

Postdoctoral Fellow in Critical Mineral Separations

Ion–Ligand Chemistry and Electrochemical Recovery from Geothermal Brines and Rare-Earth Feedstocks

Posted July 22, 2026

SALARY	START DATE	APPOINTMENT	APPLY BY
\$63,480 USD/year	October 1, 2026	12 months (renewable)	September 1, 2026

Ted Sargent and group at Northwestern University invite applications for an accomplished and creative Postdoctoral Fellow to develop selective, energy-efficient separations for critical minerals. The research will connect fundamental ion-recognition and transport science with practical recovery from complex feedstocks, with two example application areas: lithium extraction from geothermal brines and separation of rare-earth elements from primary and recycled resources.

The Fellow will investigate how ion–ligand coordination, solvation and desolvation, nucleation and crystallization kinetics, confinement, interfacial charge, and electrochemical driving forces control selectivity and rate in multicomponent solutions. Candidate approaches may include molecular ligands and ionophores, ligand-directed precipitation or crystallization, porous or redox-active solids, membranes, selective electrosorption or intercalation, and electrochemically programmed capture–release and regeneration cycles.

RESPONSIBILITIES

- Establish mechanistic relationships among ion speciation, coordination thermodynamics, nucleation or precipitation kinetics, ion–surface interactions, transport, and separation performance using controlled model systems and complex feeds.
- Design and synthesize selective ligands, ionophores, sorbents, porous hosts, membranes, or redox-active materials for critical-mineral capture and release.
- Develop chemical and electrochemical separation processes, including selective adsorption, ligand-directed precipitation or crystallization, electrosorption, intercalation, electrodialysis, electrified pH swings, and electrochemical regeneration of ligands or process solutions.
- Apply these concepts to lithium recovery from geothermal brines containing high concentrations of competing ions and to difficult rare-earth separations involving chemically similar lanthanides, including recycled magnet and other secondary feedstocks.
- Quantify selectivity, capacity, flux, kinetics, Faradaic efficiency, energy intensity, purity, stability, and ligand or sorbent recovery using analytical and in situ or operando methods.
- Translate promising molecular and materials concepts into batch and continuous-flow devices with closed-loop reagent or ligand regeneration; lead publications, interdisciplinary collaborations, mentoring, and proposal development.

QUALIFICATIONS

- Ph.D. in chemistry, chemical engineering, materials science, electrochemistry, geochemistry, or a related field, completed or expected before the start date.
- Demonstrated research experience in one or more of separation science, coordination chemistry, crystallization, hydrometallurgy, ion transport, membranes, porous materials, electrochemical engineering, or resource recovery.
- Hands-on experience with solution chemistry, materials synthesis, electrochemical measurements, or separation-device design, supported by careful mass balances and quantitative analysis.
- Proficiency with relevant characterization and analytical methods, such as ICP-OES or ICP-MS, ion chromatography, spectroscopy, X-ray methods, cyclic voltammetry, impedance, or controlled-potential techniques.
- Strong mechanistic reasoning and the ability to connect molecular interactions and transport phenomena to measurable selectivity, rate, energy and chemical consumption, and process durability.
- An excellent research and publication record commensurate with career stage, technical creativity, and the ability to collaborate across chemistry, materials, electrochemistry, and process engineering; prior experience with geothermal brines or rare-earth separations is advantageous but not required.

HOW TO APPLY

Please include the following in your application package:

- A one-page research proposal responsive to the directions and criteria outlined in this job ad
- Your academic CV, including a section dedicated to your first-authored papers. This should include a list of three referees who are prepared to be consulted

Please use the [application link here](#).