

Flotation '11

Sponsored by:



Sunday November 13th

- 14.00 Exhibition booth and poster set-up
- 17.00 Registration and wine reception (accompanying persons welcome)

Monday November 14th

- 07.00 Registration desk opens
Light breakfast of filled croissants, tea, coffee and fruit juice
- 08.00 Fundamentals Symposium Opening Remarks
B.A. Wills (MEI, UK) and D.J. Bradshaw (JKMRC, Australia)
- 08.20 **Keynote Lecture: Bubbles and flotation**
J.A. Finch (McGill University, Canada)
- 08.50 *Technical Session 1*
Chairmen: J. Yianatos (Santa Maria University, Chile) and A. Fredriksson (LKAB, Sweden)
- 08.50 **Effect of frother mobility on the bubble behaviour in bubble rise velocity measurements at the initial stages of bubble formation**
Z. Jávör, N. Schreithofer and K. Heiskanen (Aalto University, Finland)
- 09.10 **Comparison of bubble generation mechanisms for forced-air and self-aerated mechanical flotation machines**
S. Miskovic and G. Luttrell (Virginia Tech, USA)
- 09.30 **Effects of surfactant on rise velocity of large bubble**
R. Patro (College of the North Atlantic, Canada)
- 09.50 **The force of attraction between a bubble and an irregular particle**
A. Gautam and G.J. Jameson (University of Newcastle, Australia)
- 10.10 Coffee, poster viewing and exhibition
- 11.00 **A fundamental study on the role of collector in the kinetics of bubble-particle interaction**
L. Pan, S. Jung and R.-H. Yoon (Virginia Tech, USA)
- 11.20 **Variations in the induction period for particle-bubble attachment**
D.I. Verrelli, P.T.L. Koh, W.J. Bruckard and M.P. Schwarz (CSIRO, Australia)

- 11.40 **The relationships between the bubble-particle attachment time, solution chemistry and the mineralogy of a copper-sulphide ore**
B. Albjanic, D. Bradshaw (JKMRC, Australia) and A.V. Nguyen (University of Queensland, Australia)
- 12.00 **On measurement of bubble solids mass loading: an acoustic technique**
W. Zhang, S. Spencer, and P. Coghill (CSIRO Process Science and Engineering, Australia)
- 12.20 **Update on the measurement of bubble loading**
M.H. Moys (University of the Witwatersrand, South Africa), Pradip and A. Anubhav (Tata Consultancy Services, India)
- 12.40 **An apparatus to measure electrical charge of bubble swarms**
S. Uddin, L. Jin, Y. Li, M. Mirnezami and J.A. Finch (McGill University, Canada)
- 13.00 Lunch
- 14.00 *Technical Session 2*
Chairmen: P.R. Brito-Parada (Imperial College, UK) and D.I. Verrelli (CSIRO, Australia)
- 14.00 **Electrochemical behaviour of locked particles**
E.B. Tekes and Z. Ekmekci (Hacettepe University, Turkey)
- 14.20 **Improving the flotation of diamonds**
J. Zhang, D.L. Kouznetsov (Nalco Company, USA), M.K. Yu (BHP Billiton, USA), M. Rylatt (Sepro Mineral Systems, Canada) and R.-H. Yoon (Virginia Tech, USA)
- 14.40 **Effect of chemical composition on the ζ -potential of chromite**
R.F.S. Lima, J.B.A. Paulo (Universidade Federal do Rio Grande do Norte, Brazil), I. Matsuoka (Tohoku University, Japan) and P.R.G. Brandao (Universidade Federal de Minas Gerais, Brazil)
- 15.00 **Plasma-surface-modification: a pre-treatment for optimizing froth-flotation properties**
F. May (INP- Leibniz-Institut für Plasmaforschung und Technologie e.V., Germany)
- 15.20 **The development of an 'oxidation index' to characterise the extent of sulphide ore oxidation and predict flotation behaviour**
O. Bıcak and Z. Ekmekci (Hacettepe University, Turkey)
- 15.40 **Water quality—a comparative study between moncheite and pentlandite in mixture with pyroxene**
N.J. Shackleton, V. Malysiak and D. De Vaux (Anglo Research, South Africa)
- 16.00 Coffee
- 16.40 **Recycling of process water in sulphide flotation: effect of calcium and sulphate ions on galena flotation**
F. Ikumapayi, M. Makitalo, K.H. Rao (Luleå University of Technology, Sweden) and B. Johansson (Boliden Mineral AB, Sweden)
- 17.00 **Mechanisms for the improved flotation of ultrafine pentlandite and its separation from serpentine in saline water**
Yongjun Peng (University of Queensland, Australia) and D.J. Bradshaw (JKMRC, Australia)
- 17.20 **The relative adsorption of guar gum on pure minerals**
B. McFadzean, S.S. Mhlanga and C.T. O'Connor (University of Cape Town, South Africa)
- 17.40 **Colloidal properties of fatty acids as a function of pH and ionic strength**
A. Atrafi, M. Pawlik (University of British Columbia, Canada), C.O. Gomez and J.A. Finch (McGill University, Canada)

