



## **Three Postdoc positions in molecular complexation of rare earth elements (REE) in high temperature and pressure supercritical geologic fluids**

We seek motivated candidates with a strong interest in high-temperature hydrothermal experimental geochemistry, EXAFS and Raman/UV-Vis spectroscopy, chemical thermodynamics and computational geochemistry. These positions are part of the new collaborative **U.S. geoscience critical minerals experimental – thermodynamic research hub** between New Mexico Tech (NMT), Los Alamos National Laboratory (LANL), and Indiana University Bloomington (IUB), which is a Department of Energy (DOE), Basic Energy Sciences, funded project (<https://www.energy.gov/articles/doe-awards-30m-secure-domestic-supply-chain-critical-materials>).

The three Postdoc positions are expected to be filled as soon as possible **starting October/November 2021**, and include two positions at the New Mexico Bureau of Geology and Mineral Resources at NMT and one position at Indiana University Bloomington.

- **1) Postdoctoral Fellow in Experimental Geochemistry, New Mexico Tech, USA**

**JOB DUTIES:** The Postdoctoral Fellow will conduct hydrothermal laboratory experiments using X-ray absorption spectroscopic (XAS) techniques combined with hydrothermal diamond anvil cells (HDAC) and Raman/UV-Vis flow-through experiments to determine the speciation of REE in high temperature supercritical fluids. The Postdoctoral Fellow will design and test new laboratory experiments, conduct spectroscopic analyses, train students in the laboratory experiments and conduct data interpretation, analyze experimental solutions using ICP-MS, ICP-OES and minerals using XRD and SEM. This work will be complemented with molecular dynamic simulations and the development of thermodynamic and experimental databases. The Postdoctoral Fellow will also be writing research publications for peer-reviewed journals and present at conferences. This position is hosted at New Mexico Tech with Alexander Gysi as supervisor, but includes collaborations with our partners in the new U.S. geoscience critical minerals experimental – thermodynamic research hub. As such, the Postdoctoral Fellow will be expected to travel yearly with up to 5 months internships at LANL and apply for beamline time and travel to the GSECARS facility in Chicago for XAS-HDAC experiments.

**REQUIRED/DESIRED QUALIFICATIONS:** Ph.D. or other doctorate level equivalent. Required areas of study include Geochemistry/Chemistry/Geosciences. X-ray absorption (XAS) spectroscopy and hydrothermal diamond anvil cell (HDAC) required. UV-Vis and/or

Raman spectroscopy required. Analytical chemistry (ICP-OES, ICP-MS) and mineralogy (XRD, SEM) desired. Molecular simulations and thermodynamic modeling desired. Coding of python and/or C++ desired.

**APPLICATION:** For additional questions about this project please email [alexander.gysi@nmt.edu](mailto:alexander.gysi@nmt.edu). Applications will be reviewed starting immediately until positions are filled. Starting salary is 50k/yr, and employment renewable each year contingent on satisfactory progress for up to 34 months.

Applicants are expected to submit a CV, academic transcripts, a cover letter and obtain three reference letters. [Please apply here](#) and cc your application to [alexander.gysi@nmt.edu](mailto:alexander.gysi@nmt.edu).

- **2) Postdoctoral Fellow in Computational Geochemistry, New Mexico Tech, USA**

**JOB DUTIES:** The Postdoctoral Fellow will conduct ab initio molecular dynamic (MD) simulations to determine the speciation of REE in high temperature supercritical fluids. This work includes the use of high performance computing facilities at LANL in close collaboration with Dr. Pavel Dub. This Postdoctoral Fellowship has the option to include hydrothermal laboratory experimental work using X-ray absorption spectroscopic (XAS) techniques combined with hydrothermal diamond anvil cells (HDAC), and apply for beamline time and travel to the GSECARS facility in Chicago for XAS-HDAC experiments. The Postdoctoral Fellow will also be writing research publications for peer-reviewed journals and present at conferences. This position is hosted at New Mexico Tech with Alexander Gysi as supervisor, but includes collaborations with our partners in the new U.S. geoscience critical minerals experimental – thermodynamic research hub. As such, the Postdoctoral Fellow will be expected to travel yearly with up to 5 months internships at LANL.

**REQUIRED/DESIRED QUALIFICATIONS:** Ph.D. or other doctorate level equivalent. Required areas of study include Geochemistry/Chemistry/Geosciences/Computer science. Molecular simulations and thermodynamic modeling required. coding of python and/or C++ required. X-ray absorption (XAS) spectroscopy and hydrothermal diamond anvil cell (HDAC), UV-Vis and/or Raman spectroscopy desired.

**APPLICATION:** For additional questions about this project please email [alexander.gysi@nmt.edu](mailto:alexander.gysi@nmt.edu). Applications will be reviewed starting immediately until positions are filled. Starting salary is 50k/yr, and employment renewable each year contingent on satisfactory progress for up to 34 months.

Applicants are expected to submit a CV, academic transcripts, a cover letter and obtain three reference letters. [Please apply here](#) and cc your application to [alexander.gysi@nmt.edu](mailto:alexander.gysi@nmt.edu).

- **3) Postdoctoral Fellow in Geochemical Modeling and Thermodynamic Database development, Indiana University, USA**

**JOB DUTIES:** The Postdoctoral Fellow will develop an internally consistent thermodynamic dataset for rare earth element (REE) aqueous species and solids focuses on thermodynamics and data sciences to evaluate the behavior of REE in supercritical fluids. The research includes compilation and correlation of thermodynamic data for REE aqueous species, solids, and solid solutions, and aid in development of novel computational tools to interpret thermodynamic data and develop equations of state. The Postdoc is also expected to present and report research and publish scientific results in peer-reviewed journals. This position is hosted at Indiana University with Dr. Chen Zhu as supervisor, but includes collaborations with our partners in the new U.S. geoscience critical minerals experimental – thermodynamic research hub in coordination with Dr. Alexander Gysi at New Mexico Bureau of Geology and Mineral Resource and several co-PIs at New Mexico Tech and Los Alamos National Laboratory.

**REQUIRED/DESIRED QUALIFICATIONS:** The successful candidate will hold a Ph.D. in earth sciences or a closely related field by the start date and within the last five years. A strong background in aqueous geochemistry is required and skills, knowledge, and experience in data science and programming languages is highly desired. Excellent written and oral communication skills are required as well as the ability to work with a large team.

**APPLICATION:** Applications, consisting of a single PDF file combining the four documents listed below, should be emailed directly to [chenzhu@indiana.edu](mailto:chenzhu@indiana.edu), with the subject line: Postdoc Position. The position is available immediately and the start date is negotiable. The tentative application deadline is 20 October 2021, but applications will be considered on a rolling basis until the position is filled. Online applications can be submitted via <https://indiana.peopleadmin.com/postings/11356>.

*Required documents:*

- 1) *A 1-page cover letter expressing interest in and qualifications for this position*
- 2) *A CV with a list of all publications and research grants*
- 3) *A 1-page research statement summarizing previous research experience*
- 4) *The names and contact information of at least two referees with knowledge of your research and academic experience*

Salary is competitive and includes fringe benefits. The initial appointment will be for one year, with the expectation of renewable for another two years, subject to performance and funding availability. The candidate will be based on the Bloomington campus of Indiana University. We closely work with faculty and students in the School of Computing and Information Sciences and Engineering, which is across street from our building. More information about ongoing research in Zhu's group may be found at: [www.hydrogeochem.earth.indiana.edu](http://www.hydrogeochem.earth.indiana.edu)