

# ***Program***

## **Beneficiation of Phosphates V**

**February 17-22, 2008  
Intercontinental Rio  
Rio de Janeiro, Brazil**

### **Conference Chair**

**Patrick Zhang**  
Florida Institute of Phosphate Research

### **Conference Co-Chairs**

**Karen Swager**  
Mosaic Fertilizer LLC

**Laurindo Leal Filho**  
University of Sao Paulo

**Hassan El-Shall**  
Department of Materials and Engineering, Particle Engineering Research  
Center, University of Florida



[www.engconfintl.org](http://www.engconfintl.org)

**ENGINEERING CONFERENCES INTERNATIONAL, INC.**  
**Six MetroTech Center -- Brooklyn, NY 11201**  
**T: 1-718-260-3743 - F: 1-718-260-3754**  
**info@eci.poly.edu**

Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

#### ECI BOARD MEMBERS

Barry C. Buckland, President

Allen I. Laskin

Raymond McCabe

David K. Robinson

P. Somasundaran

Chair of ECI Conferences Committee: Jules Routbort

ECI Technical Liaison for this conference: Herman Bieber

ECI Director: Barbara K. Hickernell

ECI Associate Director: Kevin Korpics

# Conference Sponsors

	 ARR-MAZ do Brasil Ltda
	
	
	 Florida Institute of Phosphate Research
 	
	
	

# Organizing Committee

**Patrick Zhang**

Florida Institute of Phosphate Research  
Bartow, Florida, USA

**Laurindo Leal Filho**

Univeisity of Sao Paulo  
Sao Paulo, Brazil

**Silvia Franca**

CETEM  
Rio de Janeiro, Brazil

**Khalid Tarawneh**

Al-Hussein Bin Talal University  
Ma'an, Jordan

**Jan Miller**

University of Utah  
Salt Lake City, USA

**Marisa Bezerra de Mello Monte**

CETEM  
Rio de Janeiro, Brazil

**Daniel Tao**

University of Kentucky  
Lexington, Kentucky, USA

**Karen Swager**

Mosaic Fertilizer LLC  
Mulberry, Florida, USA

**Hassan El-Shall**

University of Florida  
Gainesville, Florida, USA

**Ricardo Neves**

Fosbrasil  
Sao Paulo, Brazil

**Wei De-Zhou**

Northeastern University  
Shenyang, China

**Abdelaâli Kossir**

CERPHOS  
Casablanca, Morocco

**Regis Stana,**

R Squared S, Inc.  
Lakeland, USA

**David Gossett**

CF Industries  
Bartow, USA

**Sunday, February 17, 2008**

17:30 – 19:30	Registration
19:30 – 20:30	Welcome Reception
20:00 – 21:30	Opening Dinner
21:30 – 21:45	Co-Chairs' Messages Laurindo Leal Filho

**IMPORTANT ANNOUNCEMENTS**

- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.

**Monday, February 18, 2008**

08:30 – 09:30 Breakfast

09:30 – 09:40 **Welcoming Remarks**  
Laurindo Leal Filho, University of Sao Paulo, Brazil

09:40 – 09:50 **Opening Remarks and Acknowledgements**  
Patrick Zhang, Florida Institute of Phosphate Research

**Session I: Fundamentals**

**Session Co-Chairs:** Jan Miller, University of Utah, USA  
Silvia Franca, CETEM, Brazil

09:50 – 11:00 **Plenary Lecture 1**  
**Limits of Fine and Coarse Particle Flotation**  
John Ralston, Ian Wark Research Institute, University of South Australia

11:00 – 11:30 **Surface Tension of Solution and Its Influence on the Selectivity of the Separation between Apatite and Gangue Minerals by Flotation with Long Chain Anionic Collectors**  
Marisa Martins / Laurindo Leal Filho, University of Sao Paulo, Brazil

11:30 – 12:00 Coffee Break

12:00 – 12:30 **The Role of Picobubbles on Coarse Phosphate Flotation Behavior**  
Daniel Tao, University of Kentucky, USA

12:30 – 13:00 **The Influence of Micas and Related Minerals on the Direct Anionic Flotation of Apatite from the Tapira Mine, Brazil - Part 1. Characterization, Sedimentation Behavior and Flotation Response of Micaceous Minerals.**  
Paulo R.G. Brandao, Federal University of Minas Gerais, Brazil

13:00 – 13:30 **Structures of Adsorbed Amine at the Quartz Surface**  
Jan Miller, University of Utah, USA

13:30 - 14:30 Lunch

14:30 – 18:00 *ad hoc* sessions/free time

**Session II: Environment and Sustainability**

**Session Chair:** B.K. Parekh, University of Kentucky, USA

18:00 – 18:30 **Plenary Lecture 2**  
**Is the Phosphate Ore Industry Sustainable?**  
Roberto Villas Boas, Center for Mineral Technology - CETEM, Brazil

18:30 – 19:00 **A Novel Technique for Water Recovery and Land Reclamation during Mining Phosphate Deposits**  
Patrick Zhang, Florida Institute of Phosphate Research, University of Florida, USA