Tuesday November 15th

- 07.45 Light breakfast
- 08.40 *Technical Session 3*
Chairmen: G.J. Jameson (University of Newcastle, Australia) and B. McFadzean (University of Cape Town, South Africa)
- 08.40 **Coarse particle flotation in turbulent flow**
S. Goel and G.J. Jameson (University of Newcastle, Australia)
- 09.00 **Investigating the effect of energy input on flotation kinetics in an oscillating grid flotation cell**
W. Massey, M. Harris and D. Deglon (University of Cape Town, South Africa)
- 09.20 **A study of the role of the aspect ratio on the collection zone in a flotation cell**
E. Tabosa, P. Holtham (JKMRC, Australia), K. Runge, R. Crosbie (Metso Minerals, Australia) and J. McMaster (Rio Tinto, Australia)
- 09.40 **3D modelling and experimental studies of flotation cell configurations for a two-phase system**
P.R. Brito-Parada and J.J. Cilliers (Imperial College, UK)
- 10.00 **Positron emission particle tracking measurements of different sized particles in a flotation vessel**
K.E. Cole, B.J. Shean, S.J. Neethling and J.J. Cilliers (Imperial College, UK)
- 10.20 Coffee, exhibition and poster viewing
- 11.20 **Investigation of boundary conditions and assumptions in modelling of mineral froth flotation**
G. Wierink and K. Heiskanen (Aalto University, Finland)
- 11.40 **Froth transport model**
F. Contreras, J. Yianatos, C. Pino and L. Vinnett (Santa Maria University, Chile)
- 12.00 **Frothing phenomena in phosphate gangue flotation from magnetite fines with fatty acid based collector and MIBC frother**
A. Vilinska, K.H. Rao (Luleå University of Technology, Sweden), A. Fredriksson and G. Adolfsson (LKAB, Sweden)
- 12.20 **The effect of aspect ratio on the stable orientations of orthorhombic particles in a thin film**
G. Morris, S.J. Neethling and J.J. Cilliers (Imperial College, UK)
- 12.40 Lunch
- 14.00 *Technical Session 4*
Chairmen: N.J. Shackleton (Anglo Research, South Africa) and N.O. Lotter (Xstrata Process Support, Canada)
- 14.00 **Estimation of air recovery by measurement of froth transport over the lip in a bidimensional flotation cell**
J. Leiva, L. Vinnett, C. Pino and J. Yianatos (Santa Maria University, Chile)
- 14.20 **Developing flotation reagents for niobium oxide recovery from its ores**
Xiao Ni, M. Parrent, Mingli Cao and Qi Liu (University of Alberta, Canada)

