



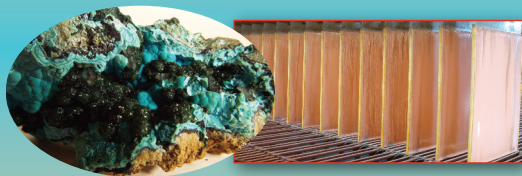
SAIMM
THE SOUTHERN AFRICAN INSTITUTE
OF MINING AND METALLURGY

BM
BASE METALS
2018

Copper Cobalt Africa

In Association with

The 9TH Southern African Base Metals Conference



Final Programme

9–12 July 2018

Avani Victoria Falls Resort, Livingstone, Zambia

FINAL PROGRAMME

MONDAY 9 JULY

- 08:00–12:30 **Short Course: An Introduction to the SAMREC and SAMVAL Codes**
Lion Room
- 08:00–16:30 **Short Course: Hydrometallurgical Processing of Cobalt**
Elephant Room
- 15:00–17:00 **Conference Registration**
Zebra Room
- 15:00–17:00 **Uploading of Tuesday presentations with Audiovisual Crew**
Giraffe Room
- 17:00–19:00 **Welcome Cocktail Party, sponsored by Sibelco Australia**
The Sundeck, Zambezi River, Royal Livingstone Hotel

TUESDAY AM 10 JULY

- 07:00–17:00 **Registration**
Zebra Room
- 07:00–14:00 **Uploading of Tuesday presentations with Audiovisual Crew**
Giraffe Room and Elephant Room

PLENARY SESSION I: COMBINED VENUE: GIRAFFE AND ELEPHANT ROOMS

Session Chair: Kathy Sole, *Consulting Hydrometallurgist (South Africa)*

- 08:15–8:25 **Opening of Conference**
Kathy Sole, *Conference Chair (South Africa)*

- 08:25–8:35 **Official Welcome from the Southern African Institute of Mining and Metallurgy**
Sehliselo Ndlovu, President of SAIMM (South Africa)
- 08:35–8:45 **Official Welcome to Zambia**
The Honourable Richard Musukwa, *Minister of Mines and Minerals Development (Zambia)*
- 08:45–9:25 **Keynote Address: Zambian mining's polymetallic future**
Sokwani Chilembo, *CEO of the Zambian Chamber of Mines (Zambia)*
- 09:25–9:55 **Premium Sponsor and Welcome Function Sponsor Sibelco (Australia)**
- 09:45–10:25 **Keynote Address: Cobalt and the rise of the lithium-ion battery megafactories**
Caspar Rawles, *Benchmark Mineral Intelligence (United Kingdom)*
- 10:25–10:35 **Premium Sponsor BASF (South Africa)**
- 10:25–10:35 **TEA BREAK**
- SESSION 1A–GENERAL: GIRAFFE ROOM**
Session Chair: Darius Muma, *Mopani Copper Mines and SAIMM Zambian Branch Chair (Zambia)*
- 11:05–11:30 **1A-1: The state of occupational safety in the South African mining industry: progress, successes and challenges**
S. Phakathi and K. Letsoalo, *Minerals Council of South Africa (South Africa)*

- 11:30–11:55 **1A-2: Training of engineering graduates in Zambia to meet mining industry needs**
J. Kapobe, C. Mazala and S. Simukanga, *Mopani Copper Mines and Zambian Higher Education Authority (Zambia)*
- 11:55–12:20 **1A-3: Production output of primary copper in South Africa: predicting future trends using the intensity-of use theory**
M.J. Nong, P.J.K. Leeuw and N. M. Cudjoe, *University of the Witwatersrand (South Africa)*
- 12:20–12:45 **1A-4: Project evaluation: the drivers behind a mineral project's value**
B. Botha, *VBKOM Consulting (South Africa)*

SESSION 1B–HYDROMETALLURGY I: ELEPHANT ROOM**Session Chair:** Tanja Marcus, *ProProcess (South Africa)*

- 11:05–11:30 **1B-1: Advances in cobalt recovery and purification**
C. Pawlik, *Mintek (South Africa)*
- 11:30–11:55 **1B-2: Milling in acidic raffinate solution in copper–cobalt hydrometallurgy circuits: the next step towards reducing operating costs**
E. Mkhize and S. Kumwenda, *SENET (South Africa)*
- 11:55–12:20 **1B-3: Frothing and froth control in copper leach washing and purification circuits**
N. Mautsa, M. Bower, B. Nel and J. Miller, *Kemira (South Africa and United Kingdom)*
- 12:20–12:45 **1B-4: Advances in design of copper–cobalt hydrometallurgical circuits: copper circuits**
G. Miller, *Miller Metallurgical International (Australia)*
- 12:45–13:45 **LUNCH BREAK**

