

Biohydrometallurgy 2016 (Biohydromet '16)

Falmouth, United Kingdom
20 - 22 June 2016

ISBN: 978-1-5108-2669-4

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

All papers Copyright© 2016 by the respective author(s), and included in these proceedings by permission to the Minerals Engineering International.
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact the author(s) of the paper desired.

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Biohydromet '16



(Twitter #Biohydromet16)

Monday June 20th

- 09.10 *Technical Session 1*
Chairmen: C. Bryan (University of Exeter, UK) and A.H. Kaksonen (CSIRO, Australia)
- 09.10 [Keynote Lecture: Commercial heap biooxidation of refractory gold ores – revisiting Newmont’s successful deployment at Carlin](#)
F.F. Roberto (Newmont Mining Corporation, USA).....1
- 09.40 [In situ bioleaching: an alternative approach of metal extraction from deep-buried sulfide ores](#)
E. Pakostova, B.M. Grail and D.B. Johnson (Bangor University, UK).....9
- 10.00 [Selective bioleaching of uranium and phosphorus](#)
J. Mäkinen and P. Kinnunen (VTT Technical Research Centre of Finland, Finland).....30
- 10.20 Coffee
- 11.10 [Oxidative and reductive bioprocessing of cobalt bearing ores, and recovery of cobalt minerals via biosulfidogenesis](#)
S.L. Smith, B.M. Grail and D.B. Johnson (Bangor University, UK).....49
- 11.30 [Bioleaching of metal sulfides by *Ferrimicrobium acidiphilum* in the presence of chloride](#)
M. Kaszuba, S. Schopf, F. Giebner and M. Schlömann (TU Bergakademie Freiberg, Germany).....64
- 11.50 [The effects of high voltage pulse comminution on bioleaching of whole ore](#)
C.G. Bryan, T.D. Sambrook, R. Bransgrove (University of Exeter, UK) and K.P. van der Wielen (Selfrag AG, Switzerland).....74
- 12.10 [Growth of mesophilic microorganisms on low-grade ore in a simulated heap bioleaching environment](#)
E. Govender-Opitz and S.T.L. Harrison (University of Cape Town, South Africa).....76
- 12.30 [Investigation of preservation methods for salt-tolerant chalcopyrite bioleaching mixed cultures](#)
A. Balfour-Cunningham, N.J. Boxall, C. Morris (CSIRO Land and Water, Australia) and N.C. Banning (University of Western Australia, Australia).....87
- 12.50 Lunch
- 14.00 *Technical Session 2*
Chairman: S. Gaydardzhiev (University of Liege, Belgium)
- 14.00 [Using isothermal microcalorimetry to measure the metabolic activity of the mineral-associated microbial community in bioleaching](#)
D.X. Makaula, R.J. Huddy, M.A. Fagan-Endres and S.T.L. Harrison (University of Cape Town, South Africa).....107
- 14.20 [Comparative genomics on *Acidithiobacillus ferrooxidans*](#)
S. Schopf, L. Bläsing and M. Schlömann (TU Bergakademie Freiberg, Germany).....128

- 14.40 [Development of molecular assays to efficiently monitor and quantify microbial species during bioleaching of copper-rich ores](#)
S. Hedrich, A. Schippers (Federal Institute for Geosciences and Natural Resources, Germany), A.-G. Guézennec, M. Charron and C. Jouliau (Bureau de Recherches Géologiques et Minières, France).....143
- 15.00 [Toxicity of leaching additives on respiration activity of *Acidithiobacillus ferrooxidans*](#)
F. Giebner, M. Roder, M. Schlömann and S. Schopf (TU Freiberg, Germany).....164

