Director of Process Engineering

Final title dependent on technical strengths

Location: Boulder, CO
Reports To: VP of R&D

Role Summary

The Head of Process Engineering will be a strategic thinker with operational discipline. They will be responsible for developing, scaling, and optimizing column separation processes for rare earth element recovery. This role centers on the chemistry and performance of functionalized resins, the engineering of scalable column systems, and the application of advanced separation science to industrial-scale challenges. The ideal candidate will bring deep expertise in chemical separations, resin formulation and property determination, and have a proven track record of translating lab-scale process flows into robust pilot-ready systems.

Key Responsibilities

Adsorbent Chemistry

- Lead the selection, design, and optimization of functionalized resins
- Evaluate bioconjugation and adsorbent chemistry (ie resin, linker and protein) interaction dynamics (adsorption, desorption, kinetics, breakthrough behavior) under varying pH, ionic strength, and contaminant loads.
- Oversee long-term stability testing, regeneration protocols, and fouling resistance for sustained industrial use.

Process Development: Hydrometallurgy and Column Separation

- Direct the development of hydrometallurgical workflows that integrate upstream leaching and solids removal with column separations into downstream recovery operations.
- Direct the development of downstream recovery unit operations, including dewatering and calcination to produce high purity rare earth oxides.
- Engineer scalable column-based systems that will translate to continuous operation, multi-column designs (simulated moving bed) that derisk pilot scale workflows.
- Integrate off-line and real-time analytical tools (e.g., ICP-OES, UV-vis, pH, conductivity) to monitor separation efficiency and metal recovery.

Process Scale-Up & Commercial Readiness

- Design and validate operational protocols (e.g., column packing, cycle times, elution profiles) for separations under industrial conditions.
- Drive process scale-up from bench-scale columns to pilot and full industrial operations, focusing on flow dynamics, pressure drops, resin loading, and system robustness.
- Partner with the Pilot Engineering Team to specify and commission large-scale equipment, including pumps, skids, instrumentation, and automated control systems.

Cross-Functional Execution & Systems Integration

- Collaborate closely with consultants and experts in upstream (bioleaching, pretreatment) and downstream teams (dewatering, calcination) to ensure process interoperability.
- Work with automation and data science teams to implement sensor-driven control strategies, closed-loop feedback systems, and predictive analytics for process control.
- Support pilot deployments and field implementation in dynamic mining or resource recovery environments.

Leadership & Team Building

- Build and lead a multidisciplinary team of chemical and process engineers, chemists, and material science technical experts
- Foster a culture of technical rigor, continuous improvement, and data-driven decision-making.
- Align the team's work with corporate objectives related to cost, throughput, selectivity, and sustainability.

Budget Management & External Collaboration

- Manage capital and operating budgets for resin procurement, pilot plant operations, and equipment integration.
- Lead technical engagements with resin suppliers, OEMs, and external research collaborators to access emerging technologies and accelerate innovation.

Qualifications

Education & Experience

- Ph.D., M.S., or B.S. in Chemical Engineering
- 7 –12+ years of experience in process development, bioconjugation, resin chemistry, and/or column separations
- Demonstrated success scaling chemical separation processes from lab to pilot

Core Competencies

- Ability to oversee processes involving resin and linker chemistry (ion exchange, chelation, hydrophobic/hydrophilic interactions).
- Ability to oversee hydrometallurgical flowsheets, including solid-liquid separation, leaching, and solvent exchange.
- Proven experience overseeing professionals with expertise in process modeling, chemical kinetics, and adsorption isotherms.

Leadership Skills

- Operational discipline and a track record of delivering results in R&D-to-commercial transitions.
- Experienced in building high-performance technical teams and mentoring scientific and engineering staff.
- Strong communication skills; able to represent company interests in technical discussions, partner meetings, and conferences.