Yishen (Eason) ZHANG

Leuven, Belgium

yishen.zhang@kuleuven.be eazzzon yishen_z website

PERSONAL INFORMATION

Date of Birth: 17th Decemeber 1993
Nationality: China
Institution: Earth and Environmental Sciences, KU Leuven
Address: Celestijnlaan 200E, 3001 Leuven

RESEARCH INTERESTS

My research interests focus on two aspects in igneous petrology:

1. Phase equilibria. Particularly to understand interior structure and geochemical composition of rocky planet.
2. Mantle melting and mantle heterogenous in igneous provinces and ocean islands. I am interested in characterization of heterogenous mantle sources from major and trace elements, the degree of mantle melting therefore accounts for the crustal thickness, trace element abundances in primary minerals
3. Crystallization kinetics, magma dynamics in magmatic systems. I am interested in understanding the crystal size, texture, morphology and their responses to the change of magmatic conditions; Elemental diffusion and its application in addressing timescales in volcanic systems. Elemental partitioning in the kinetic conditions.

To carry out the research, I use experiments combing with numerical modelling, thermodynamics, statistics, textural and geochemical analyzes

My PhD projects focus on using high temperature high pressure facilities to understand

1. the differentiation, immiscibility and thermal structure of large igneous provinces
2. crystallization kinetics in basaltic system

Beside experimental study, I am very passionate about coding, software development, data analysis.

EDUCATION & ACADEMIC APPOINTMENTS

Universität Münster **01. 2024 – present**
Postdoc fellow *Münster, Germany*

KU Leuven **06. 2019 – 01. 2024 (expected)**
PhD in Geology *Leuven, Belgium*

University of Liège **10. 2018 – 04. 2019**
Visiting scholar *Liège, Belgium*

China University of Geosciences (Beijing) **09. 2016 – 05. 2019**
Master in Geology *Beijing, China*

China University of Geosciences (Beijing) **09. 2012 – 07. 2016**
Bachelor in Geology *Beijing, China*

LABORATORY EXPERIENCE

- **Experimental petrology:**
  1 atm gas mixing furnace

  Over 300 runs with 1 atm high to low-temperature experiments, kinetic cooling experiments
  Piston cylinder apparatus:

  Experienced in 1-2GPa half inch experiments, capsule, assemblage preparation
- **X-ray tomography (nanotom system):**
  Experienced in geo-material 3D scanning, data processing

- **Electron microprobe:**
  Over 1000 hours experience with EPMA, experienced in instrument calibration, analytical method development, high precision measurement, mapping
- **Scanning Electron Microanalysis:**
  Imaging of BSE and SE
- **LA-ICP-MS**

PC SKILLS

- Fluent in programming with python, including package development, numerical modelling, data analysis, PCA analysis.
- Proficient with Matlab, numerical modelling.
- Standard knowledge of shell scripting, julia, web building language including Django framework, HTML and CSS. Vim enthusiast.
- Experienced with thermodynamic modelling software: alphaMELTs family; MAGEMin
- Experienced with scientific writing in Words, LaTeX, Overleaf
- Experienced in design and editing with Adobe Illustrator, Photoshop, Premiere

FIELD WORK EXPERIENCE

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

PRIZES & AWARDS

2023 Belgian FWO travel grant for Goldschmidt, 2023 (€500)
2018 Institute travel grant for attending Goldschmidt, 2018 (¥12000 = USD 1700)
2018 National Awards for Excellent Graduate Students (¥30,000 = USD 4300, 1%)
2014.12 Third prize in professional course. (15%)
2014.6 Third prize in professional course. (15%)
2014.5 Fourth prize in Institute Scientific Research Activity.

SERVICES

2023 Primary convenor, Goldschmidt 2023, *Dynamics and timescales in magmatic reserviors, conduits and dikes*
Journal reviewer: American Mineralogist

TEACHING

2022 Soil Science & Geology (practical, igneous rocks)
2021 Soil Science & Geology (practical, igneous and sedimentary rocks)

SUPERVISION

1. Kinjal Ganguly, Solubility of S in the Mercurian mantle. *Master. 2023*
2. Lander Cuypers, Experimental study of olivine morphology. *Bachelor, 2021*
3. Sarah Stammen, Experimental study of olivine and spinel equilibrium. *Master. 2020*

