Director of Analytical Chemistry

Final title dependent on technical strengths

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

Role Summary

The **Director of Analytical Chemistry** will lead the development and implementation of advanced analytical techniques for Biochemical separation of critical minerals from diverse feedstocks. This role will oversee the design of high-precision chemical and biochemical assays for characterizing and processing complex mixtures of high-value metals, assessing chemical synthesis reactions, and quantifying and characterizing protein quality and amount. The successful candidate will have strong experience in chromatography-based separations, analytical methods for metal characterization, design of experiment methodology, and, importantly, analytical method qualification.

The Director will collaborate with bioprocess engineers, biochemists, and bioinformatics teams to integrate analytical methods into protein production and column separation workflows. The individual will join a group of collaborative scientists with diverse skill sets and should have strong communication skills, critical thinking skills, and a rigorous approach to science.

Key Responsibilities

Analytical Method Development, Optimization, and Qualification

- Develop and qualify high-precision analytical methods for REE detection, quantification, and speciation.
- Optimize sample preparation techniques for challenging matrices (ores, tailings, electronic waste, bio-based extracts).
    - Determine and implement the best methods for REE analysis as required.
        - Elemental analysis (ICP-OES, ICP-MS),
        - Chromatography (HPLC, HPLC-MS, GC-MS),
        - Spectroscopy-based techniques (UV-Vis, FTIR, NMR)
- Ensure analytical techniques provide high sensitivity, selectivity, and reproducibility across industrial workflows.

High-Throughput & Automation Strategies

- Design high-throughput (HT) analytical workflows to accelerate REE assay development.
- Automate sample preparation and analytical workflows using robotics, liquid handling systems, and multiplexed detection methods.
- Establish real-time and inline process monitoring using advanced analytical sensors.

Quality Control (QC) & Regulatory Compliance

- Develop standard operating procedures (SOPs) for analytical measurements to ensure data integrity and compliance.
- Implement quality control (QC) and quality assurance (QA) protocols for routine analyses and reporting and for handling different feedstocks (e.g., e-waste, ores, etc.)

- Ensure compliance with environmental, safety, and regulatory requirements in working with potentially hazardous materials (e.g., strong acids/bases, etc.).
- Oversee method transfer and qualification for commercial-scale REE recovery operations.

Cross-Functional Collaboration & Technology Integration
- Work closely with HT assay, bioinformatics, and enzyme discovery teams to validate novel bio-based REE extraction methods.
- Partner with process engineers to integrate analytical chemistry into bioprocessing workflows.
- Collaborate with chemical engineers and system integration specialists to develop sensors and inline monitoring tools for industrial-scale REE separation.

Team Leadership & Development
- Build and lead a multidisciplinary team of analytical chemists and automation specialists.
- Foster a culture of innovation, precision, and collaboration across analytical chemistry and adjacent R&D teams.
- Mentor and develop emerging leaders in the field of REE analytical chemistry and industrial process monitoring.

Key Skills & Expertise Required
Required qualifications:
- Bachelor's or master's in chemistry, biochemistry, chemical engineering or related fields with 10+ years of industry experience.
- Expertise in ICP-MS, ICP-OES and other spectroscopic techniques for complex sample analysis.
    - Significant experience developing methods, operating, and qualifying ICP-OES instrumentation and methods.
- Hands-on experience with chromatographic techniques (HPLC-MS, etc) for protein quantification, and sample composition, or the ability to manage a subject matter expert in chromatographic techniques.
- Experience in automated analytical workflows, HT screening, and data-driven assay development is a plus.
- Experience with a wide variety of analytical techniques and adept at learning new instrumentation and assays.
- Demonstrated experience with analytical methods development, qualification, and validation.
- Deep knowledge of design of experiment principles and statistical analysis.
- Adept at designing and executing complex experiments in a safe, independent manner.
- Strong written and verbal communication skills and ability to work within and among different teams.
- Strong organizational skills.

Desirable qualifications:

- Experience with lab automation platforms (Tecan, Hamilton, Opentrons) and multiplexed detection technologies.
- Experience with organic synthesis or bioconjugation chemistry.
- Coding skills (Python or R).

Position:

- Title and compensation commensurate with experience.
- Full benefits package including medical, dental, 401(k)