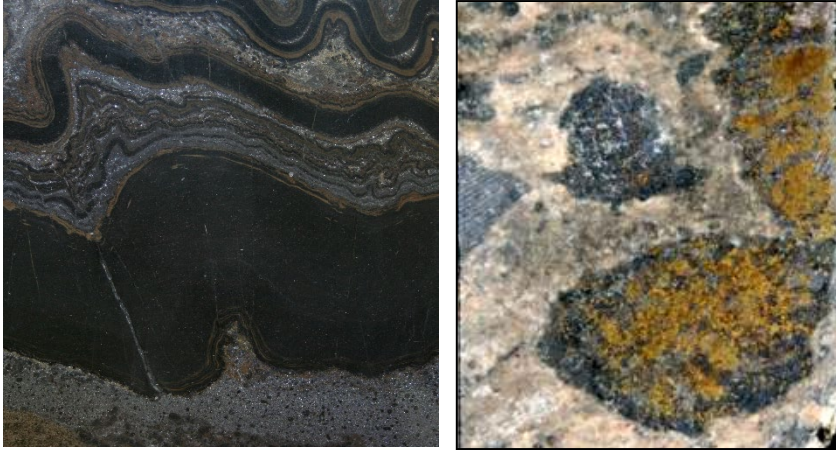# Geometallurgical research at SMI-JKMRC – building the foundations

Cathy Evans
Senior Research Fellow

Ore properties in processing – part of JKMRC DNA

Intrinsic Rock Attributes

Adaptive Machine Attributes

Mineral processing research in P9 project decoupled ore and machine characteristics

The GeM^{III} project

AMIRA P843 Geometallurgical Mapping and Mine Modelling (GeM$^{III)}$ project
– Started July 2005
– Four year project with one four year extension (P843A)

Collaborative research project:

JKMRC (SMI-UQ) a world-leader in applied mineral processing research.

BRC (SMI-UQ) – spatial modelling, optimisation in mine design and planning.
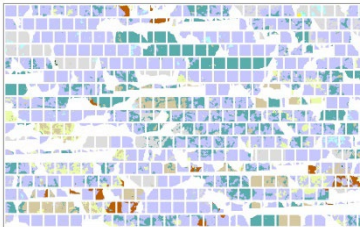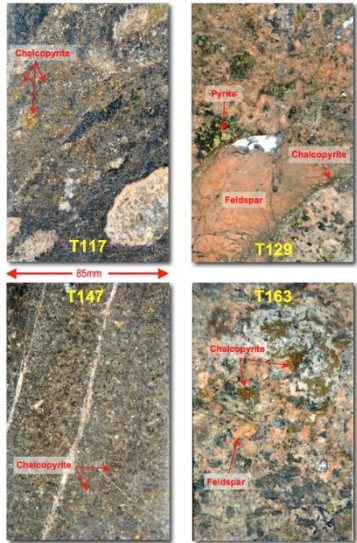

CODES ARC Centre of Excellence in Ore Deposits (UTAS) a world-leader in economic geology research.

CSIRO Exploration and Mining – automated core logging technologies.

GeM[III] project outcomes

Four JKMRC PhDs (plus three UTas PhDs)

Multi-Scale Image Analysis for Process Mineralogy – George Leigh

The Development of a Novel Method for Integrating Geometallurgical Mapping & Orebody Modelling – Luke Keeney

Development of a Methodology to Estimate Flotation Separability from Ore Microtexture – Cathy Evans

Integration and Analysis of Optical and MLA-Based Microscopy for Optimisation of Geometallurgical Modelling and Ore Deposit Characterisation – Richard Hartner

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

SMI | JKMRC
Julius Kruttschnitt Mineral Research Centre
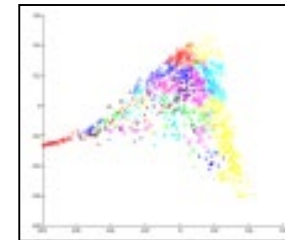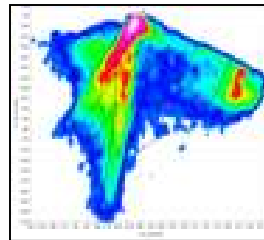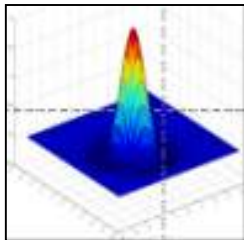
What's in a name?   Geomet research after GeM[III]

Since the end of AMIRA P843A, SMI-JKMRC has continued to perform research in this area

