LIVE ONLINE COURSE

MINERALOGY
DIAGNOSTICS FOR COPPER AND GOLD

INSTRUCTORS:
Aparup Chattopadhyay, P.GEO. & PhD
Barun Gorain, P.ENG. & PhD.

Date: June 26 - 27, 2023

Schedule: From 4:00 p.m. to 9:00 p.m. (Peruvian time)

Why recovery so important in mining?

- To maximize value from an ore body or a mining operation, recovery is one of the key drivers whether it's for precious & base metals.

- The challenge, however, is that this source of revenue is constantly under threat due to various challenges such as increasing ore complexity, high ore variability, operational inefficiencies and lack of technical know-how.

- Also, environmental regulations, shortage of water, water quality along with high cost of energy and consumables put additional constraints on operational costs and recovery.

Learn how to do diagnostics mineralogy

1.Where is the metal in ores?

- Quantitative mineralogy
- Non-Sulfides gangue: quartz, clays, talc, mica, calcite, dolomite, organic carbon etc.

2. Why metal losses in tailings?

- Is it a liberation issue? (both values and gangue)
- Is it a chemistry issue? (mill, flotation and process water chemistry)
- Is it operational control issues?

3.Issues with concentrate quality?

- Is it locking?
- Is inadvertent activation an issue? e.g. entrainment of pyrite and non-sulfide gangue?
- Can we quantify minerals deportment?

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Learn the key concepts of Cu/Au-deportment

1. Combination of Classical mineralogy, Automated mineralogy, Microprobe/SEM-EDS, Dynamic SIMS/Laser Ablation ICP-MS.

2. Optical microscopy, XRD & QEMSCAN for Bulk Mineralogy, Visible Gold Morphology, Bulk modal & Individual Size Fractions, Liberation data for sulfides/Fe-Oxides and elemental copper deportment

3. Electron Micro-probe/SEM-EDS for Composition of Visible Gold/Sulfides & Trace Au-analysis in sulfides/Fe-Oxides/TCM

4. Dynamic SIMS/Laser Ablation ICP-MS for measurement of concentration of invisible-Au in sulfides/Fe- Oxides/TCM, depth profiling analysis for proportion of solid solution & colloidal gold.

5. Quantitative Gold Distribution (visible & In-visible Gold, and distribution of in-visible gold in different sulphides, Fe-Oxides and TCM)

Key concepts of recovery

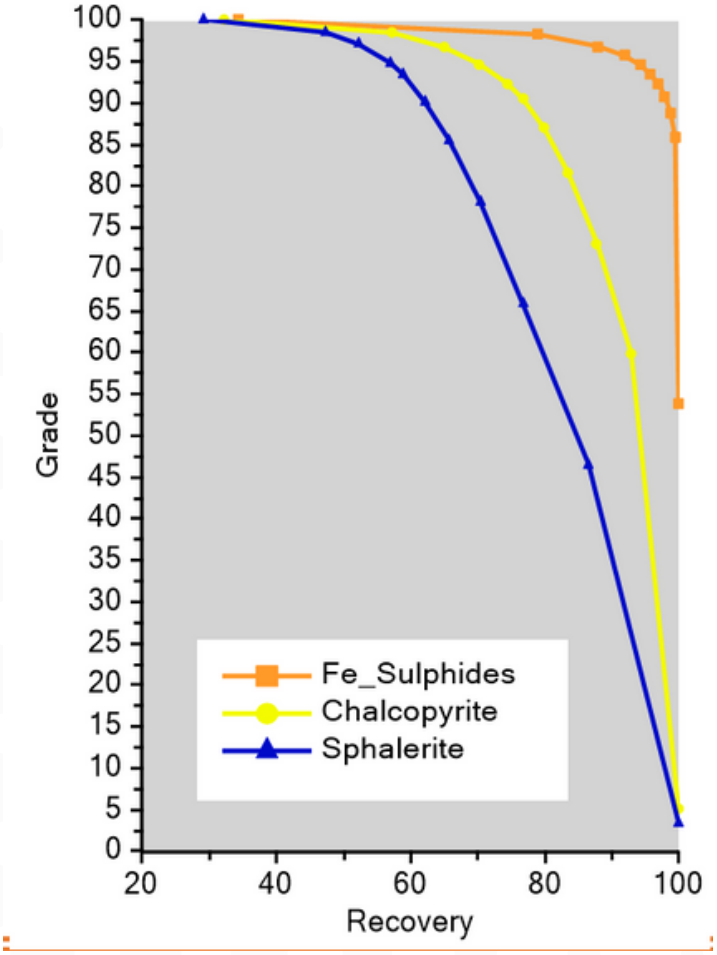
1. Quantify optimum liberation of sulfides & non-sulfide gangue minerals
2. Identify grind targets based on size distribution and not just P80
3. Provide a cleaner mill chemistry with right grind media
4. Set-up the optimum flotation & leach electrochemistry
5. Fine tune flotation & leach hydrodynamics for efficient capacity utilization
6. Leverage Digital to better control & sustain mill recovery
7. Economic-efficiency based flotation/leach operation through value-chain integration