- 14.40 **Surface properties of *ferroplasma acidiphilum* and their effect on the depression of pyrite**
M. Farahat (CMRDI, Egypt) and T. Hirajima (Kyushu University, Japan)
- 15.00 **The effects of mixed thiol collectors on the microflotation of pyrite and galena**
B. McFadzean, D. Castelyn and C.T. O'Connor (University of Cape Town, South Africa)
- 15.20 Coffee
- 16.00 **Interaction of hydroxamate reagents with copper oxide minerals and metal surfaces**
G. Hope, R. Woods, G. Parker (Griffith University, Australia), A. Buckley (University of New South Wales, Australia) and J. McLean (Axis House, Australia)
- 16.20 **The investigation of chrysocolla and malachite flotation using hydroxamates**
A. Numprasanthai, G.A. Hope (Griffith University, Australia), A.N. Buckley (University of New South Wales, Australia) and G. Sheldon (AMML Company, Australia)
- 16.40 **An investigation of depression of tennantite in copper flotation circuit**
D. Sato et al (Sumitomo Metal Mining Co. Ltd, Japan) and T. Hirajima (Kyushu University, Japan)
- 18.30 Coaches depart for conference dinner in Cape Town

Wednesday November 16th

- 07.30 Registration
Light breakfast
- 08.20 Applications Symposium Opening Remarks
J. Wills (MEI, UK) and J.-P. Franzidis (University of Cape Town, South Africa)
- 08.30 **Keynote Lecture: When are flotation models useful?**
D. Alexander (JKTech Pty Ltd, Australia)
- 09.00 *Technical Session 5*
Chairmen: K. Heiskanen (Aalto University, Finland) and C.J Greet (Magotteaux Australia Pty Limited, Australia)
- 09.00 **A probabilistic equation for flotation simulation**
D. Hatton and D. Hatfield (SGS Inc., Canada)
- 09.20 **A flotation simulator based on a first principles model**
K. Kelley, H. Do, I. Sherell, A. Noble, S. Kelles and R.-H. Yoon (Virginia Tech, USA)
- 09.40 **Predicting the flotation kinetics of liberated and composite particles**
G.J Jameson (University of Newcastle, Australia)
- 10.00 **Grade-recovery curves: a new approach for analysis of and predicting from plant data**
S. Neethling and J.J. Cilliers (Imperial College, UK)
- 10.20 Coffee and poster viewing
- 11.10 **Characterising the effect of mineralogy on flotation performance at Telfer operation**
G. Sandoval-Zambrano, E. Wightman and D. Bradshaw (JKMRC, Australia) and P. Manton (Telfer, Australia)
- 11.30 **PGM flotation prediction from automated SEM data**
C.L. Bushell, (Mintek, South Africa)

- 11.50 **Process optimization of mixed copper ores through real-time mineralogical analysis**
F.X. Paquot, M. Mumbi (First Quantum Minerals, Zambia) and K. Keet (Blue Cube Systems (Pty) Ltd, South Africa)
- 12.10 **Effect of morphology of altered silicate minerals on metallurgical performance: transport of Mg silicates to the froth phase**
T. Bhambhani and D.R. Nagaraj (Cytec Industries, USA)
- 12.30 **Recovering PGM's from chrome tailings – new art or more of the same?**
E. Nel (ENC Minerals, South Africa)
- 12.50 Lunch
- 14.00 *Technical Session 6*
Chairmen: K. Hadler (Imperial College, UK) and C.T. O'Connor (University of Cape Town, South Africa)
- 14.00 **An investigation into the effect of various ions and their ionic strength on the flotation performance of a platinum bearing ore from the Merensky reef**
M.S. Manono, K.C. Corin and J.G. Wiese (University of Cape Town, South Africa)
- 14.20 **A new modular pilot-scale setup for hydrodynamic and metallurgical flotation performance evaluation**
S. Miskovic and G. Luttrell (Virginia Tech, USA)
- 14.40 **Prediction of plant flash flotation performance using conventional laboratory methods**
B. Newcombe, E. Wightman and D. Bradshaw (JKMRC, Australia)
- 15.00 **Improving process control in flotation plants by using in-plant automated analytical laboratories**
P. Hofmeyr (IMP Automation, South Africa)
- 15.20 Coffee
- 15.50 **Industrial evaluation of a new flotation mechanism for large flotation cells**
J. Yianatos, L. Bergh, C. Pino, L. Vinnett (Santa Maria University, Chile), C. Muñoz (Collahuasi, Chile) and A. Yañez (Outotec, Chile)
- 16.10 **The effect of mixing mechanism developments on flotation cell metallurgical performance**
A. Rinne, Sami Grönstrand and R. Coleman (Outotec, Finland)
- 16.30 **Recovery of ultra-fines using Imhoflot pneumatic flotation – two pilot plant case studies recovering nickel and zinc from tailing streams**
R.M. Battersby, M. Battersby, S. Flatman (Maelgwyn Mineral Services Ltd, UK), T. Bragado (Rio Narcea Resources, Spain) R. Imhof and H. Sprenger (Maelgwyn Mineral Services Germany, Germany)
- 16.50 **The Amira P9 Project- 50 years of achievement and a vision for the future**
C. Brown (JKMRC, Australia)
- 17.10 Cocktail reception sponsored by AMIRA. Accompanying persons welcome