TUESDAY PM 10 JULY**SESSION 2A–GEOLOGY & MINING I: GIRAFFE ROOM****Session Chair:** Steven Rupprecht, *University of Johannesburg (South Africa)*

- 13:45–14:10 **2A-1: Satellite synthetic aperture radar for mine and tailings dam monitoring**
N. Pendock, *DIRT Exploration (South Africa)*
- 14:10–14:35 **2A-2: Review of radar technologies for slope stability in open pit mines**
J. Oosthuizen, *VBKOM Consulting (South Africa)*
- 14:35–15:00 **2A-3: Determination of an effective slope monitoring regime for mining a failed zone on the north wall of Nchanga Open Pit 2**
C. Silwamba, S. Syamusana and B. Sikakwi, *(Zambia)*

SESSION 2B–SOLVENT EXTRACTION I: ELEPHANT ROOM**Session Chair:** Peter Cole, *Peter Cole Metallurgical Services (South Africa)*

- 13:45–14:10 **2B-1: Techno-economic evaluation of BASF's new high-temperature solvent extraction reagent**
J.J. Taute and S. Archer, *BASF and SENET (South Africa)*
- 14:10–14:35 **2B-2: Management of mixing continuity in a solvent-extraction plant with a leach solution of high silica at Ruashi Mining**
A. Kashala, G. Mitshabu, Y. Cheng, L./ Bradford, A. Modi and P. Tshisand, *Ruashi Mining and BASF (DR Congo)*
- 14:35–15:00 **2B-3: Silica mitigation in copper solvent-extraction circuits**
K.C. Sole, F. Crundwell, N. Dlamini and G. Kruger, *University of Pretoria, CM Solutions and Market to Africa (South Africa)*
- 15:00–15:30 **TEA BREAK**

SESSION 3A–GEOLOGY & MINING II: GIRAFFE ROOM**Session Chair:** Matt Mullins, *Tacoma Strategies (South Africa)*

- 15:30–15:55 **3A-1: An African Copperbelt-style district in Columbia: Insights from long-wave infrared satellite imaging**
D. Forest and N. Pendock, *N-Side Mining Technology (Singapore)*
- 15:55–16:20 **3A-2: Copper ore variability: benefits of advanced simulation**
M. Talikka, A. Remes, M. Hicks, J. Liipo, V.-P. Takalo, S. Khizanishvili and M. Natsvlishvili, *Outotec (Finland) and JSC RMG Copper (Georgia)*
- 16:20–16:45 **3A-3: A ranking methodology to prioritise artisanal and small-scale mining projects**
S. Rupprecht, *University of Johannesburg (South Africa)*

SESSION 3B–SOLVENT EXTRACTION II: ELEPHANT ROOM**Session Chair:** Gift Chisakuta, *BASF (Zambia)*

- 15:30–15:55 **3B-1: Additive to mitigate crud formation in solvent extraction operations**
B. Mbao, L. Cohen, A. Fischmann, L. Moya, M. Moser and O. Tinkler, *Solvay (Zambia and USA)*
- 15:55–16:20 **3B-2: Loaded organic was:ing for impurities removal from electrolyte**
D. Nel, J. Kyabu, T. Ngoy, P. Koji and P. Bwando, *Mutanda Mining and BASF (DR Congo)*
- 16:20–16:45 **3B-3: On-line analysis in solvent extraction process**
R. Abod, L. Koresaar, D. Moreno and T. Balbin, *Outotec and Cobre Las Cruces (Finland and Spain)*

WEDNESDAY AM 11 JULY07:00–15:00 **Registration**

Zebra Room

07:00–13:30 **Uploading of Wednesday presentations with Audiovisual Crew**

Giraffe Room and Elephant Room

PLENARY SESSION II–COMBINED VENUE: GIRAFFE AND ELEPHANT ROOMS**Session Chair:** Sehliselo Ndlovu, *University of the Witwatersrand and President of SAIMM (South Africa)*08:15–8:20 **Welcome and Announcements**08:20–9:00 **Keynote Address: The challenges of mining, particularly in Africa (including a brief history of First Quantum Minerals)**M. Pascal, *First Quantum Minerals Ltd (Zambia)*9:00–9:10 **Premium Sponsor: Outotec (South Africa)**9:10–9:50 **Keynote Address: Overview and outlook for the cobalt market**L. Smith, *Core Consultants (United Kingdom)*9:50–10:00 **Premium Sponsor: Solvay (USA)**10:00–10:30 **TEA BREAK****SESSION 4A–COMMINATION: GIRAFFE ROOM****Session Chair:** Vongani Nkuna, *Ivanhoe Mines SA (South Africa)*10:30–10:55 **4A-1: Assessing the benefits of automatic grinding control using particle size tracking technology for true on-line particle size measurement**R. Maron, C. O'Keefe and J. Sepulveda, *CiDRA Minerals and J-Consultants (USA and Chile)*