A novel geometallurgical approach to tailings storage facility characterisation and evaluation
Eugene Louwrens
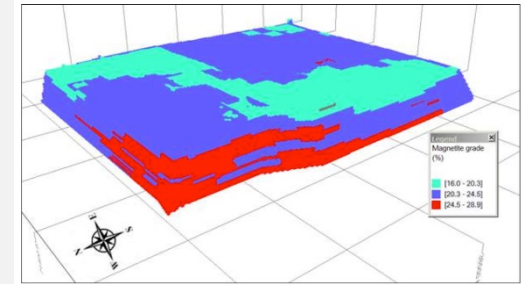
Development of a correlation between mineralogy, rock strength measures and breakage of copper porphyries
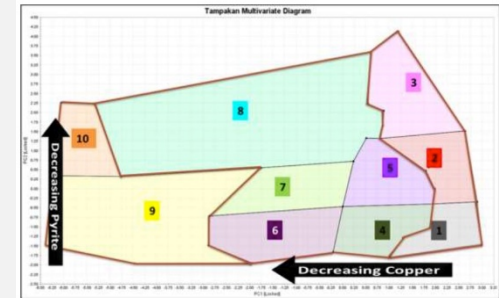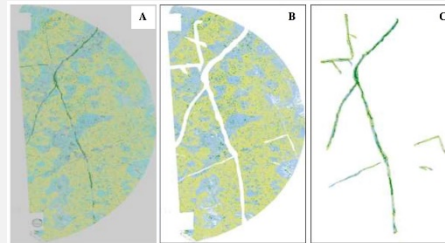Baris Yildirim
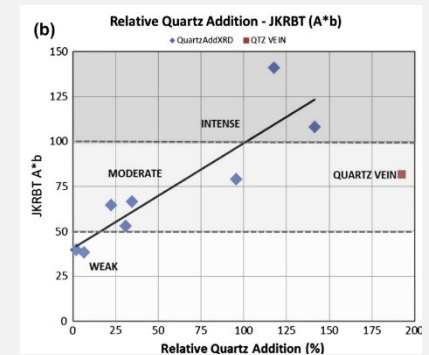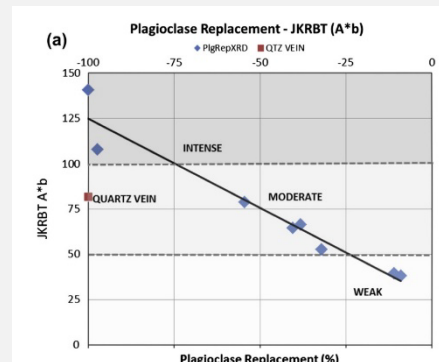
What's in a name?   Geomet research after GeM[III]

Since the end of AMIRA P843A research at JKMRC has continued to perform research in this area
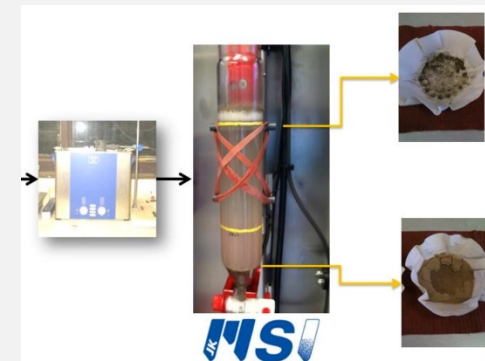
Investigating textural drivers for separation performance in a variable and complex ore body
Kate Tungpalan

Porphyry copper ore

Investigation of a mineral flotation separability test for ore characterisation in geometallurgy
Mitesh Chauhan

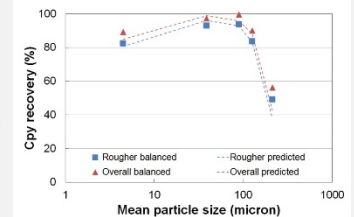*Small scale, low cost flotation test for geomet applications*

Mineralogy and texture - drivers for process behaviour

JKMRC has continued to quantify the relationships between ore properties (eg mineralogy/texture) and breakage/separation processes

The effects of mineral grain textures at particle surfaces on flotation response
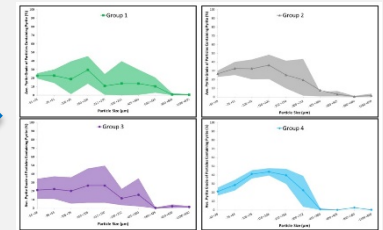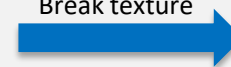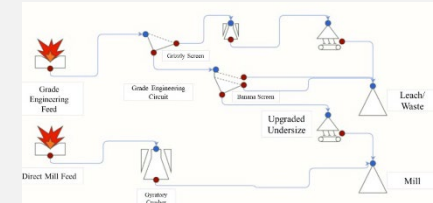Francois Vos

Measurement and modelling of the liberation and distribution of minerals in a comminuted ore
Riza Mariano

Break texture

Integrated assessment to quantify size based grade engineering operating strategies and economic impacts
Cristian Carrasco

Rapid assessment of the sorting potential of copper porphyry ores through modelling of textures and grade distributions – Greg Wilkie

Mineralogy and texture - drivers for process behaviour

Mill to Melt project – linking mineral processing and smelting

Proof of concept project to identify the most effective points in the concentrator-smelter process chain to apply energy to liberate waste

