

# Preliminary Programme · Hydrometallurgy 2016 · 1–3 August 2016

## Monday: 1 August 2016

07:00–08:00 **Registration & early morning refreshments**

08:00–08:10 **Opening Address:**  
*R.T. Jones, President, SAIMM*

### Session 1 **Plenary Session: S. Ndlovu**

08:10–08:50 **Keynote: Fundamentals of Hydrometallurgy: Solids, Solutions, and Nanoscience**  
*K. Osseo-Asare, Penn State University, USA*

08:50–09:30 **Keynote: Corrosion, leaching, crystallisation and flotation: four sides of the same coin**  
*F.K. Crundwell, CM Solutions, South Africa*

09:30–09:55 **The FLSmidth® Rapid Oxidative Leach (ROL) Process: A mechano-Chemical Approach and Industry Applications for Rapid Metal Sulphide Dissolution**  
*M. Mulligan, D. Chaiko, F. Baczek, S. Rocks, C. Eyzaguirre, C. Dickinson and R. Klepper, FLSmidth, USA*

09:55–10:20 **Extraction of Rare-Earth Elements from Iron-Rich Rare-Earth Deposits**  
*K. Bisaka, I.C. Thobadi and C. Pawlik, Mintek, South Africa*

10:20–10:30 **Sponsor Presentation: Solvay Cytec Group**

10:30–11:00 **Mid Morning Refreshments**

### Session 2A **Leaching: A. Mainza**

11:00–11:25 **A PhreeqC Model of Heap Leaching**  
*P.J. van Staden and J. Petersen, Mintek and University of Cape Town, South Africa*

11:25–11:50 **Chromium (VI) Generation During Dry and Wet Milling of Chromite Ore**  
*N.R. Mabwe, C. Chitsora and D.J. Simbi, University of Zimbabwe and Chinhoyi University of Technology, Zimbabwe*

11:50–12:15 **Indicative Vanadium Deposition in the Processing of Titaniferous Magnetite by the Roast-Leach and Electric Furnace Smelting Processes**  
*X.C. Goso, H. Lagendijk, M. Erwee and G. Khosa, Mintek, South Africa*

12:15–12:20 **Effects of Calcium Oxide on the Washing Behaviour of Secondary Zinc Oxides**  
*C. Benigni, C. Pichler and J. Antrekowitsch, University of Leoben, Austria (POSTER)*

12:20–12:25 **Purification of coal fly ash leach liquor for alumina recovery**  
*M. Rampou and S. Ndlovu, The University of the Witwatersrand, South Africa (POSTER)*

12:25–12:30 **Recovery of platinum group metals from dilute solutions: A review**  
*M.M.M. Mmonatau, University of the Witwatersrand, South Africa (POSTER)*

12:30–13:20 **Lunch**

### Session 2B **Value from Industry Waste: H. Potgieter**

11:00–11:25 **Comparison of Nitric and Sulphuric Acid Leaching of Metals from Printed Circuit Board Waste**  
*W.A. Rossouw and C. Dorfling, University of Stellenbosch, South Africa*

11:25–11:50 **Treatment of Printed Circuit Board Wastes by a Hydrometallurgical Process**  
*I. Birloaga, I. De Michelis and F. Vegliò, University of L'Aquila, Italy*

11:50–12:15 **A Kinetic Investigation of Iodine Leaching of Gold Leaf from Electronic Circuit Boards**  
*Z. Sadan, V. Ntozakhe, M. Amirudin, T. Moyo, D. Bradshaw and J. Petersen, University of Cape Town, South Africa*

12:15–12:20 **Microbial ferrous iron oxidation at low temperature conditions in a packed column bioreactors**  
*E. Chukwuchendo and T.V. Ojumu, Cape Peninsula University of Technology, South Africa (POSTER)*

12:20–12:25 **Arsenic Leaching from Mine Tailings by a Mesophilic Bacterial Culture in Continuous Stirred Tank Reactors**  
*D. Borja, R.A. Silva, K.A. Nguyen, J.H. Park, I.E. Ngoma, J. Petersen, and H. Kim Chonbuk National University Korea, Institute of Mine Reclamation Technology, Korea, University of Cape Town, South Africa (POSTER)*

12:25–12:30 **Spatial analysis of the colonisation of low grade mineral sulphide ore and its associated leaching in a 1 m bioleach column**  
*E. Ngoma, E. Govender-Opitz, R. Huddy, M. Smart, and S.T.L. Harrison, University of Cape Town, South Africa (POSTER)*

12:30–13:20 **Lunch**

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## Session 3A Leaching—Copper: J. Petersen

13:20–13:45 **The use of organic reducing agents on the extraction of Cu from oxidized exotic-Cu minerals**  
R. Lasnibat, A. Menzies and L.V. Velásquez, *Universidad Católica del Norte, Antofagasta, Chile and Universidad de Santiago, Chile* (Presentation only)

