4-29-2018

Conference Program

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*FIPR Industrial and Phosphate Research Institute Florida Polytechnic University*

Jan Miller  
*University of Utah, USA*

Laurindo Leal Filho  
*University of Sao Paulo, Brazil*

Marius Porteus  
*Foskor, South Africa*

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Program

Beneficiation of Phosphates VIII
An ECI Conference Series

April 29 – May 4, 2018
Cape Town, South Africa

Chair
Dr. Patrick Zhang
FIPR Industrial and Phosphate Research Institute
Florida Polytechnic University

Co-Chairs
Professor Jan Miller
University of Utah, USA

Professor. Laurindo Leal Filho
University of Sao Paulo, Brazil

Mr. Marius Porteus
Foskor, South Africa

Dr. Neil Snyders
Stellenbosch Univ., South Africa

Mr. Ewan Wingate
WorleyParsons, Australia

Professor Guven Akdogan
Stellenbosch Univ., South Africa

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Hans Huckstedt, LL Namibia Phosphates
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Paul Kucera, Mosaic
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Jorgen Stenvold, Yara International ASA
Chuncheng Wei, China Bluestar Lehigh Eng. Corp.
Wending Xiao, Wuhan Inst. of Technology
Xiang Yang, China Univ. Geosciences
Zeqiang Zhang, Wuhan Institute of Technology
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
Beneficiation of Phosphates VII
March 29-April 3, 2015
Melbourne, Australia
Conference Chairs:
Patrick Zhang Florida Institute of Phosphate Research, USA
Jan Miller, University of Utah, USA
Julian Hilton, Aleff Group, United Kingdom
Laurindo Leal Filho, University of Sao Paulo/Vale, Brazil
Abdelaâli Kossir, OCP Group, Morocco
Ewan Wingate, WorleyParsons Services Pty Ltd, Australia
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Minerals Engineering International

Multotec Process Equipment

Scantech International Pty Ltd

Stefanutti Stock

Ultimate Flotation

Weir Minerals Africa
Sunday, April 29, 2018

16:30 – 18:00   Registration (Foyer of Conference Venue Hall A, Ground floor of conference center)
18:00 – 19:00   Welcome Reception - Wine Tasting (Business Lounge, 1st floor of conference center)
19:00 – 21:30   Dinner (Meeting Room 11, 1st floor of conference center)

**NOTES**

- Technical Sessions will be held in Conference Venue Hall A, on the ground floor of conference center.
- The ECI office will be the Organizer Office, ground floor of conference center.
- Breakfasts for those staying in the hotel will be in the hotel’s Square Cafe and Wine Bar.
- Dinners on Sunday, Monday and Thursday will be in Meeting Room 11, 1st floor of conference center.
- Dinner on Tuesday is “on your own.”
- Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before). Shengxi Wu will be assisting speakers in loading their presentations.
- Speakers – Please leave discussion time as previously directed by your session chair.
- 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, April 30, 2018

07:00 – 08:30  Breakfast

08:30 – 08:40  Welcoming Remarks
Conference Co-Chair, Marius Porteus, Foskor, South Africa

08:40 – 08:50  Opening Remarks
Conference Chair, Patrick Zhang, Florida Industrial and Phosphate Research Institute, USA

08:50 – 09:00  ECI & Vital Conference Information
Conference Organizer, Kevin Korpics, ECI, USA

09:00 – 12:05  Session I: Sustainability and the Environment
Session Co-Chairs: Marius Porteus, Foskor, South Africa
Luca Moore, ArrMaz, USA

09:00 – 09:35  Keynote 1
Surface Chemistry and Flotation Behavior of Monazite, Apatite, Ilmenite, Quartz, Rutile, and Zircon with Octanohydroxamic Acid
Corby Anderson, Colorado School of Mines, USA

09:35 – 10:00  Resource-Saving Technology for Processing By-Products of the Wet Phosphoric Acid Process – Phosphogypsum and Fluosillicic Acid to Produce Ammonium Sulfate
Maksim Tcikin, The Research Institute for Fertilizers, Russia

10:00 – 10:25  Recovery of High Purity Calcium Sulfate from Phosphogypsum I: Thermodynamic Study of SO₄²⁻ Purification
Zeqiang Zhang, Wuhan Institute of Technology

10:00 – 10:25  Coffee break

10:25 – 10:55  Dry Beneficiation of Phosphate Minerals Using a Triboelectric Belt Separator
Kyle Flynn, ST Equipment & Technology, USA

10:55 – 11:20  Removal of Coarse Fraction from Phosphatic Clays for Clay Settling Area Reduction and Additional Phosphate
Charles Guan, Mosaic Fertilizer, LLC, Florida, USA

11:20 – 11:45  Upgrading Phosphogypsum for Uses as Construction Materials
Wending Xiao, Wuhan Institute of Technology, China

11:45 – 12:05  Lunch
Monday, April 30, 2018 (continued)