10:55–11:20 **4A-2: Influence of water balance and classifier choice on energy efficiency of milling circuits**

A. Hinde, E. Ford, J. Makola and A. Jan, *Independent consultant, Mintek, Derrick Solutions International and Derrick Corporation (South Africa and USA)*

11:20–11:45 **4A-3: Merits of optimised milling configuration on process performance: a case study of the mixed ore at Kansanshi**

C. Chongo, K. Ngoisa, P.A. Bepswa and A.N. Mainza, *Kansanshi Mine and University of Cape Town (Zambia and South Africa)*

11:45–12:10 **4A-4: Converting of Lubambe Copper Mine ball mill from grate discharge type to an overflow**

A. Mhone, *Lubambe Copper Mine (Zambia)*

12:10–12:35 **4A-5: Beneficiation of a complex low-grade chalcopyrite ore**

L. Mweene and S. Subramanian, *(India)*

12:25–13:30 **LUNCH BREAK**

SESSION 4B–ELECTROWINNING: ELEPHANT ROOM

Session Chair: Sudhir Thakurdin, *Hatch (South Africa)*

10:30–10:55 **4B-1: Design of a selection guide for copper electrowinning sizing: cell arrangement as a function of rectifier size for varying throughputs**

E. Forner, G. Miller, J. Scheepers and A.J. du Toit, *DRA Global and Miller Metallurgical International (South Africa and Australia)*

10:55–11:20 **4B-2: Advances in permanent cathode maintenance solutions**

L. Nordlund and H. van der Walt, *Outotec (Finland)*

11:20–11:45 **4B-3: Lead contamination of copper cathodes: direct electrowinning compared with leach/solvent extraction/electrowinning**

G. Mithshabu, C. Tshula, P. Tshisand, B. Faqing and A. Feather, *BASF, Gécamines Luilu Refinery and Ruashi Mining (DR Congo and South Africa)*

11:45–12:10 **4B-4: Determination of MCM2 copper cathode sampling regime**

O. Mahenga, D. Muma, B. Muleya, E. Musenge and G. Bwalya, *Mopani Copper Mines and Zambia Revenue Authority Mineral Beneficiation Laboratory (Zambia)*

12:10–12:35 **4B-5: Electrochemical characterisation of cobalt electrowinning from dilute sulphate solutions**

R. Wildenboer, *University of Pretoria (South Africa)*

12:25–13:30 **LUNCH BREAK**

WEDNESDAY PM 11 JULY

SESSION 5A–HYDROMETALLURGY II: GIRAFFE ROOM

Session Chair: Davies Kakengela, *Castle Lead (Zambia)*

13:30–13:55 **5A-1: MesoTherm™ bio-oxidation technology: a simple process for the treatment of base metal sulphide ores**

C. van Buuren, M. Nicolle and J. van Niekerk, *Outotec (South Africa)*

13:55–14:20 **5A-2: Laboratory column leaching of cobalt using raffinate and sodium metabisulphite**

P. Bwando, *BASF (Dr Congo)*

- 14:20–14:45 **5A-3: Acid bake–leach process for recovering copper and cobalt from complex sulphide–oxide concentrates**
P. Mwamba, J.H. Masinja, J. Manchisi and Y.R.S. Hara,
University of Zambia and Copperbelt University (Zambia)
- 14:45–15:10 **5A-4: Polymetallic processing within a circular economy**
P. van Staden, M. Gericke, V. Conic and D. Milanovic,
Mintek and Mining and Metallurgy Institute (South Africa and Serbia)

SESSION 5B–ION EXCHANGE AND MEMBRANES: ELEPHANT ROOM**Session Chair:** Johanna van Deventer, *Purolite (South Africa)*

