

SHELBY T. RADER

CONTACT INFORMATION

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EDUCATION

Ph.D. The University of Arizona, Department of Geosciences	2018
B.S. Western Kentucky University, Geology, <i>Summa Cum Laude</i>	2012
B.S. Western Kentucky University, Chemistry, <i>Summa Cum Laude</i>	2012

APPOINTMENTS & PROFESSIONAL EXPERIENCE

Assistant Research Scientist, Indiana University, Bloomington, IN, USA	2019-present
Postdoctoral Researcher, University of Massachusetts Lowell, Lowell, MA, USA	2018-2019
Graduate Research Associate, University of Arizona, Tucson, AZ, USA	2012-2018

TEACHING EXPERIENCE

Indiana University Department of Earth and Atmospheric Sciences, Bloomington, IN:

Earth Materials (one semester mineralogy/petrology course)	F21, F20
Environmental Geology	Summer21
Mineral Resources	S21
Isotope Geochemistry (graduate level)	S21

University of Arizona Department of Geosciences, Tucson, AZ:

Petrology (Teaching Assistant)	S18
Mineralogy (Teaching Assistant)	F16

Illinois State University Department of Geology, Geography, and the Env., Normal, IL:

Field Camp (Teaching Assistant)	Summer13
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PUBLICATIONS

Published:

5. **Rader, S.T.**, Gaschnig, R.M., Newby, S.M., Bebout, G.E., Mirakian, M.J., Owens, J.D. (2021) Thallium behavior during high-pressure metamorphism in the Western Alps, Europe. *Chemical Geology* 579(30), DOI: [10.1016/j.chemgeo.2021.120349](https://doi.org/10.1016/j.chemgeo.2021.120349)
4. Gaschnig, R.M., **Rader, S.T.**, Reinhard, C.T., Owens, J.D., Planavsky, N., Wang, X., Asael, D., Greaney, A., Helz, R. (2021) Behavior of the Mo, Tl, and U isotope systems during differentiation in the Kilauea Iki lava lake. *Chemical Geology* 574(20), DOI: [10.1016/j.chemgeo.2021.120239](https://doi.org/10.1016/j.chemgeo.2021.120239)
3. **Rader, S.T.**, Maier, R.M., Barton, M.D., Mazdab, F.K. (2019) Uptake and fractionation of thallium by *Brassica juncea* in geogenic thallium-amended substrate. *Environmental Science and Technology* 53(5), 2441-2449, DOI: [10.1021/acs.est.8b06222](https://doi.org/10.1021/acs.est.8b06222)
2. **Rader, S.T.**, Mazdab, F.K., Barton, M.D. (2018) Mineralogical thallium geochemistry and isotope variations from igneous, metamorphic, and metasomatic systems. *Geochimica et Cosmochimica Acta* 243, 42-65, DOI: [10.1016/j.gca.2018.09.019](https://doi.org/10.1016/j.gca.2018.09.019)
1. Celestian, A.J., Powers, M., **Rader, S.** (2013) In situ Raman spectroscopic study of transient polyhedral distortions during Cesium exchange into sitinakite. *American Mineralogist* 98(7), 1153-1161.

In press:

1. Aarons, S.M., Johnson, A.C., **Rader, S.T.**: The icing on the cake: Forming Earth's continental crust. *Under revision, Elements*.

GRANTS AND AWARDS

PI Funding (Post 2019)

Rader, S.T. (Lead, PI), Runyon, S. (Co-PI), *Collaborative Research: Investigation of controls on redox-related critical element deposition and remobilization via thallium isotopes* | National Science Foundation, Petrology and Geochemistry, \$356,921 total, \$188,699 to IU. **Pending**.

Rader, S.T., *The fate and transformation of redox-sensitive thallium in the Critical Zone* | IU Faculty Research Support Program – Seed Funding, \$20,462 total. **Awarded** (Active 08/2021 – 03/2022).

Gaschnig, R. (Lead, PI), Rader, S.T. (Co-PI), *Collaborative Research: Tracking novel metal isotope signatures during subduction metamorphism* | National Science Foundation, Petrology and Geochemistry, \$284,610 total, \$62,010 to IU. **Awarded** (Active 04/2020 – 03/2023).

Research Fellowships, Scholarships, and Grants (Pre 2019)

ChevronTexaco Geology Fellowship	2018
Graduate and Professional Student Council Travel Grant	2017
Chernoff Graduate Scholarship	2017
Geological Society of America Student Research Grant (Outstanding Mention Award)	2017
Newmont Baker Fellowship	2017
Susan G. Earl Galileo Circle Scholarship	2016
Goldschmidt Conference Student Grant	2016
Graduate and Professional Student Council Travel Grant	2016
Arizona Sky School Fellowship	2015-2017
Graduate and Professional Student Council Travel Grant	2015
Society of Economic Geologists Student Research Grant	2014
National Science Foundation Graduate Research Fellowship	2013-2016
Judson Roy Griffin Outstanding Senior in Geology, Geology Department, Western Kentucky University	2012

