

CV

Ke Zhu (朱柯)

Employment:

A. V. Humboldt Postdoc Fellow, Freie Universität Berlin, Germany (Host: Harry Becker) 01/04/2021 – now

Education:

Ph.D., Institut de Physique du Globe de Paris, Université de Paris, France.

(Supervisor: Frederic Moynier)

01/12/2017– 31/03/2021

Master 2 Program, Institut de Physique du Globe de Paris, France.

01/09/2017 – 30/11/2017

M.S in Geology, University of Science and Technology of China, China.

01/09/2014 – 19/06/2017

B.S in Geochemistry, Chengdu University of Technology, China.

07/09/2010 – 20/06/2014

Joint PhD student, University of Copenhagen, Denmark

01/03/2018 – 31/03/2021

(Co-supervisors: Martin Bizzarro, Martin Schiller)

Awards:

1. Alexander von Humboldt Fellowship for Postdoc Researcher
2. Student Sponsorship from European Association of Geochemistry
3. Aide à la MOBILITE INTERNATIONALE des doctorants de l'IPGP
4. O. Richard Norton Award (travel grant in MetSoc 2019)
5. Wiley Award (outstanding presentation award in MetSoc 2019)
6. Oral Presentation Award in Geoscience Symposium in USTC, 2016

Visiting Research:

Carnegie Institute for Science, USA (Host: Conel M. O'D. Alexander)

Freie Universität Berlin, Germany (Host: Harry Becker)

Nanjing University, China (Hosts: He-Jiu Hui and Wei-Qiang Li)

China University of Geosciences, Beijing (Hosts: Jian-Ming Zhu and Li-Juan Xu)

Purple Mountain Observation, Chinese Academy of Sciences (Hosts: Wei-Biao Hsu and Yun Jiang)

Research Interests:

Understanding the timing of formation and processes of differentiation and volatile depletion of terrestrial planets. To reach these goals I develop and use high precision isotopic measurements.

I used Cr isotope measurements which valuably include a stable isotope ratio ($^{53}\text{Cr}/^{52}\text{Cr}$, to study processes), a radiogenic daughter of ^{53}Mn (^{53}Cr , to study timing) and nucleosynthetic anomalies ^{54}Cr (to study stellar origin). I combine these three approaches by using both thermal ionization mass-spectrometry (TIMS) and multi-collector, inductively coupled plasma mass-spectrometry (MC-ICPMS), unspiked (radiogenic and nucleosynthetic anomalies) and double spiked (stable isotopes).

1. Cr isotopic anomalies in meteorites.

I have measured by both TIMS and MC-ICP-MS the mass-independent Cr isotope variations produced by both radiogenic ingrowths to study the timing (e.g. ^{53}Mn - ^{53}Cr chronometry) and nucleosynthetic anomalies to study the origin (^{54}Cr) of primitive meteorites, their main components (chondrules) and planetary bodies (including Earth, Moon, Mars, Angrite, Ureilite, and Aubrite parent bodies).

2. Cr stable isotopic compositions (mass-dependent fractionation) in meteorites.

I use an original approach by measuring Cr stable isotope variations (using double spike approach coupled with a MC-ICP-MS) to study the origin of chondrites and volatile loss, magmatic evolution, and core-mantle differentiation of terrestrial planets (Mars, Vesta, Angrite, Ureilite, and Aubrite parent bodies).

3. Other isotopic systems.

After my PhD study, I also started to touch the isotopes of other elements. For example, 1) Ni is a siderophile element that can be used to trace the planetary core formation; 2) Ca isotope compositions of chondrites and planets and the implications for their genetic relationships and differentiation.

4. Terrestrial samples.

I am also expanding my expertise of isotopes from meteorites to terrestrial samples, including Archean samples, tektites, oceanic island basalts, Fe-Mn nodules and banded iron formation.

Publications (* corresponding author):

Published:

1. **Zhu K.**, Liang J.*, Shen J., Sun, W., Zhao, J., (2017) Geochemical significance of silicon-bearing rutile in eclogites from Dabie-Sulu ultrahigh pressure metamorphic terrane. *Earth Science Frontiers*, 24(3): 288-300. (in Chinese with English 2bstract)
2. **Zhu, K.**, Liu, J., Moynier, F., Qin L.*, Alexander, C.M.O.D., He, Y., (2019) Chromium isotopic evidence for an early formation of chondrules from the Ornans CO chondrite. *The Astrophysical Journal*, 873, 82.
3. **Zhu, K.***, Moynier, F., Wielandt, D., Larsen, K., Barrat, J., Bizzarro, M., (2019) Timing and origin of the angrite parent body inferred from Cr isotopes. *The Astrophysical Journal Letters*, 877, L13.
4. **Zhu, K.***, Sossi, P.A., Siebert, J., Moynier, F., Tracking the volatile and magmatic history of Vesta from chromium stable isotope variations in eucrites and diogenites. *Geochimica et Cosmochimica Acta*, 266, 598-610.
5. **Zhu, K.***, Moynier, F., Schiller M., Wielandt, D., Larsen, K., van Kooten E. M. M. E., Barrat, J., Bizzarro, M., Chromium Isotopic Constraints on the Origin the Ureilite Parent Body. *The Astrophysical Journal*, 888, 126.
6. **Zhu, K.***, Moynier, F., Schiller, M., Bizzarro, M. (2020) Dating and tracing the origin of enstatite chondrite chondrules with Cr isotopes. *The Astrophysical Journal Letters*. 894, L26.
7. **Zhu, K.***, Moynier, F., Schiller, M., Alexander, C.M.O'D., Davidson, J., Schrader, D.L., Bizzarro, M. (2020) Chromium isotopic insights into the origin of chondrite parent bodies and the early terrestrial volatile depletion. *Geochimica et Cosmochimica Acta*, 301, 158.
8. **Zhu, K.***, Moynier, F., Schiller, M., Alexander, C.M.O'D., J.-A. Barrat, Bischoff A., Bizzarro, M. (2021) Mass-independent and mass-dependent Cr isotopic composition of the Rumuruti (R) chondrites: Implication for their origin and their significance for planet formation. *Geochimica et Cosmochimica Acta*, 293, 598.