Mineralogy Grade Recovery Curve

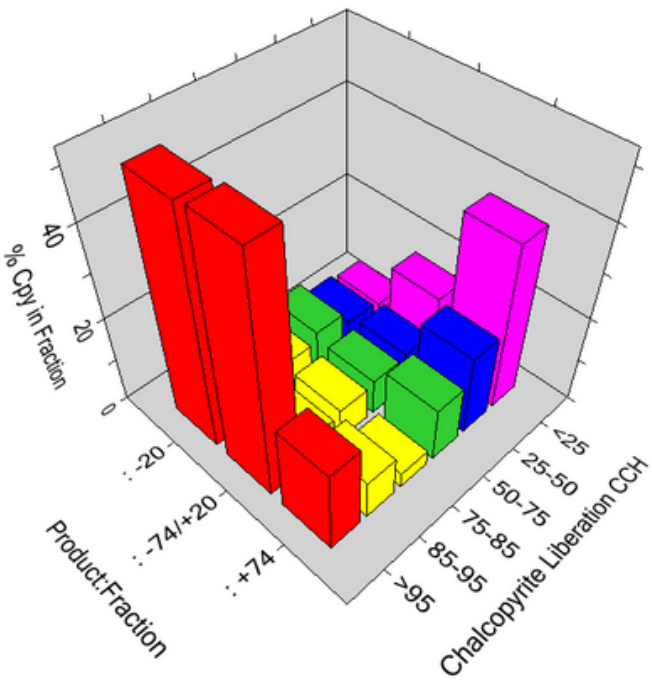
Global Grade/Recovery Curve Data

Pyrite		Chalcopyrite		Sphalerite	
Recovery	Grade	Recovery	Grade	Recovery	Grade
100.0	53.8	100.0	5.0	100.0	3.4
99.5	85.8	92.9	59.9	86.6	46.5
98.8	88.8	87.8	73.1	76.8	65.8
98.0	90.7	83.5	81.6	70.4	78.1
97.0	92.2	80.0	86.9	65.8	85.5
95.8	93.4	76.8	90.4	62.2	90.1
94.2	94.5	74.5	92.3	58.9	93.4
91.9	95.7	70.3	94.7	57.1	94.8
87.9	96.8	65.1	96.6	52.2	97.0
79.1	98.2	57.4	98.4	47.4	98.4
34.3	100.0	32.3	100.0	29.3	100.0

Theoretical Grade Recovery Curve



Chalcopyrite Inventory



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What we will learn in the 2-Day Workshop ?

DAY 1

1) Learn the basic principles & techniques for diagnostics mineralogy
(session 1: 2 hr) incl. 15 min break

2) Step-by-step application of IPMIN's methodology for various operations and projects
(session 2: 3 hr) includes 15 min break

DAY 2

3) Discuss problem solving case studies: Bring your mineralogy related challenges and discuss potential solutions (session 1: 3 hr) includes 15 min break

4) Conclusion: Panel Discussion involving Guest Speaker and Metallurgists: Improve recovery

- in your operation with IPMIN's Diagnostics Mineralogy Techniques (2 hr.)

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INSTRUCTOR 1

Aparup Chattopadhyay, P.GEO. & PhD.

- 25+ years in the gold and base metals industry focusing on quantitative gold-copper deportment and preg-robbing characteristics of carbonaceous matters (TCM).
- Extensive experience in precious metal deportment and quantitative mineral analysis for metallurgy diagnostics.
- IPMINS Inc.: Director & Lead Mineralogist since May 2015.
- PRO Inc.: Manager, Process Mineralogy.
- SGS Inc.: Senior Mineralogist, Advanced Mineralogy Facility.
- Ph.D. from Indian Institute of Technology, Kharagpur.
- M.Tech in Applied Geology from Indian Institute of Technology.
- Proprietary technique “Integrated gold and copper deportment”

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INSTRUCTOR 2

Barun Gorain, P.ENG. & PhD.

- 25+ years in the gold and base metals industry focusing on technology
- Extensive experience in plant operations, projects and new technologies
- Ore2Metal Inc.: Managing Director & Founder since June 2020.
- Hindustan Zinc: Chief Technology Officer for Hindustan Zinc, Vedanta
- Barrick Gold: Director of Strategic Technology Solutions
- Teck Corp: Group Leader based in Trail, British Columbia
- PhD from JKMRC, University of Queensland
- B.Tech in Mineral Engineering from Indian School of Mines.
- Patented technology “AMBS” commercially used at Barrick’s Jabal Sayid in Saudi Arabia and Antofagasta’s Esperanza in Chile for copper and copper-gold processing.

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INVESTMENT:
USD 800

- Bank transfers (commissions are not included)
- Payment link
- Western Union (request data)
- Money Gram ((request data)

Bank transfers

- **Deposit at Bank:**
  BANCO DE CRÉDITO DEL PERU
- **Beneficiary:**
  INTERNATIONAL METALLURGICAL CONSULTANTS S.A.C.
- **Account Number in Dollars :**
  193-1872625-1-12
- **SWIFT code :**
  BCPLPEPL
- **Inter- bankcode:**
  00219300187262511219
- **Bank Address :**
  Jr. Lampa 499. Lima , Peru

Payment link: https://pagolink.niubiz.com.pe/pagoseguro/INTERMET/1134820

Email:
informes@intermetperu.com
luciana.riva@encuentrometalurgia.com

Phone:
+ 51 989 975 959
+ 51 960 995 971
(01) 489 3145

WhatsApp:
wa.me/51989975959
wa.me/51960995971