Tuesday June 21st

- 09.00 *Technical Session 3*
Chairmen: A. Parbhakar-Fox (University of Tasmania, Australia) and P. D'Hugues (BRGM, France)
- 09.00 [Keynote Lecture: Current status and continued development of the BIOX Process](#)
J. van Niekerk (Outotec, South Africa).....173
- 09.30 [Influence of dissolved oxygen on the bioleaching efficiency of a mesophile to moderate thermophile consortium under oxygen enriched atmosphere](#)
A.-G. Guezennec, P. d'Hugues (BRGM, France), D. Ibarra (Air Liquide, France) and A. Archane (Milton Roy Mixing, France).....186
- 09.50 [The role of solution potential on the reductive leaching of Co\(III\) from oxide ore in the presence of mesophilic bacteria and added pyrite](#)
L. Zeka, A.I. Ndala (University of Lubumbashi, DR Congo), S. Gaydardzhiev and J. Frenay (University of Liege, Belgium).....195
- 10.10 [Selection of thermophiles for bioprocessing copper and nickel concentrates](#)
P.R. Norris, L. Laigle, T.J. Ogden and O.J.P. Gould (University of Exeter, UK).....204
- 10.30 Coffee
- 11.10 [Effect of bio-oxidation treatment time on gold recovery via cyanidation](#)
S. Ahoranta, G. Zou, A.-M. Lakaniemi, J. Puhakka (Tampere University of Technology, Finland) and R. Neitola (Geological Survey of Finland, Finland).....216
- 11.30 [Lithium recovery from lithium-containing micas using sulfur oxidizing microorganisms](#)
S. Reichel, T. Aubel, A. Patzig, E. Janneck and M. Martin (G.E.O.S. Ingenieurgesellschaft mbH, Germany).....235
- 11.50 [Mobilisation of metals from Kupferschiefer in neutral to alkaline environment using bulk and biotechnologically produced organic acids](#)
S. Kostudis, K. Bachmann, S. Kutschke, K. Pollmann and Jens Gutzmer (Helmholtz Institute Freiberg for Resource Technology, Germany).....254
- 12.10 [Inhibition of *Acidithiobacillus caldus* and the potential for adaptation to thiocyanate present in cyanidation tailings waste water](#)
C.J. Edward and S.T.L. Harrison (University of Cape Town, South Africa).....268
- 12.30 [Microbial ecology and solution chemistry of interstitial and flowing liquid phases during bioleaching of low-grade sulfide ore](#)
C.G. Bryan, S.M. Kay and V. Simov (University of Exeter, UK).....279
- 12.50 Lunch

- 14.00 *Technical Session 4*
Chairman: C. Brierley (BrierleyConsultancy, USA)
- 14.00 [The collaborative bioleaching of chalcopyrite by *Alicyclobacillus* and acidophiles](#)
M. Zhang, X. Liu, G. Wang, Z.Wang, W. Liu, J. Wen(General Research Institute for Nonferrous Metals, China) and C. Zhao (Weifang University of Science & Technology, China).....289
- 14.20 [Exploratory studies on the bioleaching of a pegmatite lithium ore](#)
M.C. Vila, A. Futuro, M.L. Dinis, S. Santos, A. Danko and A. Fiúza (University of Porto, Portugal).....293
- 14.40 [Study on the microbe-mineral interaction and their molecular mechanism based on synchrotron radiation techniques](#)
J. Xia, H. Liu, Z. Nie, L. Wang, Y. Yang, Y. Ma, H. Zhu, Y. Cui, H. Liu, C. Zhao and L. Liu (Central South University, China).....301
- 15.00 [Comparative study of S, Fe and Cu speciation transformation during chalcopyrite bioleaching by mixed mesophiles and mixed thermophiles](#)
H. Liu, J. Xia and Z. Nie (Central South University, China).....327
- 15.20 [Fungal biomineralization of pyromorphite and cerussite on the surface of lead metal](#)
C. Povedano-Priego, I.M. Sanchez, G. Tschuschke, I.S. Castro and L. M. Merroun (University of Granada, Spain).....353

Wednesday June 22nd

- 09.00 *Technical Session 5*
Chairmen: N. Boxall (CSIRO, Australia) and M.L. Torem (Pontifical Catholic University of Rio de Janeiro)
- 09.00 [Remediation of acidic metal-rich waste waters using sulfidogenic bioreactor sustained by algal biomass](#)
A.L. Santos and D.B. Johnson (Bangor University, UK).....379
- 09.20 [Biologically-induced precipitation of aluminium in synthetic acid mine water](#)
C. Falagan, D.B. Johnson (Bangor University, UK), F.J. Sánchez-España (Geological Survey of Spain, Spain) and I. Yusta (TheUniversity of theBasque Country, Spain).....391
- 09.40 [The effect of inoculum concentration on the biokinetic test for characterising acid rock drainage](#)
A.K.B. Opitz and S.T.L. Harrison (University of Cape Town, South Africa).....412
- 10.00 [Influence of flow and contact surface area on the mitigating efficiency of benign desulphurised tailings in ARD prevention from waste coal interburden](#)
A. Kotsiopoulos and S.T.L. Harrison (University of Cape Town, South Africa).....421
- 10.20 [Treatment of mine-site polluted water through biosorption](#)
S. Alam(University of Saskatchewan, Canada).....436
- 10.40 Coffee
- 11.20 [New approaches for recovering metals from mine wastes](#)
C. Falagan, B.M. Grail and D.B. Johnson (Bangor University, UK).....446
- 11.40 [Enhancing manganese recovery from mining waste by using mixed culture of indigenously isolated bacterial strains](#)
S. Ghosh, S. Nayak and A.P. Das (Siksha O. Anusandhan University, India).....469