9. **Zhu, K.***, Moynier, F., Schiller, M., Barrat, J.-A., Becker, H. Bizzarro, M. (2021) Tracing the origin and core formation of the enstatite achondrite parent bodies using Cr isotopes. *Geochimica et Cosmochimica Acta*, 308, 256.
10. **Zhu, K.***, Moynier, F., Schiller, M., Alexander, C.M.O'D., Davidson, J., Schrader, D.L., Zhu, J.-M., Wu, G.-L., Schiller, M., Bizzarro, M., Becker, H. (2021) Chromium stable isotope panorama of chondrites and implications for Earth early accretion. *The Astrophysical Journal*, in press.

Submitted:

Zhu, K.*, Barrat, J.-A., Yamaguchi, A., Moynier, F. (2021) Nickel and chromium stable isotopic composition of ureilites: implications for the Earth's core formation and differentiation of the ureilite parent body. Under review in *Geophysical Research Letters*.

Conferences:

1. *TRR170 Summer School* (June 2018), "Origin of the Earth-Moon System", Burg Reichenstein, Germany.
2. **Zhu, K.**, Sossi, P. and Moynier, F. (2018) Chromium stable isotopic evidence for the origin of the volatile depletion from Vesta. *CNSA (LESEC) – ESA Lunar Science Workshop*, 40, Amsterdam, Netherlands. (Talk)
3. **Zhu, K.**, Sossi, P., Julien, S. and Moynier, F. (2019) Chromium Stable Isotopic Insights into the Origin of the Volatile Element Depletion of Vesta. *50th Lunar and Planetary Science Conference*, 1523, Texas, USA. (Poster)
4. **Zhu, K.**, Liu, J., Qin, L., Alexander, C. M.O'D., He, Y. and Moynier, F. (2019) Chromium Isotopic Evidence for an Early Formation of Chondrules from the Ornans CO Chondrite. *50th Lunar and Planetary Science Conference*, 2405, Texas, USA. (Talk)
5. **Zhu K.**, Moynier F., Schiller M., Wielandt D., Larsen K. K., van Kooten E. M. M. E. and Bizzarro M. (2019) Chromium Isotopic Constraints on the Origin the Ureilite Parent Body. *The 82nd Annual Meeting of the Meteoritical Society*, 6323, Sapporo, Japan. (Talk)
6. **Zhu K.**, Moynier F., Wielandt D., Larsen K. K., Barrat J.-A. & Bizzarro M. (2019) Timing and Origin of the Angrite Parent Body Inferred from Cr Isotopes. *Goldschmidt Abstracts*, 2019, Barcelona, Spain. (Talk)
7. **Zhu K.**, Moynier F., Schiller M., van Kooten E. M. M. E. and Bizzarro M. (2020) Dating and tracing the origin of cosmic Earth-like materials with Cr isotopes. *Winter School-First solids and planetesimals: formation conditions and evolution*, Les Houches, France. (Poster)
8. **Zhu K.**, Moynier F., Schiller M., Alexander, C. M.O'D., Davidson J., Schrader D. and Bizzarro M. (2020) Radiogenic and nucleosynthetic chromium isotopic insights on the origin of chondrite parent bodies and the early melting of proto-Earth. *Winter School-First solids and planetesimals: formation conditions and evolution*, Les Houches, France. (Poster)
9. **Zhu K.**, Moynier F., Schiller M., Alexander, C. M.O'D., Davidson J., Schrader D. Barrat, J., Bischoff, A. and Bizzarro M. (2021) Mass-Independent Chromium Isotopic Panorama in Chondrites: Implications for Origin of Chondrite Parent Bodies and Early Terrestrial Depletion. *52th Lunar and Planetary Science Conference*. 2131. (Poster, Virtual)
10. **Zhu, K.**, Moynier, F., Schiller, M., Becker H., Barrat, J., Bizzarro, M. Tracing the origin and differentiation of the enstatite achondrite parent bodies using Cr isotopes. *Goldschmidt Abstracts*, 2021 (Poster, Virtual)

Invited Presentations:

1. ETH Zurich. May 2020. (virtual)
2. China University of Geoscience (Wuhan). May 2020. (virtual)
3. TRR170 Community, Berlin. Nov. 2020 (virtual)
4. Purple Mountain Observation, Chinese Academy of Sciences. Apr. 2021
5. Nanjing University. Apr. 2021
6. China University of Geoscience (Wuhan). May 2021.
7. Purple Mountain Observation, Chinese Academy of Sciences. Jul. 2021

8. Institute of Geochemistry, Chinese Academy of Sciences. Sep. 2021
9. NASA Lunar and Planetary Institute. Nov. 2021 (Virtual)
10. Peking University. Nov. 2021 (Virtual)

Public Services:

Reviewer for *Geochemical Perspectives Letters*, *Earth and Planetary Science Letters*, *Geochimica et Cosmochimica Acta*, *Meteoritics & Planetary Science* and *Environmental Pollution*.

Student helper in Goldschmidt 2019.

Associate Editor of “Geoscience Home” blog on Wechat (with followers of ~40,000)