Thursday November 17th

- 07.45 Light breakfast
- 08.40 *Technical Session 7*
Chairmen: E. Wightman (JKMRC, Australia) and R.-H. Yoon (Virginia Tech, USA)
- 08.40 **Challenges in industrial experimental design: evaluating treatment effects in a scavenger application**
D. Govender, M. Nelson, D. Lelinski (FLSmidth, USA)
- 09.00 **Pilot scale direct flotation of a phosphate ore with silicate-carbonate gangue**
R.O. Albuquerque, J.A. Aquino (CDTN/CNEN, Brazil), C.A. Pereira (UFOP, Brazil) and A.E.C. Peres (UFMG, Brazil)
- 09.20 **Flotation level control with flow control pinch valves**
J. Häkkinen (Larox Flowsys, Finland)
- 09.40 **Monitoring of flotation performance by passive acoustic emissions**
S.J. Spencer, R. Bruniges, G. Roberts, V. Sharp, A. Catanzano, W. Bruckard and K. Davey (CSIRO Process Science and Engineering, Australia)
- 10.00 **Outotec's Virtual Experience for training operators in minerals processing**
K. Rönberg (Outotec Oyj, Finland) and P.i Lamberg (Luleå University Technology, Sweden)
- 10.20 Coffee
- 11.00 **Measuring flotation process using probe sensor based on 3D electrical resistance tomography**
A. Lehtikoinen, P. Laakkonen, M. Vauhkonen (Numcore Ltd, Finland), A. Rinne, K. Saloheimo (Outotec Oyj, Finland) and S. Lahteenmaki (Inmet Pyhäsalmi mine, Finland)
- 11.20 **The effect of froth depth on air recovery and flotation performance**
K. Hadler and J.J. Cilliers (Imperial College, UK)
- 11.40 **Application of a simplified method to model flotation grades and recoveries**
C.D. Smith and J.J. Cilliers (Imperial College, UK)
- 12.00 **The use of machine vision to predict flotation performance**
S.H. Morar, M.C. Harris (University of Cape Town, South Africa) and D.J. Bradshaw (JKMRC, Australia)
- 12.20 **On-line pulp chemistry monitoring for improved metallurgical performance**
C.J Greet (Magotteaux Australia Pty Limited, Australia)
- 12.40 Lunch
- 14.00 *Technical Session 8*
Chairmen: J.-P. Franzidis (University of Cape Town, South Africa) and D.J. Bradshaw (JKMRC, Australia)
- 14.00 **Pyrrhotite depression in Ni ores and its potential environmental implications**
T. Chimbanda, M. Becker, J.L. Broadhurst, S.T.L Harrison and J-P Franzidis (University of Cape Town, South Africa)

