Preliminary Technical Program

Beneficiation of Phosphates VII
An ECI Conference Series
March 29-April 3, 2015
Melbourne, Australia

Chair
Dr. Patrick Zhang
Florida Industrial and Phosphate Research Institute

Co-Chairs
Professor Jan Miller
University of Utah, USA
Dr. Julian Hilton
Aleff Group, United Kingdom
Professor Laurindo Leal Filho
University of Sao Paulo/Vale, Brazil
Dr. Abdelaâli Kossir
OCP Group, Morocco

Mr. Ewan Wingate
WorleyParsons Services Pty Ltd, Australia
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<td>16:00 - 19:00</td>
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<td>18:00 - 19:00</td>
<td>Welcome Reception</td>
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<td>19:00 - 21:00</td>
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Monday, March 30, 2015

06:30 - 08:30  Breakfast

**Opening Remarks**
08:30 - 08:35  
**Conference Chair:** Patrick Zhang, Florida Industrial and Phosphate Research Institute, USA

**Welcoming Remarks**
08:35 - 08:45  
**ECI Liaison:** Alan Hatton, Massachusetts Institute of Technology, USA

08:45 - 08:55  
Ewan Wingate, WorleyParsons Services Pty Ltd., Australia

**Session I: Comprehensive Extraction**

**Session Co-Chairs:** Abdelaali Kossir, OCP Group, Morocco  
Gary Albarelli, Florida Industrial and Phosphate Research Institute, USA

**Keynote 1:**
08:55 - 09:35  
Smart, sustainable development of phosphate resources: The prospects of phosphogypsum utilization and uranium recovery  
Julian Hilton, Aleff Group, United Kingdom

09:35 - 10:05  
Recovery of REE from an apatite concentrate in the nitrophosphate process of fertilizer production  
Mahmood Alemrajabi, Royal Institute of Technology (KTH), Sweden

10:05 - 10:35  
There and back again 2.5: Who did what in solvent extraction - a demonstrated and proven technology for uranium recovery from phosphoric acid  
Vaughn Astley, Dr. Phosphate, Inc., USA

10:35 - 11:05  
Coffee break

11:05 - 11:35  
Enrichment of rare earth elements from Florida phosphate flotation tailings  
Yan Wu, China University of Geosciences, China

11:35 - 12:05  
Rare earths and the recovery of administratium from phosphates  
Vaughn Astley, Dr. Phosphate, Inc., USA

12:05 - 12:35  
Upgrading phosphate flotation tailings for rare earths extraction  
Salah Al-Thyabat, Al-Hussein Bin Tall University, Jordan

12:35 - 14:15  Lunch
Session II: Process Innovation
Session Co-chairs: Laurindo Leal Filho, Vale, Brazil
Arafat Ghosheh, Saudi Arabian Mining Co. Ma’Aden, Saudi Arabia

Keynote 2:
14:30 - 15:15
The surface and colloid chemistry of layered silicate minerals
Jan Miller, University of Utah, USA

15:15 - 15:45
Tenova Bateman technologies: Tailor made approaches for mechanical beneficiation of phosphate rock
Leonid Lisiansky, Tenova Bateman Technology, Israel

15:45 - 16:15
Coffee break

16:15 - 16:45
Water quality effect in phosphate flotation: Understanding leads to overcoming
Lucas R. Moore, ArrMaz, USA

16:45 - 17:15
An alternative flotation process for apatite concentration of the Itataia carbonaceous uranium-phosphate ore
Elves Matiolo, Centro de Tecnologia Mineral, Brazil

17:15 - 17:45
Study on mineral processing of a medium to low grade phosphate ore
Mei Yang, China University of Geosciences, China

17:45 - 18:15
Application of pico-nano bubble generator in phosphate reverse flotation
Guoxin Wang, ArrMaz, USA