13:45–14:10 **Physical and Chemical Transformations of Gangue Materials during Leaching of Copper Ore Particles and their Influence on Copper Leaching Kinetics**  
T. Vargas, F. Rojas, C. Bahamondez, R. Castro, C. Ihle, M. Caraballo and E. Widzyk-Capehart, *University of Chile, Chile*

14:10–14:35 **Electrochemical study of copper sulfide minerals**  
L.B. Lazcano, M. Nicol and L.V. Velásquez, *Universidad Católica del Norte, Chile, Murdoch University and Universidad de Santiago, Chile* (Presentation only)

14:35–15:00 **Mid-afternoon refreshments**

## Session 4A Solvent Extraction and Ion Exchange: T. Thulare

15:00–15:25 **Value Recovery from Mukondo Mine Low-Grade Cobalt Ore by Heap Leaching and Solvent Extraction**  
M.B. Kime, E.K. Kanowa, A.F. Mulaba-Bafubiandi and S.N. Dyambi, *Université de Lubumbashi, University of Johannesburg, and Boss Mining, DRC*

15:25–15:50 **A Techno-Economic Evaluation of Copper Recovery from Mine Water using a Novel Continuous Ion-Exchange Process**  
J. Carr and C. van der Walt, *CleanTeQ, Australia, and Multotec Process Equipment, South Africa*

15:50–16:15 **Separation of Zirconium and Hafnium from  $(\text{NH}_4)_3\text{Zr}(\text{Hf})\text{F}_7$  using Amine based Extractants**  
E.W. Conradie, D.J. van der Westhuizen, J.T. Nel and H.M. Krieg, *North-West University and South African Nuclear Energy Corporation (SOC) Ltd. (Necsa), South Africa*

16:15–16:40 **Analysis of Equilibrium Isotherms of Ion Exchange Resin in Cyclic Duty**  
M. Maloka and A. Nesbitt, *Tibsen Technologies and University of Cape Town, South Africa*

16:40–17:05 **Development of a Pertraction Process for the Purification of Platinum-Group Metals**  
D.J. van der Westhuizen, O.S.L. Bruinsma and H.M. Krieg, *North-West University and, Bruinsma Solutions, Potchefstroom*

17:05–17:15 **Day 1 Closure**

17:30–19:00 **Networking Cocktail Function**

## Tuesday: 2 August 2016

07:00–08:00 **Registration & early morning refreshments**

08:00–08:10 **Welcome:**  
S. Ndlovu, *Conference Chair Person*

## Session 5 Plenary Session: S. Bhargava

08:10–08:50 **Keynote: Hydrometallurgy-its role in a circular economy**  
M. Reuter, *Helmholtz Institute Freiberg for Resource Technology, Germany*

08:50–09:30 **Keynote: Oxygen—Why is it ineffective as an oxidant in hydrometallurgical processes?**  
M.J. Nicol, *Murdoch University, Australia*

## Session 3B Precipitation and Crystallisation: M. Mulligan

13:20–13:45 **Ice Scaling in Continuous Eutectic Freeze Crystallization**  
D. Jooste, J. Chivavava and A.E. Lewis, *University of Cape Town, South Africa*

13:45–14:10 **Copper Sulphate Crystallisation Plants at Remote Ore Locations**  
D. Megaw, J. Moolman, P. Muzadi and T. Marcus, *ProProcess Engineering (Pty) Ltd, South Africa*

14:10–14:35 **Characterisation of Precipitate Formed during Iron and Precious Metal Removal from Sulphate Leach Solutions**  
R.J. Coetzee, C. Dorfling and S.M. Bradshaw, *University of Stellenbosch, South Africa*

14:35–15:00 **Mid-afternoon refreshments**

## Session 4B Bioprocessing: P. van Staden

15:00–15:25 **Conversion Kinetics of Cyanide to Thiocyanate in the Presence of Reduced Sulphur Species: Sulphite, Thiosulphate and Polysulphide**  
C. Burcher-Jones, S. Lodewyk, K. Shaik and J. Petersen, *University of Cape Town, South Africa*

15:25–15:50 **Extraction of Copper and Cobalt from Oxidized Ore using Organic Acids**  
S. Biswas and A.F. Mulaba-Bafubiandi, *University of Johannesburg, South Africa*

15:50–16:15 **Application of a Biological Fuel Cell Concept for the Bacterial Oxidation of Ferrous Ion in Leaching Solutions Containing High Concentrations of Chloride Ions**  
T. Vargas and G. Meruane, *University of Chile, Chile*

16:15–16:40 **Effects of Intermittent Irrigation on the Extraction of Copper from Mineral Sulphides using Heap-Bioleaching Systems**  
E. Vries and S.T.L. Harrison, *University of Cape Town, South Africa* (Presentation only)