- 13:30–13:55 **5B-1: Recovery of cobalt and nickel from acidic waste streams: effect of chloride, sulfate and column studies using phosphonic acid-functionalised silica**
J.T.M. Amphlett, S.E. Pepper, W. Peng and M.D. Ogden,
University of Sheffield (United Kingdom)
- 13:55–14:20 **5B-2: Cobalt–nickel pertraction refinery to process pregnant leach solution from recycled spent catalysts. Part 1: Cobalt extraction from a binary system**
N. Mans, D. van der Westhuizen, D. Bruinsma, P. Cole, J. du Toit, E. Munnik, A. Coates, V. Coetzee and H. Krieg,
Northwest University, Bruinsma Solutions, Peter Cole Metallurgical Services, DRA Global and Minemet (South Africa)
- 14:20–14:45 **5B-3: Metal removal from synthetic mine tailings leachates using fixed-bed ion-exchange columns**
A.L. Riley, S.E. Pepper, E.L. Sexton and M.D. Ogden,
University of Sheffield (United Kingdom)

- 14:45–15:10 **5B-4: Solvent-impregnated resins for niche applications in metal processing**
V. Yahorava, V. Bazhko and R.R. Leso, *Mintek (South Africa)*
- 15:10–15:30 **TEA BREAK**
- 15:30 Buses leave for River Cruise–pick-ups from AVANI Victoria Falls and Royal Livingstone Hotels
- 16:00–18:00 **Luxury Sunset Cruise and Game Viewing on the Zambezi River**
Sponsored by Axis House
African Queen and Lady Livingstone
- 18:30–22:00 **Boma Braai Conference Dinner**
Sponsored by ALS Global
Mukuni Boma, AVANI Victoria Falls Hotel

THURSDAY AM 12 JULY

- 07:00–16:00 **Registration**
Zebra Room
- 07:00–14:00 **Uploading of Thursday presentations with Audiovisual Crew**
Giraffe Room and Elephant Room

PLENARY SESSION III: COMBINED VENUE: GIRAFFE AND ELEPHANT ROOMS**Session Chair:** Jackson Sikamo, *Chairman and Country Manager Chibuluma Mines PLC (Zambia)*

- 08:15–8:20 **Welcome and Announcements**
- 08:20–9:00 **Keynote Address: P3-1: The Giant Kamoā–Kakula Project in the Democratic Republic of Congo**
S. Amos, V. Nkuna and B. Matsetela, *Kamoā Copper SA and Ivanhoe Mines (South Africa)*

- 9:00–9:10 **Cruise Sponsor and Social Media Sponsor**
Axis House (South Africa)
- 9:10–9:50 **Keynote Address: Urban mining and the pivotal role of hydrometallurgical approaches for recycling secondary source feeds**
B. Currie, *Ausenco (Australia)*
- 9:50–10:00 **Dinner Sponsor**
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- 10:00–10:30 **TEA BREAK**
- SESSION 6A–CONCENTRATION AND FLOTATION: GIRAFFE ROOM**
Session Chair: Shamudulu Shamaila, *WorleyParsons (South Africa)*
- 10:30–10:55 **6A-1: Empirical model of recovery response of copper sulphide circuit at Kansanshi Mine**
M. Lusambo and F.K. Mulenga, *Kansanshi Mine and University of South Africa (Zambia and South Africa)*
- 10:55–11:20 **6A-2: Relationship between Kansanshi ore mineralogy and copper recovery across different processing circuits**
L. Little, Q. McLennan, A. Prinsloo, B. Kaputula and C. Siame, *Kansanshi Mine (Zambia)*
- 11:20–11:45 **6A-3: Flotation process metering of concentrate, slurry, air and water flows using non-intrusive fibre-optic sensing**
D. Finfer, *Silixa Ltd. (United Kingdom)*
- 11:45–12:10 **6A-4: Continuous improvement of a copper concentrator by advanced flotation control**
P.D. Knoblauch, *Mintek (South Africa)*

- 12:10–12:35 **6A-5: Development of flotation reagent automated system**
C. Ngulube, W. Munalula and I. Mkandawire, *Kansanshi Mine (Zambia)*
- 12:35–13:00 **6A-6: Copper recovery from carboneous sulphide ores by flotation**
R.S. Magwaneng, K. Haga, A. Batnasan, A. Shibayama, M. Kosugi, R. Kawarabuki, K. Mitsuhashi and M. Kawat, *Akita University and Nittestu Mining (Japan)*
- 13:00–14:00 **LUNCH BREAK**
- SESSION 6B–PROJECTS AND OPERATIONS I: ELEPHANT ROOM**
Session Chair: Eleanore Forner, *DRA Global (South Africa)*
- 10:30–10:55 **6B-1: Processing of Copperbelt historical copper smelter slag through the Chibuluma concentrator and future prospects for maximising value recovery**
B. Kaluma, A. Mwanza and J. Sikamo, *Chibuluma Mines (Zambia)*
- 10:55–11:20 **6B-2: Innovative process design for oxide ores in the Democratic Republic of Congo**
D. Alexander, C. van der Merwe, R. Lumbule and J. Kgomo, *Eurasian Resources Group and Boss Mining (South Africa and DR Congo)*
- 11:20–11:45 **6B-3: BOSS 50: A fast-track project in the Democratic Republic of Congo**
A. Lathwood, *(DR Congo)*

