MINERAL PROCESSING

Rare Earth Elements

The Saskatchewan Research Council's (SRC) Mineral Processing team provides leading-edge research, development and demonstration services for a variety of commodities and minerals processing technologies. SRC's team of engineers and scientists have extensive experience and know-how in all aspects of Rare Earth Elements (REE) process testing and development.

For nearly a decade, SRC has been involved in the major REE primary processing and separation technologies, for both heavy and light REEs, in Canada and worldwide.

Separation Pilot Plant

In addition to bench and pilot testing, SRC has built a separation pilot plant that can be configured to different separation processes for either group separation or individual REE separation. SRC adapted that technology to address specific REE separation challenges in processing secondary rare earth resources, such as uranium raffinate.

Our technology is also applicable to separating concentrates from primary rare earth mineral resources, such as monazite and bastnaesite. In addition, SRC has developed both acidic and alkaline processes to treat rare earth ores from different areas around the world, including North America, South America and Europe.

With SRC's expertise and technologies for both primary and secondary REE resources, our clients have the potential to maximize the value of their rare earth projects.

Service Capabilities

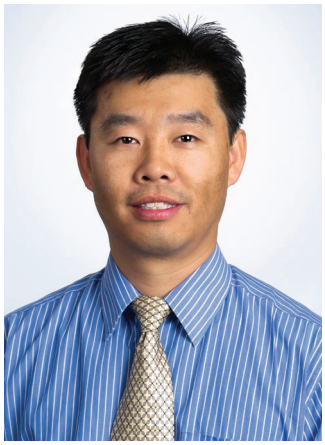
- Technology and Process **TESTING** (Primary and Secondary Resources)
  - Bench
  - Pilot
  - Field
- Technoeconomic **EVALUATION** of REE technologies
  - Mineralogy
  - Process
  - Equipment
- Process **DESIGN**
- **OPTIMIZATION** and **TROUBLESHOOTING** of REE hydrometallurgical and separation plants
- **PRODUCT MANUFACTURE** and tolling services to produce either marketing samples or production

SRC SASKATCHEWAN RESEARCH COUNCIL

Jack Zhang
Manager
Mineral Processing

Mining and Energy
125-15 Innovation Blvd., Saskatoon, SK, S7N 2X8
jack.zhang@src.sk.ca | 306-385-4118

Key REE Team Members



Jack Zhang (PhD, P.Eng.)

Jack Zhang has worked on mineral processing and hydrometallurgy for over a decade. In the past 12 years, he has worked on numerous rare earth projects involving all processes related to sorting, gravity separation, magnetic separation, flotation, leaching, fractional precipitation and solvent extraction.

In addition, Jack has conducted numerous literature reviews and published journal papers and conference papers in the areas of rare earth ore processing and rare earth concentrate processing. More recently, Jack has co-authored the book "Separation Hydrometallurgy of Rare Earth Elements" with Baodong Zhao and Bryan Schreiner.

Since 2012, Jack has acted as the rare earth technical committee member for the CIM Rare Earth Symposium for reviewing papers and chairing sessions. He is currently the manager of SRC's Mineral Processing Business Unit. His team provides technical services to meet the needs of the mineral processing industry. Jack is also the principle investigator on a project to produce REOs by leaching high-grade REE ore.

Baodong Zhao (PhD, P.Eng.)

Baodong Zhao has more than 25 years of experience in metallurgical engineering and project management, especially in rare earth mineral processing and hydrometallurgy. He was previously an Independent Metallurgical Consultant at REE Metallurgical Consulting and the Vice President of Metallurgy at Great Western Minerals Group Ltd.

In the past 8 years, Baodong has worked on many rare earth projects by leading and participating in all aspects of laboratory and pilot plant test work, as well as Preliminary Economic Assessments covering sample preparation, mineralogical characterization, beneficiation, hydrometallurgy and rare earth element separation using solvent extraction technology. Baodong is a reviewer for the Canadian Metallurgical Quarterly.