- 12.00 [Solid phase analyses of chemically and biologically leached smelter slag](#)
A.H. Kaksonen (CSIRO Land and Water, Australia), S. Särkijärvi, J.A. Puhakka (Tampere University of Technology, Finland), E. Peuraniemi, S. Junnikkala (Boliden Harjavalta Oy, Finland) and O.H. Tuovinen (Ohio State University, USA).....481
- 12.20 [Bioleaching of steel slag for metal recovery](#)
V. Sjöberg and S. Karlsson (Örebro University, Sweden).....493
- 12.40 [Economic potential for reprocessing copper mine tailings in Chile](#)
M. Drobe, A. Schippers and J. Vasters (BGR Hannover, Germany).....522
- 13.00 Lunch
- 14.00 *Technical Session 6*
Chairman: S.T.L. Harrison (University of Cape Town, South Africa)
- 14.00 [Metal extraction from mine tailings using bioleaching at the Old Tailings Dam, Western Tasmania, Australia](#)
A. Parbhakar-Fox (University of Tasmania, Australia).....535
- 14.20 [Continuous tank bioleaching of mine tailings by a mesophilic bacterial culture](#)
D. Borja, R.A. Silva, H. Kim (Chonbuk National University, Republic of Korea), J. Park (Institute of Mine Reclamation Technology, Republic of Korea), I.E. Ngoma and J. Petersen (University of Cape Town, South Africa).....549
- 14.40 [Arsenic-binding siderophores from arsenic-resistant actinobacteria](#)
G. Retamal, Levicán (Universidad de Santiago, Chile), M. Mehnert, R. Schwabe, M. Schlömann and D. TischlerDirk (TU BergakademieFreiberg, Germany).....555
- 15.00 [From coal waste to soil substrate: a study on soil sulfur speciation after cultivation with *Panicum maximum*](#)
B.A. Firpo, J. Weiler, I.A.H. Schneider (Universidade Federal do Rio Grande do Sul, Brazil) and J.C.S.S. Menezes (Universidade do Oeste de Santa Catarina, Brazil).....568

POSTERS

- [Removal of calcium and magnesium ions from seawater by *Bacillus subtilis* strain LN8B for use in the flotation of molybdenum ores](#)
D. Arias, L. Cisternas and M. Rivas (University of Antofagasta, Chile).....576
- [Growth of the microalgae *Scenedesmus* sp. in a coal mining ARD treated by neutralization/precipitation](#)
A.P.P. Freitas, I.A.H. Schneider, B.A.F. Vasquez, N.N.V. Ramirez and M. Farenzena (Universidade Federal do Rio Grande do Sul, Brazil).....585
- [Crystal phase-dependence of chalcopyrite on its bioleaching by *Acidianusmanzaensis*](#)
J. Xia, H. Zhu, L. Wang, H. Liu and Z. Nie (Central South University, China).....591
- [In situ characterization of leaching products and adsorption property between chalcopyrite and *Sulfolobusmetallicus*](#)
J. Xia, L. Wang, H. Zhu, H. Liu and Z. Nie (Central South University, China).....612
- [Dependence of tolerance to heavy metal ions of *Acidianusmanzaensis* on extracellular polymer substance](#)
Z. Nie, Y. Cui, H. Liu, H. Liu and J. Xia (Central South University, China).....637
- [Bioflotation of hematite using the *RhodococcusErythropolis* strain as bioreagent](#)
C.A.C. Olivera, A.G. Merma and M.L.Torem (Pontifical Catholic University of Rio de Janeiro, Brazil).....655

Advances in mini-column testing for tracking bacterial oxidation of ferrous iron by using magnetic resonance imaging

A. Videla (Pontificia Universidad Católica de Chile, Chile).....671

Bioleaching of copper from brake pads dust using encapsulated biomass

F. Vermeulen and X. Nicolay (AsblMeurice R&D, Belgium).....683

Preliminary studies in mineral-specific bioleaching of Theisensludge

S. Eisen, M. Schlömann and S. Schopf (TU Bergakademie Freiberg, Germany).....N/A

BIOMore – An alternative mining concept

E. Pakostova and B. Johnson (Bangor University, UK).....N/A

Adhesion studies of microorganisms on natural sulphidic ore minerals

N. Eisen, S. Schopf and M. Schlömann (TU Bergakademie Freiberg, Germany).....N/A