- 14.20 **Froth flotation for desulphurization and coal recovery: A comparative study of South African and Brazilian ultrafine colliery wastes**
J.R. Amaral Filho, I.A.H. Schneider (Federal University of Rio Grande do Sul, Brazil), C. K. Mbamba, S.T.L. Harrison, J.-P. Franzidis and J. Broadhurst (University of Cape Town, South Africa)
- 14.40 **Impacts of grinding media composition on the flotation of mixed oxides-sulphides copper ores**
S. Jacques and D. Bastin (University of Liège, Belgium)
- 15.00 **Effect of reducing grinding conditions on the flotation behaviour of low-S content PGE containing ores**
H. Miettunen, R. Kaukonen, S. Ojala, R. Keiski (University of Oulu, Finland) and K. Corin (University of Cape Town, South Africa)
- 15.20 **The effect of feed preparation on copper activation in the flotation of Mt. Keith pentlandite**
Yongjun Peng (University of Queensland, Australia) and D. Seaman (Newcrest Mining Ltd, Australia)
- 15.40 **Conference summary**
D.J. Bradshaw (JKMRC, Australia) and J.-P. Franzidis (University of Cape Town, South Africa)
- 15.55 **Closing Remarks and Invitation to Flotation '13**
A.J. Wills (MEI, UK)
- 16.00 Coffee and Wine (accompanying persons welcome)

Posters

Fundamentals Symposium

Air bubbles in iron ore green pellets due to flotation reagent: characterization by scanning electron microscopy and X-ray microtomography

I.U. Bhuiyan, J. Mouzon, J. Hedlund, F. Forsberg (Luleå University of Technology, Sweden) and S.P.E. Forsmo (LKAB, Sweden)

Effect of different spargers and operational parameters on gas hold-up in column flotation

M. Saffari and M. Iranajad (Amirkabir University of Technology, Iran)

Spectroelectrochemical investigation of hydroxamate with bastnasite (cerium) and rare earth oxides

J. Cui, G.A. Hope (Griffith University, Australia) and A.N. Buckley (University of New South Wales, Australia)

Flotation routes for a phosphate ore bearing silicate-carbonate gangue

R.O. Albuquerque, J.A. Aquino (CDTN/CNEN, Brazil), A.E.C. Peres and C.A. Pereira (Federal University of Minas Gerais, Brazil)

Influence of turbulence kinetic energy on bubble size distribution in different scale flotation cells

E. Amini, D.J. Bradshaw, M. Brennan (JKMRC, Australia) and J.A. Finch (McGill University, Canada)

Investigating the role of pulp chemistry on the floatability of a Cu-Ni sulfide ore

K.C. Corin, J. Mishra and C.T. O'Connor (University of Cape Town, South Africa)

Kaolinite and hematite microflotation using etheramine and ammonium quaternary salts

O.M.S. Rodrigues, A.E.C. Peres, A.H. Martins (Federal University of Minas Gerais, Brazil) and C.A. Pereira (Universidade Federal de Ouro Preto, Brazil)

An investigation into the role of dithiophosphate in the flotation of a PGM ore

K.C. Corin, J. Bezuidenhout and C.T. O'Connor (University of Cape Town, South Africa)

Novel collector development for coal flotation

C. Da Silva (Nalco Company, South Africa) and S. Blubaugh (Nalco Company, USA)

Amazon species saponified oils as apatite and calcite collectors

D.S. Costa, A.S. Alves (Universidade Federal do Pará, Brazil), A.E.C. Peres, A.B. Henriques and P.L. Pagani (UFMG, Brazil)

Interfacial properties of natural magnetite particles compared with their synthetic analogue

E. Potapova, M. Westerstrand, M. Grahm, A. Holmgren, J. Hedlund (Luleå University of Technology, Sweden) and X. Yang (Chinese Academy of Science, China)

The effect of frother type and dosage on flotation performance

J. Wiese and P. Harris (University of Cape Town, South Africa)

Effect of chloride salts on mean bubble diameter and bubble diameter distribution in a flotation column

L. Filippov and P. Piriou (Laboratoire environnement et minéralurgie, France)

An investigation into the role of froth phase in controlling chromite in the flotation of UG2 ore using a laboratory column flotation cell

M. Alvarez-Silva, J. Wiese and C.T. O'Connor (University of Cape Town, South Africa)

The interaction of the flotation reagent, n-octanohydroxamate, with sulfide minerals

G. Parker, R. Woods, G. Hope (Griffith University, Australia) and A. Buckley (University of New South Wales, Australia)

The use of the froth surface lamellae burst rate as a flotation froth stability measurement

S.H. Morar, M.C. Harris (University of Cape Town, South Africa) and D. J. Bradshaw (JKMRC, Australia)

AFM force measurements between gold and silver surfaces in xanthate solutions: effect of applied potentials

Z. Li and R.-H. Yoon (Virginia Tech, USA)

A model of froth motion to test flotation cell crowder designs—experimental validation with overflowing 2D foam

K.E. Cole, P. R. Brito-Parada and J.J. Cilliers (Imperial College, UK)

Determination of floatability using JKMSI and oxidation index methods

O. Bıcak, Z. Ekmekçi (Hacettepe University, Turkey) and D.J. Bradshaw (JKMRC, Australia)

How ore mineralogy can affect the flotation performance of the ore?