**Monday, February 18, 2008 (continued)**

19:00 – 19:30 **A Pilot-Scale Study of Deep Cone Paste Thickening Process for Phosphatic Clay Disposal in Florida**  
B.K. Parekh, University of Kentucky, USA

19:30 – 20:00 **The New Sustainable Source for Phosphorus Fertilizer?**  
Carissa Gengenback / C. B. Gengenbach, University of Nebraska-Lincoln, USA

20:00 – 21:00

Dinner

21:00 – 22:00

Social Hour

**Tuesday, February 19, 2008**

08:30 – 09:30

Breakfast

**Session III: Flotation Research and Practice**

**Session Co-Chairs: Paulo R.G. Brandao, UFMG, Brazil  
Seng Yap, Arr-Maz Custom Chemicals, USA**

09:30 – 10:00

**Plenary Lecture 3  
Liberation Limitations to Phosphate Flotation Recovery as Revealed by 3D  
X-Ray Micro CT Analysis**  
Jan Miller, University of Utah, USA

10:00 – 10:30

**Recent Development of a Direct-Reverse Flotation Process for Phosphate  
Ore in China**  
Yihe Wei, Wuhan Institute of Technology, Wuhan, China

10:30 – 11:00

**How to Conduct a 'Standard' Florida Phosphate Lab Flotation Test**  
Andrea Williams, Mosaic Fertilizer LLC, Florida, USA

11:00 – 11:30

Coffee Break

11:30 – 12:00

**The Influence of Micaceous Minerals on the Direct Anionic Flotation  
of Apatite from the Tapira Mine, Brazil - Part 2. Studies on Mixtures  
Apatite/Micaceous Minerals**  
Paulo R.G. Brandao, Federal University of Minas Gerais, Brazil

12:00 – 12:30

**Characterization of Apatite from Salitre Deposit by Cathodoluminescence  
Microscopy and Chemical Microanalysis (SEM-EDS/WDS)**  
Henrique Kahn, University of Sao Paulo, Brazil

12:30 – 13:00

**Phosphorous Resources Beneficiation and Research Advances in  
China**  
Han Yuexin, Northeastern University, China

13:00 – 14:00

Lunch

14:00 – 18:00

*ad hoc* sessions/free time

**Session IV: Process Innovations**

**Session Co-Chairs: Marisa Bezerra de Mello Monte, CETEM, Brazil  
Stemmer Ndala, Mintek, South Africa**

18:00 – 18:30

**Optimization of Jordanian Phosphate Flotation**  
Khalid Tarawneh, Al-Hussein Bin Talal University, Jordan

18:30 – 19:00

**Development of Custofloat<sup>®</sup> Collectors for Processing Yunnan  
Sedimentary Dolomitic Phosphate Ore**  
Guoxin Wang, Arr-Maz Custom Chemicals, USA

19:00 – 19:30

**Upgrading Intermediate Pebble Grade by Grinding and Amine Flotation**  
Andrea Williams, Mosaic, Florida, USA

19:30 – 19:45

Coffee Break



**Tuesday, February 19, 2008 (continued)**

- |               |  |
|---------------|--|
| 19:45 – 20:15 | <b>Jordanian Phosphate Mining History</b><br>Khalid Tarawneh, Al-Hussein Bin Talal University, Jordan              |
| 20:15 – 20:45 | <b>Phosphate Flotation – From Boulders to Bug-Dust</b><br>Reginald Liberato, Canadian Process Technologies, Canada |
| 20:45 – 22:00 | Dinner   |
| 22:00 – 23:00 | Social Hour  |

**Wednesday, February 20, 2008**

08:30 – 09:30 Breakfast

**Session V: Analysis and Control**

**Session Co-Chairs:** Regis Stana, R squared S, Inc., USA  
Claudio Schneider, CETEM, Brazil

09:30 – 10:00 **Laser-Induced Breakdown Spectroscopy (LIBS) for Phosphate Rock Online Analyses – Long Term Stability Test**  
Michael Gaft, Laser Detect Systems, Israel

10:00 – 10:30 **Characterization Studies of Phosphate Ore Types from Salitre Alcaline Complex, Brazil (MG)**  
Henrique Kahn, University of Sao Paulo, Brazil

10:30 – 11:00 **Chemical Composition and Micro Morphology of Apatite Surface Exposed To Under Saturated Aqueous Solution**  
Marisa Bezerra de Mello Monte, Center for Mineral Technology – CETEM, Brazil

11:00 – 11:30 Coffee Break

11:30 – 12:00 **TBA**  
TBA

12:00 – 12:30 **Quantitative Determination of Carbonate and Hydrogen Phosphate Ions on Apatite Surface by Drift Technique**  
Marisa Bezerra de Mello Monte, CETEM, Brazil

12:30 – 13:00 **Apatite from Alkaline Complexes – Behavior in Mineral Processing and Characterization Techniques**  
Henrique Kahn, University of Sao Paulo, Brazil