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- 09:30–09:55 **Evaluation of Ozonation Technology for Gold Recovery and Cyanide Management during Processing of Double-Refractory Gold Ore**  
V. Bazhko and V. Yahorava, *Mintek, South Africa*
- 09:55–10:20 **Cyanide Biodegradation System to Treat Gold Mining Effluent and its Microbial Community Dynamics**  
D. Shin, J. Park, H. Park, M. Kim and J.C. Lee, *Korea Institute of Geoscience and Mineral Resources and Korea University of Science and Technology, Korea*
- 10:20–10:30 **Sponsor Presentation: Outotec**
- 10:30–11:00 **Mid-morning refreshments**
- Session 6A Water Treatment and Utilisation: O. Bazhko**
- 11:00–11:25 **A Review of Methods for the Quantification of Water Use in South African Mines**  
D. Dheda, C.M. Sheridan and K.G. Harding, *University of the Witwatersrand, South Africa*
- 11:25–11:50 **Acid Mine Drainage Water Treatment using the SAVMIN™ Process**  
M. van Rooyen, *Mintek, South Africa*
- 11:50–12:15 **Comparison of the Efficiency of Defluoridation by Titanium Dioxide and Fly Ash**  
J.H. Potgieter and R.M.C. Mathipa and M.P. Mawasha, *University of the Witwatersrand*
- 12:15–13:10 **Lunch**
- Session 7A Precipitation, Crystallisation and Adsorption: C. Dorfling**
- 13:10–13:35 **Effect of Ethylene Maleic Anhydride on the Particulate Processes during Hydrogen Reduction of Nickel Ammine Sulphate Solutions**  
R.A. Iloy and F. Ntuli, *University of Johannesburg, South Africa*
- 13:35–14:00 **Demonstration of Magnesium Hydroxide Recycle Technology Using an Elutriation Technique**  
S. Mokoena and C. Pawlik, *Mintek, South Africa*
- 14:00–14:25 **Purification of an Industrial Platinum-Group Metals Dilute Process Stream Using Waste Yeast Biomass Immobilized On Plaster Of Paris**  
D. Oke, S. Ndlovu and V. Sibanda, *University of the Witwatersrand, South Africa*
- 14:25–15:00 **Mid afternoon refreshments**
- Session 8A Value from Industry Waste: P. Cole**
- 15:00–15:25 **Development and Economic Assessment of a Lithium Battery Recycling Process in South Africa**  
B.D.H. Knights and F. Saloojee, *CM Solutions, South Africa*
- 15:25–15:50 **Hydrometallurgical Extraction of Strategic Metals from Engine-Reverted Turbine Blade Superalloy**  
R.R. Srivastava, M.S. Kim and J.C. Lee, *Korea University of Science and Technology (UST), Korea Institute of Geoscience and Mineral Resources (KIGAM), Korea*
- 15:50–16:10 **Recovery of Rare Earth Oxide from Phosphor Powder of Spent Fluorescent Lamp**  
S. Pramanik, M.K. Sinha, A. Kumari, M.K. Jha and S.K. Sahu, *CSIR-National Metallurgical Laboratory, India*
- 16:10–16:20 **Days 2 Closure**
- 17:30–22:00 **Dinner Function**

## **Session 6B Emerging Technologies: D. Tharandt**

- 11:00–11:25 **Novel Methods for the Recovery of Vanadium from Spent Catalysts**  
A. Kaka, N. Mahomed, M. Wessels and L. van Dyk, *University of the Witwatersrand, South Africa*
- 11:25–11:50 **Scoping Study of the Upgrading of Fluxed and Fluxless Tiianiferous Magnetite Slags using the Upgraded Slag Process**  
X.C. Goso, J. Petersen, J. Nell and K. Bisaka, *Mintek, University of Cape Town and Hatch, South Africa*
- 11:50–12:15 **Handling the disposal of fine coal slurries for waste minimisation and prevention of acid rock drainage**  
A. Kotsiopoulos, J. Broadhurst and S.T.L. Harrison, *University of Cape Town, South Africa (Presentation only)*
- 12:15–13:10 **Lunch**
- Session 7B Leaching—Uranium: M. Dworzanowski**
- 13:10–13:35 **A Value-Based Approach to Leach Optimization at Rössing Uranium Limited**  
N. Jansen van Rensburg and J. Petersen, *Rössing Uranium Limited, Namibia and University of Cape Town, South Africa*
- 13:35–14:00 **Kinetics of Uranium Extraction from Synthetic Coffinite – A Comparison with Synthetic Uraninite and Brannerite**  
H.S. Reynolds, R. Ram, M.I. Pownceby, J. Tardio, L. Jones and S.K. Bhargava, *RMIT University, Australia and CSIRO Mineral Resources, Australia*
- 14:00–14:25 **Process Chemistry and Mineralogy of Brannerite Leaching**  
R. Gilligan and A.N. Nikoloski, *Murdoch University, Australia*
- 14:25–15:00 **Mid afternoon refreshments**
- Session 8B Electrochemical Studies: V. Sibanda**
- 15:00–15:25 **Chalcopyrite dissolution using Electrochemical Tests**  
E.C. Beltrán, G. Frisch and G.L. Velásquez, *Institut Für Anorganische Chemie, Germany and University of Santiago, Chile*
- 15:25–15:50 **Probing the Surface Chemistry of Uranium Refractory Ores with a Microelectrode**  
L.A. Jones, R. Ram, J. Tardio, M. Pownceby, M. Chen and S. Bhargava, *RMIT University, Australia and CSIRO, Australia*
- 15:50–16:10 **Investigation of the Mechanism of Dissolution of Chalcopyrite using Photo-Effects**  
L.J. Bryson, A. van Aswegen, B. Knights and F.K. Crundwell, *Anglo American and CM Solutions South Africa*
- 16:10–16:20 **Days 2 Closure**