18:30 - 20:30
Dinner

20:30 - 21:30
Social Hour
Tuesday, March 31, 2015

06:30 - 08:30 Breakfast

Session III: Flotation Reagents
Session Co-Chairs: Chaucer Hwang, Mosaic Company, USA
Gerald Heebner, Arizona Chemicals, USA

Keynote 3:
08:30 - 09:15 The effect of dissolution kinetics on flotation response of apatite with sodium oleate
Laurindo Leal Filho, Vale Technological Institute, Brazil

09:15 - 09:45 Application of Custofloat® carbonate collectors in beneficiating phosphate ores in China
Guoxin Wang, ArrMaz, USA

09:45 - 10:15 Processing Florida dolomitic phosphate pebble with Custofloat® carbonate collectors
Guoxin Wang, ArrMaz, USA

10:15 - 10:45 Coffee break

10:45 - 11:15 Improvement of dolomite collector on high magnesium pebble sample from Florida
Patrick Zhang, Florida Industrial and Phosphate Research Institute, USA

11:15 - 11:45 Opportunities for flocculation/flotation treatment of phosphate slimes using temperature responsive reagents
Elizaveta Forbes, CSIRO, Australia

11:45 - 12:15 Phosphate beneficiation with novel collectors for direct and reverse flotation: Beyond low cost fatty acids
Pablo Dopico, Clariant Mining Solutions, USA

12:15 - 12:45 The use of lanthanum (La+3) and Cerium (Ce+3) ions as phosphate activators in low grade phosphate flotation
Salah Al-Thyabat, Mining Engineering Department, Al-Hussein Bin Talal University-Jordan, Jordan

12:45 - 14:15 Lunch

14:15 Optional excursion(s)

Dinner on own
**Wednesday, April 1, 2015**

06:30 - 08:30  Breakfast

**Session IV: Processing Equipment**  
**Session Co-Chairs:** Jaisen Kohmuench, Eriez Flotation Division, USA  
Abdelhak Kabbabi, OCP Group, Morocco

**Keynote 4:**  
08:30 - 09:15  Advances in particle characterization for improved mineral processing technology  
Jan D. Miller, University of Utah, USA

09:15 - 09:45  Column flotation of phosphate ore – An engineer’s perspective  
Ewan Wingate, WorleyParsons, Australia

09:45 - 10:15  Phosphate In Australia – So Near Yet So Far  
Ewan Wingate, WorleyParsons, Australia

10:15 - 10:45  Coffee break

10:45 - 11:15  Gravitational separation behavior of collophanite from dolomite in a packed column jig  
Wending Xiao, China University of Geosciences, China

11:15 - 11:45  Pilot testing and feasibility analysis of deep cone thickening for Florida phosphate clay (slime)  
Chaucer Hwang, The Mosaic Company, USA

11:45 - 12:15  Application of classification and fluidized-bed flotation at PCS aurora  
Jaisen Kohmuench, Eriez Flotation Division, USA

12:15 - 12:45  Understanding the comminution mechanism of high-pressure grinding rolls: Lower cost, higher efficiency and selectivity  
Francisco Sotillo, PerUsa EnviroMet, Inc., USA