14:30 – 17:40  **Session II: Comprehensive Extraction**

**Session Co-Chairs:** Neil Snyders, Stellenbosch University, South Africa  
Barend du Plessis, University of Pretoria, South Africa

14:30 – 15:05  **Keynote 2:**  
*Rare Earths Occurrence in Florida Phosphate Ore and Their Fate during Mining and Chemical Processing*  
Patrick Zhang, Florida Industrial and Phosphate Research Institute, USA

15:05 – 15:30  **The Recovery of Rare Earth Elements from Phosphate Rock and Phosphate Mining Waste Products Using A Novel Water-Insoluble Adsorption Polymer**  
Joseph Laurino, Periodic Products, Inc., Florida, USA

15:30 – 15:55  **A Novel Process to Recover Sulfur, Lime and Rare Earths from Gypsum**  
David van Vuuren, University of Pretoria, South Africa

15:55 – 16:25  Coffee break

16:25 – 16:50  **Hydrothermal Pre-Treatment Process of Phosphogypsum for Enhanced Rare Earths Recovery**  
Volha Yahorava, Mintek, South Africa

16:50 – 17:15  **Simultaneous Recovery of Rare Earths and Uranium from Wet Process Phosphoric Acid Using Solvent Extraction with D2EHP**  
Shengxi Wu, National Engineering Research Center for Rare Earth Materials, General Research Institute for Nonferrous Metals, Beijing, China

17:15 – 17:40  **Recovery of Thorium from Phosphogypsum by Acid Leaching**  
Tebogo Mashifana, University of Johannesburg, South Africa

19:00 – 20:30  Dinner

20:30 – 21:30  Social Hour (Business Lounge, 1st floor of conference center)
Tuesday, May 1, 2018

07:00 – 08:30  Breakfast

08:30 – 12:20  **Session III: Flotation Fundamentals and Reagents**  
**Session Co-Chairs:** Charles Guan, The Mosaic Company, USA  
André Silva, Federal University of Goiás, Brazil

08:30 – 09:05  **Keynote 3**  
**History and Future of Phosphate Mining and Beneficiation in South Africa**  
Marius Porteus, Foskor, South Africa

09:05 – 09:30  **How to Truly Optimize Phosphate Flotation, When Feed Grade is Ever-changing**  
Lucas R. Moore, ArrMaz, USA

09:30 – 09:55  **New Reagent Development for the Beneficiation of Various Phosphate Ores**  
Pablo Dopico, Clariant Mining Solutions, USA

09:55 – 10:20  **Mine Arnaud Project: Flotation Circuit Adjustment and Collector Reduction**  
Christine Croteau, COREM, Canada

10:20 – 10:40  Coffee break

10:40 – 11:05  **Case Study for Processing Phosphate Ores Worldwide**  
Guoxin Wang, ArrMaz, USA

11:05 – 11:30  **Evaluation of the Effect of Ca²⁺ Ion Concentration on Calcite Flotation of Santa Quitérias’S Ore Using Carbonic Gas**  
Amanda Soares, Centro de Tecnologia Mineral (CETEM), Brazil

11:30 – 11:55  **Investigation of the Mechanism of Apatite/Carbonates Separation in Acidic Flotation Process Using In Situ Raman Spectroscopy**  
Lev Filippov, Université de Lorraine, France

Mohammed El Asri, Sidi Mohamed Ben Abdellah University, Morocco

12:30 – 14:00  Lunch

14:00  Free time/Optional self-organized excursion(s)

Dinner on your own
**Wednesday, May 2, 2018**

07:00 – 08:30
Breakfast

08:30 – 12:00
**Session IV: Flotation Fundamentals and Reagents Part 2**
Session Co-Chairs: Pablo Dopico, Clariant Mining Solutions, USA
Volha Yahorava, Mintek, South Africa

08:30 – 09:00
**Tailoring Collectors to Allow for Sea Water Usage in Phosphate Beneficiation**
Lucas R. Moore, ArrMaz, USA

09:00 – 09:30
**The Surface Chemistry and Microflotation of Xenotime and Depression of Gangue Minerals**
Corby Anderson, Colorado School of Mines, USA

09:30 – 10:00
**Heavy Metal Contamination and Health Risk Assessment in Waste Mine Water Dewatering Using Phosphate (oral132s1) Beneficiation Processes**
Mohammad Salem Al-Hwaiti, Al-Hussein Bin Talal University, Jordan

10:00 – 10:30
Coffee break

10:30 – 11:00
**Alternative Depressor for Apatite Flotation**
André Carlos Silva, Federal University of Goiás, Brazil

11:00 – 11:30
**Separation of Dolomite from Phosphate at Low Cost and Reduced Environmental Impact**
Wending Xiao, Hubei Bonan Technology Co., Ltd, China

11:30 – 12:00
**Using Two Alternative Vegetable Oil’s as Collector in Apatite Froth Flotation**
André Carlos Silva, Federal University of Goiás, Brazil

12:30 – 14:00
Lunch

14:00 – 19:00
Group Tour (City tour of Cape Town and trip up Table Mountain) followed by transfer to Gold Restaurant