PUBLICATIONS

Journal publications

1. 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*
2. **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. *Contrib. Mineral. Petrol. 178(1):1-24.*
3. 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 sub-aerial fault-related Romanèche Mn deposit (France). *Chemical Geology. 121280*
4. **Zhang Y**, Hou T, Veksler IV, Lesher CE, 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.*

Manuscript under review

1. **Zhang Y**, Namur O, Li W, Shorttle O, Gazel E, Jennings ES, Thy P, Grove TL, Charlier B. (under review in JPET). An extended calibration of the olivine-spinel aluminum exchange thermometer: Application to the melting conditions and mantle lithologies of large igneous provinces.
2. Jin Z, **Zhang Y**, Bose M, Glynn S, Couffignal F. (under review in Sci. Adv.). A Novel Mechanism for Intermediate-Felsic Magmatism in the Early Solar System.

Manuscript in progress

1. **Zhang Y**, Charlier B, Grove TL, Brown SM, Namur O, Holtz F. (in prep). The very late-stage crystallization of the lunar magma ocean and the composition of immiscible urKREEP.
2. Jin Z, Hou T, **Zhang Y**, Namur O. (in prep). Stable and metastable silicate liquid immiscibility in the Chang'E-5 basaltic magma.
3. **Zhang Y**, Namur O, Charlier B, Bouvier AS (in prep). Kinetic partitioning of trace elements in olivine.
4. **Zhang Y**, Namur O, Charlier B (in prep). A new thermodynamic model for chromium solubility in basaitic melts.
5. **Zhang Y**, Namur O, Charlier B, Holness MB (in prep). A general model for olivine growth rate and morphology.
6. Li W, **Zhang Y** (in prep). PyAp: a python package for calculating magmatic volatile, trace element concentrations, and oxygen fugacity using mineral apatite. Code available at https://github.com/alexweiranli/pyAp

Conference Abstract

1. **Zhang Y**, Namur O, Charlier B, 2023. Magmatic differentiation and silicate liquid immiscibility in large igneous province. EMPG-XVIII 2023. *oral*
2. **Zhang Y**, Namur O, Charlier B, Holness MB, 2023. A general model for olivine growth rate and morphology. Goldschmidt 2023. *poster*
3. 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*
4. 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*
5. 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 elements partitioning experiments. Goldschmidt 2023. *poster*
6. 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*
7. **Zhang Y**, Namur O, Charlier B, Li W, Shorttle O, Gazel E, Jennings ES, Thy P, Grove TL, 2022, A re-evaluation of Al-in-Olivine geothermometer. Goldschmidt 2022 *oral*
8. **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*

9. **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*
10. **Zhang Y**, Hou T, Veksler IV, Lesher CE, Namur O, 2018. Phase equilibria and geochemical constraints on the petrogenesis of high-Ti picrite from the Paleogene East Greenland flood basalt province. Goldschmidt Abstract 2018. *oral*

INVITED TALKS

1. Namur O, Charlier B, Cartier C, **Zhang Y**, Nittler M, Collinet M, Grove T, McCammon C. Sulfur chemistry in planetary interiors - Effects of reducing conditions. *2023. Department of Physics and Astronomy, KU Leuven.*
2. Namur O, Tosi N, Shorttle O, Cartier C, Lin Y, **Zhang Y**, Saracino F, Liado L, Pirotte H, Charlier B. Mercury's mantle as constrained by its crust. *Goldschmidt 2023 keynote talk.*

CODE DEVELOPMENT

1. Li W, **Zhang Y** – pyAp, a package for calculating magmatic volatile, trace element concentrations, and oxygen fugacity using mineral apatite. *python*
2. **Zhang Y** – Mass balance calculation for petrology using non-negative and matrix decomposition algorithms, with MCMC propagating errors on phases and bulk composition. *python*
3. **Zhang Y**, Namur O, Gerve TDV – Multi-component olivine diffusion, integrated with uncertainties of temperature, pressure, oxygen fugacity. *python*
4. **Zhang Y** – Stepwise backward F-test model for multiple linear regression. *python*
5. **Zhang Y** – Script converts alphaMELTS output to formatted spreadsheet. *python*

References

1. Olivier Namur (KU Leuven, Belgium): olivier.namur@kuleuven.be
2. Bernard Charlier (University of Liège, Belgium): b.charlier@uliege.be
3. Weiran Li (The University of Hong Kong, China): weiranli@hku.hk

Last edit: 19. July. 2023
Leuven, Belgium