# Preliminary Programme · Hydrometallurgy 2016 · 1–3 August 2016

## Wednesday: 3 August 2016

07:00–08:00 **Registration and early morning refreshments**

08:00–08:10 **Welcome:**

S. Ndlovu, *Conference Chair Person*

### Session 9 **Plenary Session: F. Crundwell**

08:10–08:50 **Keynote: Hard times for the Resource Sector - a catalyst for innovation research**

S.K. Bhargava, *RMIT University, Australia*

08:50–09:30 **New Uranium Leach and Recovery Circuits using Developments from Copper Processing Technology**

G. Miller, *Miller Metallurgical Services Pty Ltd, Australia*

09:30–09:55 **Comparative Study of the Influence of Microwave Pretreatment on Zinc Leaching from Coarse Cone- and High-Pressure Grinding Roller-Crushed Sphalerite Ore**

E. Charikinya and S.M. Bradshaw, *Stellenbosch University, South Africa*

09:55–10:20 **Dissolution Kinetics of Copper Ores and Concentrate with Sea Water and Discard Brine**

V. Quezada and L. Velásquez, *Universidad Católica del Norte and Universidad de Santiago de Chile, Chile*

10:20–10:50 **Mid-morning refreshments**

### Session 10A **Value from Industry Waste: L. van Dyk**

10:50–11:15 **Recovery of Uranium from Nuclear Conversion Plant Waste**

M. Potgieter, J.C. Barry, D.J. van der Westhuizen, and H.M. Krieg, *NECSA and North-West University, South Africa*

11:15–11:40 **Processing of waste lithium ion batteries to recover cobalt as a valuable product**

M.K. Jha, S.K. Sahu and V.K. Jha, *CSIR-National Metallurgical Laboratory and ADV Metal Combine Pvt. Ltd, India (Presentation only)*

11:40–12:05 **Continued Development of the BIOX®, ASTER® and HiTeCC Processes**

J. van Niekerk, W. Olivier, C. van Buuren and T. Ritasalo, *Outotec, South Africa and, Finland*

12:05–12:30 **An investigation into the effect of Fe(III) concentration of the product characteristics of Fe(III) oxyhydroxide precipitates from acid mine drainage and bio-hydrometallurgical wastewater**

C. Mangunda, J. Petersen and A. Lewis, *University of Cape Town, South Africa (Presentation only)*

12:30–13:30 **Lunch**

### Session 10B **Leaching: T. Ojumu**

10:50–11:15 **Investigation of leach phenomena in large particles during heap leaching using X-ray Computed Tomography**

R. Ram, J. Petersen, M. Becker and D. Bradshaw, *University of Cape Town, South Africa (Presentation only)*

11:15–11:40 **A Kinetic Study of the Leaching of Chalcopyrite in Ammonia-Ammonium Sulphate Solutions**

T. Moyo and J. Petersen, *University of Cape Town, South Africa*

11:40–12:05 **Mitigation of the Process Dysfunctions Related to the Presence of Talcaeous Minerals in the Feed to a Copper Hydrometallurgical Plant Operating in Katanga, DR Congo**

L.M. Shengo, P. Kabwika, M.J. Matepa, C.W.N. Mutiti and J.-L.M. Mulumba, *University of Lumbumbashi and Mutantanda Mining Sprl, Kolwezi, DRC*

12:05–13:30 **Bioleaching of a Polymetallic Sulphide Ore from Capillitas (Argentina)**

P. Chiacchiarini, L. Surin, A. Ferrando, C. Cordero and A. Giaveno, *Universidad Nacional del Comahue and PROBIEN (CONICET-UNCo), Universidad Nacional del Comahue, Argentina*

12:30–13:30 **Lunch**