-Mg exoplanets *Collin Isaline* — Master thesis: Crystallization temperature of parent magmas and mantle sources for volcanoes in the Southern Volcanic Zone of the Andean Arc (Chile)

OUTREACH

2025	K–12 Earth and planetary open house, Rice University & R-STEM
2024	Identification and building of molecular models of Venus' atmosphere, Middle School Planetary Exploration, Rice University & Houston Independent School District

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