

*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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**Previous conferences in this series:**

***Beneficiation of Phosphates: Theory and Practice***

**December 5-10, 1993**

**Palm Coast, Florida**

*Conference Chairs:*

Ronald Wiegel, IMCF

Hassan El-Shall, Florida Institute Phosphate Research, USA

Brij Moudgil, University of Florida, USA

***Beneficiation of Phosphates II***

**December 6 - 11, 1998**

**Palm Coast, Florida**

*Conference Chairs:*

Patrick Zhang Florida Institute of Phosphate Research, USA

Ronald Wiegel, University of Minnesota, USA

Hassan El-Shall, Florida Institute Phosphate Research, USA

***Beneficiation of Phosphates III***

**December 2-7, 2001**

**St. Petersburg, Florida**

*Conference Chairs:*

Patrick Zhang Florida Institute of Phosphate Research, USA

P. Somasundaran, Columbia University, USA

Hassan El-Shall, Florida Institute Phosphate Research, USA

R. Stana, R. Squared S., Inc., USA

***Beneficiation of Phosphates IV***

**December 5-10, 2004**

**Miami Beach, Florida**

*Conference Chairs:*

Patrick Zhang Florida Institute of Phosphate Research, USA

Hassan El-Shall, Florida Institute Phosphate Research, USA

Jan Miller, University of Utah

R. Stana, R. Squared S., Inc., USA

***Beneficiation of Phosphates V***

**February 17-22, 2008**

**Rio de Janeiro, Brazil**

*Conference Chairs:*

Patrick Zhang Florida Institute of Phosphate Research, USA

Hassan El-Shall, Florida Institute Phosphate Research, USA

Laurindo Leal Filho, University of Sao Paulo, Brazil

Karen Swager, Mosaic Fertilizer LLC, USA

***Beneficiation of Phosphates VI***

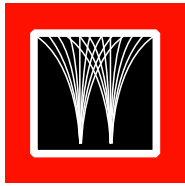
**March 6-11, 2011**

**Kunming, China**

*Conference Chair:*

Patrick Zhang Florida Institute of Phosphate Research, USA

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## **Sunday, March 29, 2015**

16:00 - 19:00	Conference check-in (Function Foyer)
18:00 - 19:00	Welcome Reception
19:00 - 21:00	Dinner

### **Notes**

- *All technical sessions will be in Parkside Room B.*
- *Meal locations will be announced on site.*
- *No recording, please! The use of any devices to capture images (e.g., camera or camera phones) or sound (e.g., tape and digital recorders) is strictly prohibited at all technical and poster sessions without the express written consent, obtained in advance, from ECI.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3-5 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile telephones to vibrate or off during technical sessions.*
- *Please write your name on your program so that it can be returned to you if lost or misplaced.*
- *After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.*



**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

**Monday, March 30, 2015 (continued)**

**Session II: Process Innovation**

**Session Co-chairs:** Laurindo Leal Filho, Vale Technological Institute, 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<sup>+3</sup>) and Cerium (Ce<sup>+3</sup>) 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**

George Piegols, PCS Phosphate, 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**

06:30 - 08:30 Breakfast

**Session V: Hydrometallurgy**

**Session Co-Chairs:** Vaughn Astley: Dr. Phosphate, Inc., USA  
Tibaut Theys, Prayon Technologies, Belgium

**Keynote 5:**

08:30 - 09:15

**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

**Acidulation of low grade collophanite using HCL for production of dihydrate gypsum whisker and effective compound fertilizer**  
Wending Xiao, China University of Geosciences (Wuhan), China

10:15 - 10:45

Coffee break

10:45 - 11:15

**Alloy 31 lining in hemihydrate reactors**  
John Pannia, IPL Phosphate Hill, Australia

11:15 - 11:45

**P<sub>2</sub>O<sub>5</sub> reclamation from gypsum sacks**  
Casey R. Hiette, IPL Phosphate Hill Operations, Australia

11:45 - 12:15

**Improvement of valves and pumps for the phosphoric reactor circuit.**  
Matthew Johnson, Incitec Pivot Limited, Australia

12:15 - 12:45

**Environmentally friendly, energy efficient slurry handling by MULTISAFE double hose-diaphragm pumps**  
Alan Frost, FELUWA Pumpen Australia, Australia

12:45 - 14:45

Lunch

**Thursday, April 2, 2015 (continued)**

**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 Lunch and departures