19:00 – 21:00
Off site dinner at Gold Restaurant (with transfer back to hotel)
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00 – 08:30</td>
<td>Breakfast</td>
</tr>
<tr>
<td>08:30 – 11:40</td>
<td><strong>Session V: Hydrometallurgy</strong>&lt;br&gt;<strong>Session Co-Chairs:</strong> Christine Croteau, COREM, Canada&lt;br&gt;Guven Akdogan, Stellenbosch University</td>
</tr>
<tr>
<td>08:30 – 09:05</td>
<td><strong>Keynote 4</strong>&lt;br&gt;Latest Trend for Fluorine in the Phosphoric Industry: Absorption Efficiency Improvement, Conversion into Raw Material&lt;br&gt;Tibaut Theys, Prayon Technologies, Belgium</td>
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<td>09:05 – 09:30</td>
<td><strong>Can Your P₂O₅ Be Commercially Exploited?</strong>&lt;br&gt;Ewan Wingate, WorleyParsons, Australia</td>
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<tr>
<td>09:30 – 09:55</td>
<td><strong>How Phosphate Rock Quality Impacts the Phosphoric Acid and Granulation Plant Operations</strong>&lt;br&gt;Curtis Griffin, PegasusTSI, USA</td>
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<tr>
<td>09:55 – 10:20</td>
<td><strong>Recovery of Rare Earths and P from Pre-concentrated Phosphate Flotation Tails by Sulfuric Acid Leaching</strong>&lt;br&gt;Patrick Zhang, FIPR Institute, USA</td>
</tr>
<tr>
<td>10:20 – 10:50</td>
<td>Coffee break</td>
</tr>
<tr>
<td>10:50 – 11:15</td>
<td><strong>Revisiting the Merseburg Process: Economic Opportunity and Environmental Benefit?</strong>&lt;br&gt;Gary Albarelli, Florida Industrial and Phosphate Research Institute, USA</td>
</tr>
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<td>11:15 – 11:40</td>
<td><strong>Recovery of Rare Earth Elements from Phosphate Rock by Hydrometallurgical Processes - A Critical Review</strong>&lt;br&gt;Shengxi Wu, National Engineering Research Center for Rare Earth Materials, General Research Institute for Nonferrous Metals, Beijing, China</td>
</tr>
<tr>
<td>12:00 – 13:30</td>
<td>Lunch</td>
</tr>
</tbody>
</table>
Thursday, May 3, 2018 (continued)

14:00 – 17:15  
**Session VI: Advances in Processing Technology and Equipment**  
**Session Co-Chairs:** Dan Darlington, JR Simplot Co., USA  
Johan Van Niekerk, Ultimate Flotation, South Africa

14:00 – 14:25  
**Physical Separation of High Grade and Low Grade African Phosphates**  
Deepika Babu Dayal, Mintek, South Africa

14:25 – 14:50  
**Evaluation of an Aguia Resources-Três Estradas Brazilian Phosphate Ore Using Column Flotation**  
Khosana Mohlabane, Eriez Flotation Division - SA, South Africa

14:50 – 15:15  
**Influence of the Impeller Speed on Phosphate Rock Flotation**  
André Carlos Silva, Federal University of Goiás, Brazil

15:15 – 15:40  
**Successful Applications of Vertical-Roller-Mills in Phosphate Processing**  
Jonathan Smith, Loesche South Africa, South Africa

15:40 – 16:00  
Coffee break

16:00 – 16:25  
**A Comparative Study of Different Columns Sizes for Ultrafine Apatite Flotation**  
Elves Matiolo, Centro de Tecnologia Mineral, Brazil

16:25 – 16:50  
**The Fundamentals, Unique Features and Performance of A Newly Improved Packed Column Jig for Phosphate Processing**  
Wending Xiao, Wuhan Institute of Technology, China

16:50 – 17:15  
**Milling of the Phosphate Rock Flotation Circuit Circulating Load Aiming Production Increase and Iron Content Reduction in the Final Concentrate**  
André Carlos Silva, Federal University of Goiás, Brazil

17:15 – 17:40  
**GEOSCAN-M use at Ma’aden Phosphate Al Jalamid mine, Saudi Arabia**  
Luke Balzan, Scantech International, Australia

19:00 – 21:00  
Banquet
Friday, May 4, 2018

07:00 – 08:30  Breakfast
Departures

For the Technical Excursion group: Trip to Phalaborwa and tour of Foskor phosphate mine
**Poster Presentations**

1. **The Ultimate Phosphate Flotation solution**  
   Johan Swanepoel, Ultimate Flotation, South Africa

2. **New approache to phosphate ore beneficiation coupling chemistry and hydrodynamic of flotation process**  
   Inna V. Filippova, University of Lorraine, France

3. **Best practices of Russia in extracting ree from fertilizer waste**  
   Sergey Kirillov, Ural Federal University, Russia

4. **Benefication of Estonian phosphate ore by flotataion**  
   Kadiann Tamm, Tallinn University of Technology, Estonia