Modelling approach based on mineralogy and texture and observed liberation/ separation behaviours
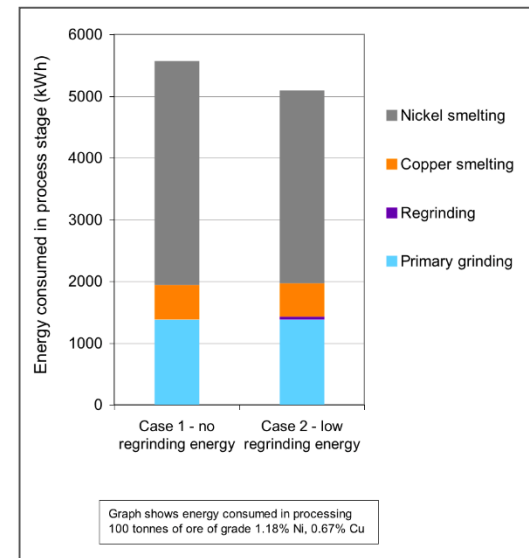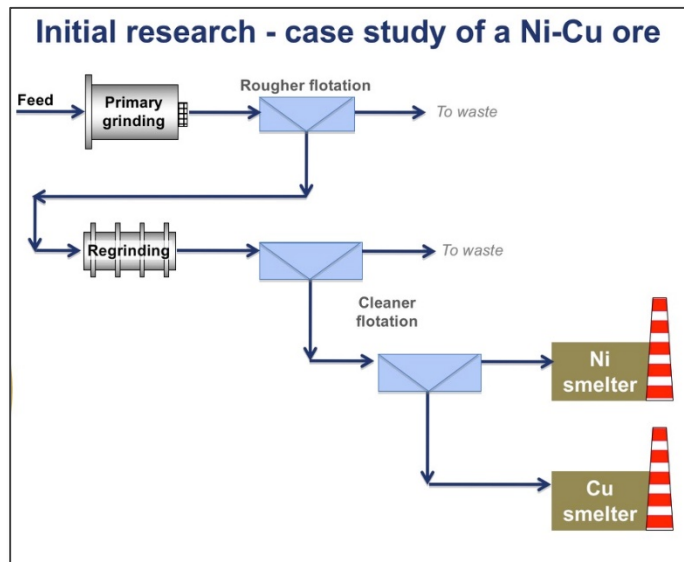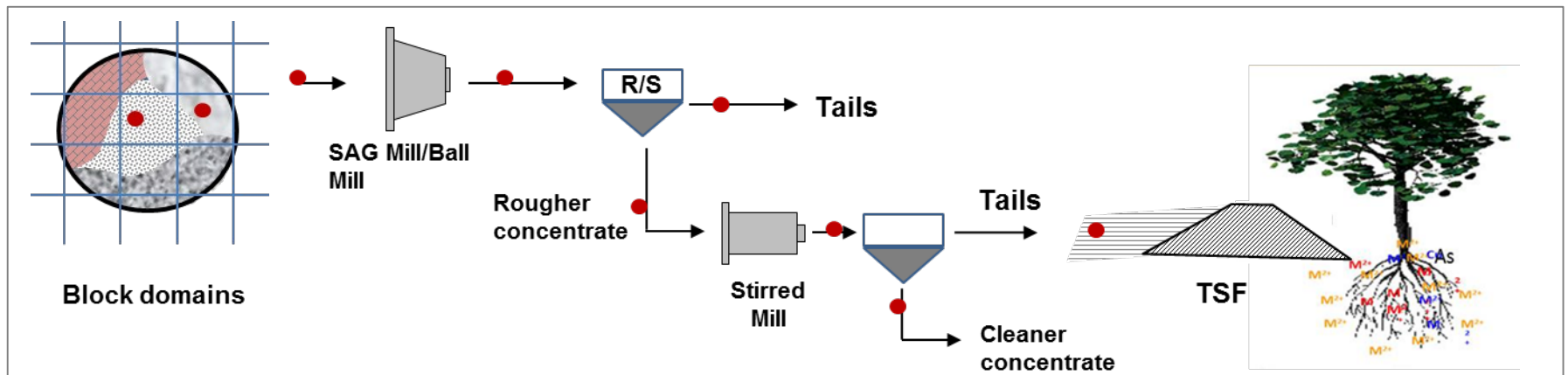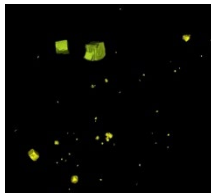
Designer Tailings

A proof of concept project to link process modelling with environmental models

- Collaboration between two SMI Centres - SMI-JKMRC and SMI-CMLR

Tested a simulation framework to predict tailings characteristics and model their rehabilitation

Quantified ore mineralogy and texture → **Simulation framework – P9 MDK** → **Size mineralogy, texture data as inputs to TSF models**

Tool to identify where in process chain to focus effort to improve tailings management practices

Current PhD research activities

The Use of Corescan Images in Predicting Breakage Characteristics – Anh Nguyen

Predicted Axb

Visual drill core logging | Predicted from drill core scan images

Linking quantitative mineralogy and texture to breakage properties of rocks at microscale – Pia Lois

MLA

10 mm

Optical

First Fracture Force (N) vs Particle Size (mm)