SMI Sustainable Minerals Institute

Geometallurgy at the Sustainable Minerals Institute

The University Of Queensland
AUSTRALIA

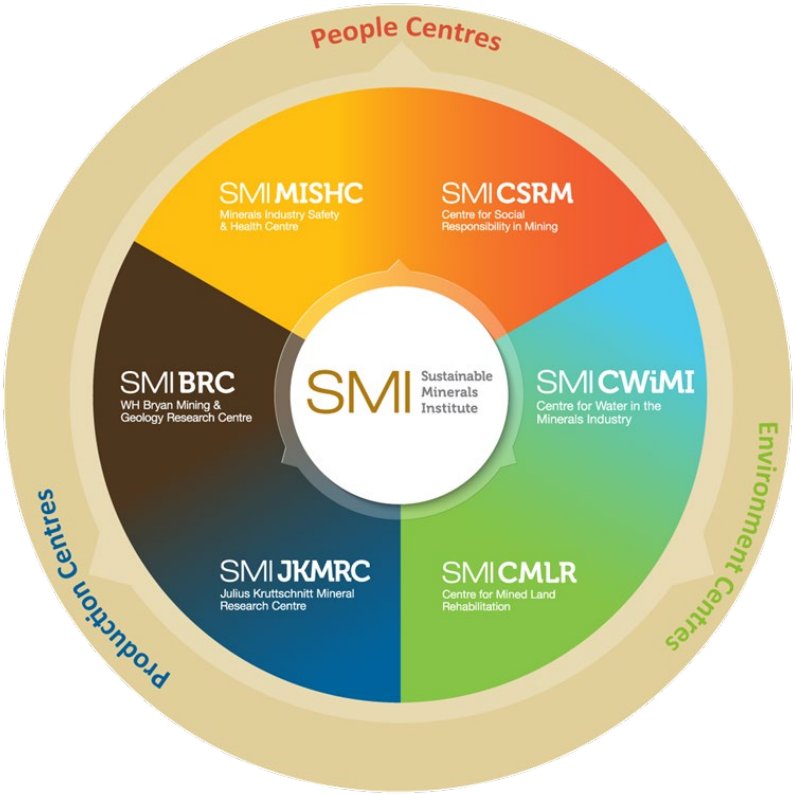
Create change

UQ Sustainable Minerals Institute

- **Our purpose** is to develop game changing people by working with our partners to co-create solutions to the big challenges facing the sector.

- **Our expertise** which comes from experience across the research, government and industry sectors is genuinely independent and objective.

- **Our work** covers all facets of the life of mine from geology, to minerals extraction, water management issues, minerals processing, workplace health and safety, mine rehabilitation, energy and community engagement.



THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
Create change

- Geological expertise
- Modelling expertise

SMI BRC
WH Bryan Mining & Geology Research Centre

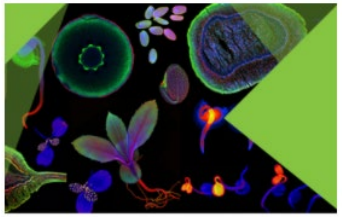
- Mineral processing knowledge
- Mining and blasting knowledge
- Testing/analytical facilities

SMI JKMRC
Julius Kruttschnitt Mineral Research Centre

Other UQ areas

- School of Mechanical and Mining Engineering
- School of Earth and Environmental Sciences
- School of Chemical Engineering
- Research Computing Centre

- Environment/waste expertise



SMI CMLR
Centre for Mined Land Rehabilitation

Geometallurgy at the SMI

SMI ICEChile
The International Centre of Excellence in Chile

- Analytical facilities
- Geological expertise
- Mining
- Mineral processing
- Computing

- Access to key mineral province – key issues in industry
- CORFO funding

JKtech
SMI Technology Transfer

- Industry feedback
- Research/Consulting synergy

Geometallurgical research questions

- What fundamental geological processes have produced the key variations in ore characteristics that will affect comminution and separation?
- How can we improve the way these variations are measured, mapped, and incorporated into mineral processing strategies?
- How can we improve the feedback loop between mine and process performance and predictive orebody models?
- How can we understand, predict and mitigate the effects of deleterious elements and ore characteristics in order to minimise environmental footprints?

Geometallurgy – current/recent projects

A Novel geometallurgical approach to tailings storage facility characterisation and evaluation

Ore amenability to HVP processing

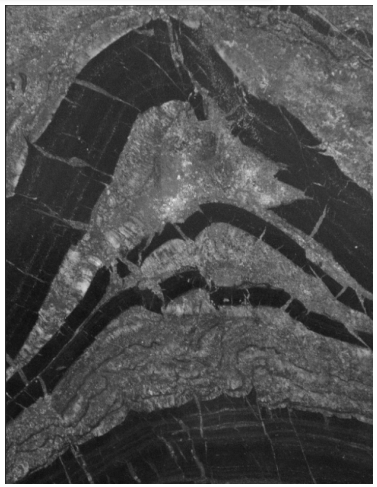
Texture models for liberation prediction

Reconcile
- Grade
- Performance
- feedback

Natural Caves – Underground Mass Mining Analogues

Observe
- Drill samples
- Exposures
- Mineralogy
- Photogrammetry
- Geophysics
- Texture

Geological prediction of reactive ground



Development of a correlation between mineralogy, rock strength measures and breakage in Porphyry Copper deposits

Estimate/Predict
- Grade
- Rock mass mechanical behaviours
- Plant performance variables
- Others
  - Deleterious elements
  - AMD
  - Etc

Measure
- Geochemistry
- Mineral chemistry
- Hyperspectral response
- Metallurgical test results
- Structure/geotech

Geological controls on Arsenic deportment

Effect of veins on mineral liberation

Model
- Geological domains
- Geomet domains
- Rock mass

Measuring While Drilling for rock mass characterization in Comminution

Ore fabric/composition linkages to blasting characteristics

Exploring the linkages between texture, mineralogy, alteration and rock strength

Use of Hyperspectral scanning for understanding of ore processing variability

Summary

- Geometallurgical research is spread across a number of SMI centres, and has strong synergies with existing programs in geology, mining, mineral processing, environment and waste management
- Despite the lack of a “headline” group, geometallurgy has become embedded in JKMRC and BRC programs, as well as elsewhere in the SMI
- SMI and UQ testing and analytical facilities also remain strong and appropriate to support a comprehensive geometallurgical research program
- The SMI is committed to a growing Orebody Knowledge research program, and intends to achieve this through
  - A conscious emphasis on pursuit of geometallurgical research opportunities
  - Continued building of capacity, both staff and HDR students
  - Increased internal and external communication of existing and new geometallurgical initiatives