R.H. Tabatabaei and S.M.S.M. Vianna (University of Queensland, Australia)

Applications Symposium

A novel technology for preferential flotation recovery of molybdenite from a porphyry copper-molybdenum ore

Liu Guang-yi, Zhong Hong, Lu Yi-ping, Cao Zhan-fang, Xia Liu-yin and Wang Shuai (Central South University, China)

Novel collectors for PGM and Au minerals flotation

T. Bhambhani and D.R. Nagaraj (Cytec Industries, USA)

Reducing high ash Turkey-Erzurum-Oltu lignite coal's ash by flotation

O. Bilgin and M.K. Dilmac (Ataturk University, Turkey)

Barite upgrading for mud oil from jig tailing by column flotation

M. Saffari, M. Iranajad, S. Golshan (Amirkabir University of Technology, Iran) and M. Kashani (Azad University of Tehran, Iran)

Investigating the behaviour of secondary copper sulphide minerals at plant scale

E.M. Wightman, C L. Evans and D.J. Bradshaw (JKMRC, Australia)

The investigation of beneficiation of rutile ore with agglomeration and flotation

O. Bilgin and M.K. Dilmac (Ataturk University, Turkey)

Investigation into the mineralogy and flotation performance of oxidised Pt ore

M. Becker, J. Wiese (University of Cape Town, South Africa) and M. Ramonotsi (Boynton Investments, South Africa)

Carbonates content reduction in zinc ore concentrate

L. Martins (Votorantim Metais Zinco, Brazil), A.E.C. Peres, R. Galéry (UFMG, Brazil) and C.A. Pereira (UFOP, Brazil)

Application of column flotation in copper flotation circuit of CBI

O. Altun, M. Can, Z. Ekmekci (Hacettepe University, Turkey) and A. Aslan (Çayeli Bakır İşletmeleri, Turkey)

Flotation of coal and sulphur from South African ultrafine colliery wastes

C.K. Mbamba, J.-P. Franzidis, S.T.L. Harrison and J. Broadhurst (University of Cape Town, South Africa)

Dissolved air flotation in clarification of low turbidity waters using aluminum sulfate and *Moringa oleifera* seeds as coagulants

P.G.S. Ledo, J.B.A. Paulo and R.F.S. Lima (Universidade Federal do Rio Grande do Norte, Brazil)

Reagents type effects on smithsonite recovery by flotation

A. Mehdilo, H. Zarei, M. Irannajad and H. Arjmandfar (Amirkabir University of Technology, Iran)

Recovery of low grade uranium ores by froth flotation: study of the texture and synergetic effects of flotation reagents

L. Filippov, A. Duverger, I. Filippova (Nancy Université, France) and H. Kasaini (AREVA, BG Mines, France)

A review of copper-arsenic mineral removal from copper concentrates

G. Long (MMG Rosebery, Australia), Y. Peng (University of Queensland, Australia) and D. Bradshaw (JKMRC, Australia)

Modelling the concentrate percent solids from a flotation cell

D. Hatfield and D. Hatton (SGS Inc., Canada)

Modelling flotation performance using simplified pulp and froth models

C.D. Smith and J.J. Cilliers (Imperial College, UK)

The interaction of thiol collectors with anglesite in the presence of Mn(IV) under sulfuric acid condition

Ping Xiang et al (Central South University, China) and Yuandao Chen (Xiangqi Research Institute for Comprehensive Utilization of Mineral Resources, China)

The Significance of pulp and froth rheology in flotation performance

S. Farrokhpay (JKMRC, Australia)