12:45 - 14:15  Lunch

14:15  Group tour

19:00 - 21:00  Dinner

21:00 - 22:00  Social Hour
### Thursday, April 2, 2015

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<tr>
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| **Session V: Hydrometallurgy** | Session Co-Chairs: Vaughn Astley: Dr. Phosphate, Inc., USA  
Tibaut Theys, Prayon Technologies, Belgium |
| 08:30 - 09:15 | **Keynote 5:** Research progress on the production of industrial phosphoric acid and downstream phosphates from wet-process phosphoric acid in China  
Yuanxin Wu, Wuhan Institute of Technology, China |
| 09:15 - 09:45 | Newcomer in phosphoric acid process routes the DA-HF process ensures 2 to 3% of efficiency increase compared to a standard dihydrate plant with a limited number of extra equipment  
Tibaut Theys, Prayon Technologies, Belgium |
| 09:45 - 10:15 | Influence of crystallinity and dissolution kinetics on apatite flotation response with sodium oleate  
Laurindo Leal Filho, Vale Technological Institute, Brazil |
| 10:15 - 10:45 | Coffee break                                              |
| 10:45 - 11:15 | Acidulation of low grade collophanite using HCL for production of dihydrate gypsum whisker and effective compound fertilizer  
Zhangcheng Yu, Hu Ji Zhen Hubei Wo Yu Chemical Co., Ltd., China |
| 11:15 - 11:45 | Alloy 31 lining in hemihydrate reactors  
John Pannia, IPL Phosphate Hill, Australia |
| 11:45 - 12:15 | P₂O₅ reclamation from gypsum sacks  
Casey R. Hiette, IPL Phosphate Hill Operations, Australia |
| 12:15 - 12:45 | Improvement of valves and pumps for the phosphoric reactor circuit.  
Matthew Johnson, Incitec Pivot Limited, Australia |
| 12:45 - 13:15 | Environmentally friendly, energy efficient slurry handling by MULTISAFE double hose-diaphragm pumps  
Rudolf Gänsl, FELUWA Pumpen GmbH, Germany |
| 13:15 - 14:45 | Lunch                                                     |
Thursday, April 2, 2015

Session VI: Waste Utilization and the Environment
Session Co-Chairs: Julian Hilton, Aleff Group, United Kingdom
Salah Al-Thyabat, Al-Hussein Bin Talal University, Jordan

15:00 - 15:30
Overcoming the regulatory hurdles to recovering rare earths from phosphate
Gary Albarelli, Florida Industrial and Phosphate Research Institute, USA

15:30 - 16:00
An optimized approach to phosphate recovery
Jaisen Kohmuench, Eriez Flotation Division, USA

16:00 - 16:30
Recovery of rare earths from Florida phosphogypsum
Patrick Zhang, Florida Industrial and Phosphate Research Institute, USA

16:30 - 17:00
Coffee break

17:00 - 17:30
Environmental protection: An imperative of sustainable development in phosphate industry
Abdelhak Kabbabi, OCP Group S.A., Morocco

17:30 - 18:00
Phosphorus removal and recovery from waste water by bio-processing followed by microwave radiation
Patrick Zhang, Florida Industrial and Phosphate Research Institute, USA

18:00 - 18:30
Recovery of sulphur values from phosphogypsum: A historical review and prospects for the future
Gary Albarelli, Florida Industrial and Phosphate Research Institute, USA

19:30 - 22:00
Banquet
Friday, April 3, 2015

06:30 - 08:30  Breakfast

Session VII: Analysis and Control
Session Co-Chairs: Wending Xiao, China University of Geosciences, China
Michael Gaft, Laser Distance Spectrometry (LDS), Israel

09:00 - 09:30  ReLIBS (Remote Laser Induced Breakdown Spectroscopy) – Industrial online analyzer for phosphate industry
Michael Gaft, Laser Distance Spectrometry (LDS), Israel

09:30 - 10:00  The use of advanced process controls in a phosphoric acid reactor
Vaughn Astley, Dr Phosphate, Inc., USA

10:00 - 10:30  Coffee break

10:30 - 11:00  Suitability of Geoscan-M elemental analyser for phosphate rock
Derek Griffiths, Scantech International Pty Ltd, Australia

11:00 - 11:30  The impact of an increase in potassium content in the rock feed on the operation of the Phosphate Hill hemihydrate phosphoric acid plant
Gerhardus C. Du Plessis, Incitec Pivot Ltd, Australia

11:30 - 12:00  Optimization of Jordanian phosphate flotation by artificial neural network (ANN)
Salah Al-Thyabat, Al-Hussein Bin Talal University, Jordan

12:00 - 12:00  Lunch and departures