OUTREACH EXPERIENCES

Upward Bound Career Days, IUPUI TRIO Upward Bound, Indianapolis, IN. <i>Invited.</i>	2021
Activity Coordinator IdeaFestival Bowling Green, Bowling Green, KY. <i>Invited.</i>	2021
Keynote Speaker Western Kentucky University Department of Geology, Bowling Green, KY. <i>Invited.</i>	2020
Keynote Speaker IdeaFestival Bowling Green, Bowling Green, KY. <i>Invited.</i> https://www.youtube.com/watch?v=cpqT6tO5iZI	2020
Arizona Sky School Instructor – The UA Sky School provides two- to five-day immersive science inquiry programs at the summit of Mt. Lemmon in the Santa Catalina Mountains. Students from 4th through 12th grades participate in authentic field research experiences in small groups mentored by graduate student scientists.	2015-2017
Keynote Speaker 2015 Mansfeld Middle School STEM Night, Tucson, AZ. <i>Invited.</i>	2015
Keynote Speaker Western Kentucky University Department of Geology, Bowling Green, KY. <i>Invited.</i>	2015
Co-coordinator for Geosciences at the Tucson Festival of Books – Organized a volunteer staff of more than fifty people for a booth representing the Geosciences department to engage children and their parents. Educational activities include stream tables, seismometers, and a daily demonstration of volcanism with a liquid nitrogen volcano.	2014-2017
Instructor at Saturday Science Academy in Tucson, AZ.	2014, 2017
Development and classroom implementation of educational modules related to mining in collaboration with University of Arizona Superfund Research Program (UA SRP) and Tohono O'odham Community College (TOCC). https://www.superfund.arizona.edu/learning-modules/tribal-modules/information	2013-2017

PRESENTATIONS – selected conference abstracts

- Blakowski, M. *, **Rader, S.T.**, Aarons, S., Dong, Z., Perala-Dewey, J., Hageman, K., Heim, E., Bartos, A., Brahney, J. (2021) Heavy metals in dust from the shrinking Great Salt Lake: Where do they come from and where do they go? AGU. New Orleans, LA.
- Snodgrass, K. * and **Rader, S.T.** (2021) Resources in the Rockies? Economic Geology: An analysis of platinum group element (PGE) ore deposits from the New Rambler Mine, Medicine Bow Mountains, Wyoming. IU Undergraduate Research Summer Symposium. Bloomington, IN.
- Marshall, S.J. *, Gaschnig, R.M., Stegner, C.J. *, **Rader, S.T.**, Bebout, G.E. (2021) Molybdenum isotope systematics in the high-P/T Schistes Lustrés and at Lago di Cignana: Investigation of partitioning and isotopic fractionation during subduction zone metamorphism. Goldschmidt. Lyon, France.
- Stegner, C.J. *, Marshall, S.J., Gaschnig, R.M., **Rader, S.T.**, Bebout, G.E. (2021) Molybdenum behavior during subduction zone metamorphism in the Catalina Schist. Goldschmidt. Lyon, France.
- Rader, S.T.**, Gaschnig, R., Owen, J., Bebout, G. (2019) Thallium variations during high-pressure metamorphism. Goldschmidt. Barcelona, Spain.
- Rader, S.T.**, Maier, R., Mazdab, F., Barton, M. (2017, presenting previous poster) Uptake and fractionation of thallium by *Brassica juncea* in geogenic Tl-amended substrate. NIEHS Superfund Research Program Annual Meeting. Philadelphia, PA.
- Rader, S.T.**, Maier, R., Mazdab, F., Barton, M. (2017) Uptake and fractionation of thallium by *Brassica juncea* in geogenic Tl-amended substrate. Goldschmidt. Paris, France.
- Rader, S.T.**, Mazdab, F., Barton, M. (2017) Thallium: A Geochemical Tool within Ore-Forming Systems. GeoDaze. Tucson, AZ. (AWARDED *Runner-Up Best Overall Presentation*).
- Rader, S.T.**, Mazdab, F., Barton, M. (2016) Thallium Isotopic Variability Within Sulfides and K-Bearing Silicates. Goldschmidt. Yokohama, Japan.
- Rader, S.T.**, Mazdab, F., Barton, M. (2016) Thallium Variations in Ore-Forming Systems. GeoDaze. Tucson, AZ. (AWARDED *Runner-Up Best Overall Presentation*).
- Rader, S.T.**, Powers, M., Celestian, A.J. (2013) Multidimensional Approach to Understanding Heterosilicate Ion Exchange. GeoDaze. Tucson, AZ. (AWARDED *Best Paper Presentation in Economic Geology*).

* denotes student presentation

SERVICE

Session Convener	Goldschmidt 2021 – Elemental cycling during subduction and the generation of arc magmas, AGU 2020 – Novel Isotopes in Earth Systems
Journal Reviewer	Geochimica et Cosmochimica Acta; Chemical Geology; The Canadian Mineralogist; Minerals; Chemosphere; Environmental Science and Pollution Research
Grant Reviewer	American Chemical Society

STUDENTS MENTORED

Cameron Adams, undergraduate, Indiana University	2021-present
Nico Lovinello, undergraduate, Indiana University	2021-present
Katie Snodgrass, undergraduate, Indiana University	2021-present
Jennifer Hurst, undergraduate, Indiana University	2021-present
Kirsten Hawley*, graduate student (Ph.D.), Indiana University	2020-present
Jayson Eldridge*, graduate student (M.S.), Indiana University	2020-present
Caleb Fifer*, graduate student (M.S.), Indiana University	2019-present

**denotes served as committee member*

ANALYTICAL EXPERTISE

Trace metal clean lab

Nu Plasma II MC-ICP-MS

IsoProbe (Thermo Scientific/GV/Micromass) MC-ICP-MS

Agilent 7900 quadrupole ICP-MS

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Teledyne CETAC LSX-213 G2 laser ablation system

Two-stage extraction chromatography column techniques for Tl extraction

Single-stage extraction chromatography column techniques for Mo, U, Ni, and Pb extraction

Thermo Element II ICP-MS

Raman spectroscopy

Low temperature chemical syntheses

CAMECA SX100 Ultra electron probe microanalyzer (EPMA)