- 11:45–12:10 **6B-4: The historic Kipushi zinc project in the Democratic Republic of Congo**
B. Masetela, V. Nkuna and S. Amos, *Ivanhoe Mines and Kamoa Copper SA (South Africa)*
- 12:10–12:35 **6B-5: The Mutoshi Project: Part 1–Metallurgical testwork, process design and project delivery**
P. Ilunga, D. Samal, M. Nicolle, M./ Lampi, K. Valkama, J. Edwards and N. Tatalias, *Consulting Metallurgist, Chemicals of Africa (Chemaf), Outotec and METC (DR Congo, South Africa and Finland)*
- 12:35–13:00 **6B-6: Copper refinery modernisation, Mopani Copper Mines plc, Mufulira, Zambia**
M. Chooye, R. Patel, A. Pranowo and B. O'Rourke, *Mopani Copper Mines and Glencore Technology (Zambia and Australia)*
- 13:00–14:00 **LUNCH BREAK**

THURSDAY PM 12 JULY

SESSION 7A–TAILINGS AND GENERAL: GIRAFFE ROOM

Session Chair: Alain Kabemba, *SIMEKA Infrastructure and Services (South Africa)*

- 14:00–14:25 **7A-1: Dewatering tailings for dry stacking: Rapid water recovery by means of centrifuges**
R. Klug, A. Rivadeneira and N. Schwarz, *Flottweg, benaventura and Schwarz Global Consulting (Germany, Peru and South Africa)*

- 14:25–14:50 **7A-2: Tailings thickener improvements at Sentinel Copper Mine**
M. Bower and M. Kynkaanniemi, *Kemira Chemicals and Minera Panama (United Kingdom and Panama)*
- 14:50–15:15 **7A-3: “Training for Life”**
J. Kapobe, M. Milupi, A. Lemmer, C. Mazala and R. Phiri, *Mopani Copper Mines (Zambia)*
- 15:15–15:40 **7A-4: Disruptive effect of battery recycling on the near future cobalt market**
N. Steenkamp, *Consulting Geologist and Geotechnical Engineer (South Africa)*

SESSION 7B–PROJECTS AND OPERATIONS II: ELEPHANT ROOM

Session Chair: Wezi Banda, *ERG Africa (South Africa)*

- 14:00–14:25 **7B-1: Operational experiences of Mufulira ISASMELT technology since inception**
J. Kapobe, J. Sasikumar, K. Chitundu, C. Mazala and R. Phiri
- 14:25–14:50 **7B-2: Sonic injection in sulphide smelting: an update**
J. Kapusta, *(Canada)*
- 14:50–15:15 **7B-3: Operational readiness: from project to operating asset**
R. Taute and P.M.J.G. Thomson, *SENOPS (South Africa)*
- 15:15–15:40 **7B-4: Outotec service portfolio and recent development in managing asset performance**
J. Lempainen and M. Lindemann, *Outotec (Finland)*
- 15:40–16:15 **TEA BREAK and CLOSE OF CONFERENCE**

NOTES

18:00 Arrival back at AVANI Victoria Falls and Royal Livingstone Hotels

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TECHNICAL PROGRAMME AT A GLANCE

Avani Victoria Falls Resort, Livingstone, Zambia

	Zebra	Giraffe	Elephant	Lion
Monday 9 July	Registration and Conference Secretariat		Short course: Hydrometallurgical processing of cobalt	Short course: SAMREC and SAMVAL codes
Tuesday 10 July	Registration and Conference Secretariat	Plenary I		
		General	Hydrometallurgy I	
		Geology and Mining I	Solvent Extraction I	
		Geology and Mining II	Solvent Extraction II	
Wednesday 11 July	Registration and Conference Secretariat	Plenary II		
		Comminution	Electrowinning	
		Hydrometallurgy II	Ion Exchange and Membranes	
Thursday 12 July	Registration and Conference Secretariat	Plenary III		
		Concentration and Flotation	Projects and Operations I	
		Tailings and General	Projects and Operations II	
Friday 13 July	Post-conference technical tour to Kansanshi Mine, Smelter, Concentrator and Hydromet Plant			

Copper Cobalt Africa 2018 Conference

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