13:00 – 14:00 Lunch

**Session VI: Hydrometallurgical Processing**

**Session Co-Chairs:** Daniel Tao, University of Kentucky, USA  
Roberto Belger, Fosfertil, Brazil

14:15 – 14:45 **Plenary Lecture 4**  
**The Removal Processes of Phosphoric Acid Impurities: Challenges and Opportunities**  
Abdelaâli Kossir, CERPHOS, Casablanca, Morocco

14:45 – 15:10 **Contamination of Potentially Trace Metals in Aqaba and Eshidiya Phosphogypsum/ Jordan**  
M. S. Al-Hwaiti, Al-Hussein Bin Talal University, Jordan

**Wednesday, February 20, 2008 (continued)**

- 15:10 – 15:35      **Thermodynamic and Kinetic Characteristics of Process of Crystallization of Phosphates and Fluorides of Lanthanoids on Primings Phases from Modeling and Industrial Solutions of A Phosphoric Acid**  
Cheremisina Olga, St-Peterburgs State College of Mines (engineering university), Russia
- 15:35 – 16:00      Coffee Break
- 16:00 – 16:25      **The Recovery of Uranium From Phosphoric Acid, The Third Time Around**  
Regis Stana, R Squared S, Florida, USA
- 16:25 – 16:50      **The Martison Phosphate Project, “Its Time Has Come”**  
Vaughn Astley, Dr. Phosphate, Florida, USA
- 16:50 – 17:15      **The Archeology of Phosphoric Acid Production in Florida. Discovery of the Remains of Central Florida Phosphate Industry: Early Third Millennium AD**  
Vaughn Astley, Dr. Phosphate, Florida, USA
- 17:15 – 17:40      **Uranium Recovery: from Phosphate to the Environment**  
Artur Canella Avelar, University Federal de Minas Gerais, Brazil
- 19:45 – 23:00      Conference Banquet – Off site at Porcao Rios  
  
Bus Transportation Provided

**Thursday, February 21, 2008**

08:30 – 09:30 Breakfast

**Session VII: Processing of Refractory Ores**

**Session Co-Chairs:** Abdelaâli Kossir, CERPHOS, Morocco  
Jim Hendrix, University of Nebraska, USA

09:30 – 10:00 **Selective Flotation of Calcite from Apatite by Using Phosphoric Acid and Citric Acid as Depressants**  
José Farias Oliveira, COPPE/UFRJ, Brazil

10:00 – 10:30 **Ordinary Temperature Flotation Technology for Anning Sedimentary Phosphate Ore**  
Qian Yalin, China Bluestar Lehigh Engineering Corp.

10:30 – 11:00 **Direct Flotation of Apatite from Dolomite, Calcite and Silica in Complex Jhamarkotra Ore, Rajasthan, India**  
Anders Cassel, Akzo Nobel Surface Chemistry AB

11:00 – 11:30 Coffee Break

11:30 – 12:00 **Separation of Relatively Coarser Dolomite Particles from Dolomitic Phosphate Pebbles Using Selected Fatty Acid Soap Collector**  
Zhengxing Gu, Arr-Maz Custom Chemicals, USA

12:00 – 12:30 **Industrial Flotation Circuit Design for a Complex Silico-Carbonated Phosphate Ore by Simulation**  
Claudio Schneider, Center for Mineral Technology - CETEM

12:30 – 13:15 **MiloBen – A Demonstration and Survey**  
Julian Hilton, Aleff Group, England

13:15 - 14:15 Lunch

14:15 – 20:00 *ad hoc* sessions/free time

20:00 – 21:00 Dinner

21:00 – 22:00 Social Hour

**Friday, February 22, 2008**

08:30 – 09:30 Breakfast

**Session VIII: Reagents**

**Session Co-Chairs:** Khalid Tarawneh, Al Hussein Bin Talal Univ., Jordan  
Todd Parker, Mosaic Fertilizer LLC, USA

09:30 – 10:00 **Plenary Lecture 5**  
**Performance Evaluation of Clay Binder in Phosphate Flotation**  
Daniel Tao, University of Kentucky, USA

10:00 – 10:30

10:00 – 10:25 **The Role of Surfactants on Collectors and Modifiers for Improving Phosphate Flotation**  
F. J. Sotillo / Guoxin Wang, ArrMaz Custom Chemicals, Florida, USA

10:25 – 10:50 **Recovery Improvements for Phosphate Flotation**  
Seng Yap, ArrMaz Custom Chemicals, Florida, USA.

10:50 – 11:15 Coffee Break

11:15 – 11:40 **Apatite Dispersants**  
Armando Corrêa de Araujo, UFMG, Brazil

11:40 – 12:05 **Bio-Acidulation of Rock Phosphates for Cheaper Soil Ameliorates**  
S.M. Ndala, Mintek, South Africa

12:05 – 12:15 Closing Remarks  
Paul Clifford and Patrick Zhang, Florida Institute of Phosphate Research

12:15 Lunch and departure