

HYDRO PROCESS2010

Proceedings of the 3rd International
Workshop on Process Hydrometallurgy

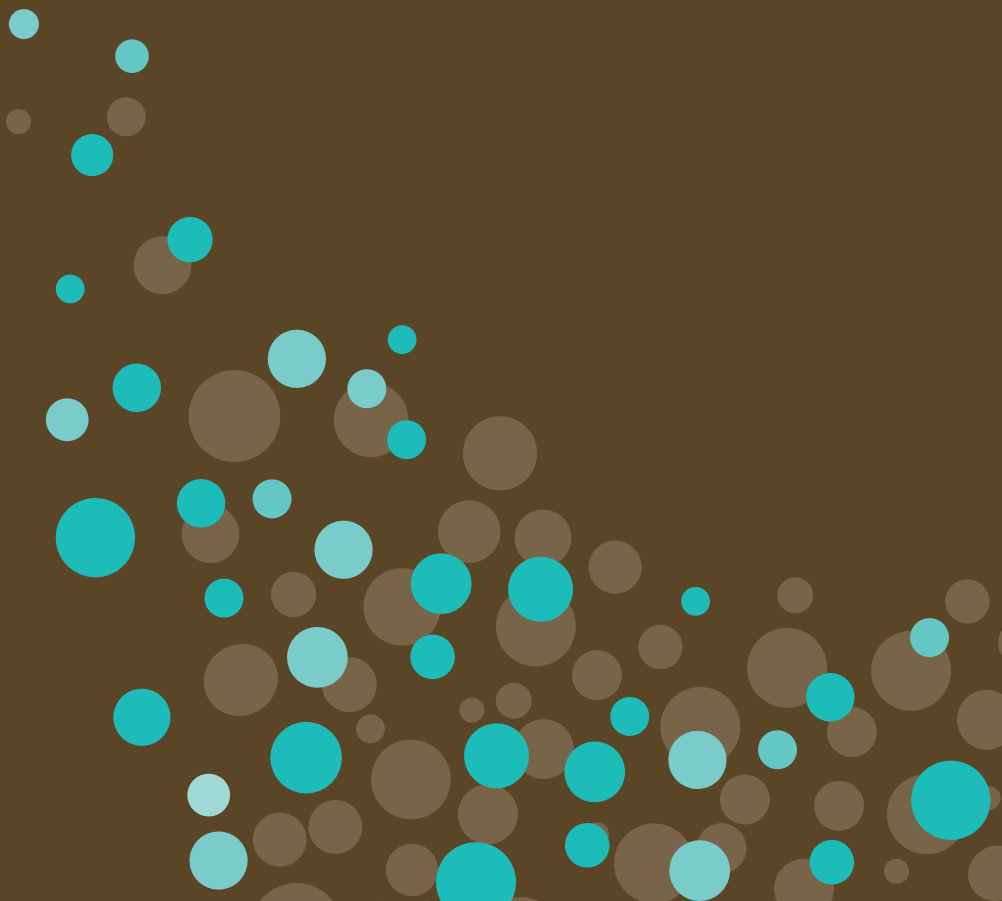
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• **Editors**

Jesús Casas

Patricio Ibáñez

Marcelo Jo



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Gecamin

Paseo Bulnes 197, Piso 6
Santiago, Chile
Zip Code: 833 0336
Telephone: (56-2) 652 1500
Fax: (56-2) 652 1570
E-mail: info@gecamin.cl
www.gecamin.cl

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HYDROPROCESS 2010 workshop was organised by Gecamin, Chile

Gecamin

Gecamin is a private, Chilean company created in 1998 that annually organises international technical events with the aim of informing and inspiring mining industry professionals, fostering the exchange of information, and sharing best practices and new technologies applied in mining. The goal of each conference is to bring together engineers, scientists, researchers, managers and operators to enable a focused discussion on the latest developments and innovations with the ultimate purpose of establishing interdisciplinary networks of research and knowledge exchange. Through these conferences and training programmes, Gecamin seeks to help the industry to openly address its most pressing concerns and find more sustainable solutions.

Gecamin organises seminars in partnership with institutions of strong technical excellence in mining such as Universidad de Chile, Pontificia Universidad Católica de Chile, Universidad de Concepción, Universidad Técnica Federico Santa María, University of Western Australia and University of Queensland, among others.

In 12 years of operation, more than 12,000 professionals have attended our events and have been trained in areas of paramount importance to the mining industry. These areas include the following: Geology, Mining Unit Operations, Mine Planning, Mineral Processing, Hydrometallurgy, Paste and Thickened Tailings, Mine and Plant Maintenance, Automation and Control, Water and Energy Management in Mining, Mine Closure, Environmental and Social Impacts Assessment.

Each event organised by Gecamin features a great diversity of technical papers presenting case studies applications, as well as theoretical research and scientific findings. Every conference is documented by the proceedings containing carefully selected

peer reviewed papers; prominent industry experts and academics bring their knowledge and experience to our events ensuring high standards of the proceedings and the technical programmes

The next few years are expected to bring a much more positive economic outlook, allowing mining companies worldwide to activate or reconsider alternatives for greenfield and brownfield projects. Sustainability, water in mining and efficient energy use will remain the key focus areas throughout the major part of the industry. For this reason, Gecamin believes it is of great importance to share experiences and discuss alternatives and opportunities for improving operational processes and best practices with colleagues from around the world.

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Foreword

After the financial collapse and world recession that occurred in 2008–2009, and against most of the economists' predictions, the copper market has rapidly recovered its price trends and is currently in a very healthy position.

At least for the next five years, copper demand worldwide is foreseen to exceed copper production, thus supporting the forecast of high prices. In fact, this is becoming the base upon which the industry is planning its growth.

High copper prices are essential for enabling greenfield projects because they are very intensive in capital and operating costs, and breakeven costs are expected to exceed 2 dollars. Why is that?

Because the complexity of projects in terms of remote locations, high altitude or high political risk, declining ore grades, deeper resources forcing to move gigantic amounts of burden in open pits, high prices of critical supplies like water, energy or workforce; tightening of environmental restrictions and communities becoming more and more critical is increasing.

In particular, speaking of environmental restrictions, the carbon footprint of the mining industry is one of the most worrisome issues at the present time. As countries are being pushed to be part of a program for the reduction of greenhouse gas emissions, industries that use energy intensively across the world like ours will be sooner than later forced by sectors to reduce emissions with the obvious impact on operating costs.

Competitiveness is the key, but at the same time, there is a great pressure on the shoulders of professionals to capture competitive advantages for the companies they work for, inserted in a mining industry full of opportunities but also with severe restrictions.

By-products have become a real opportunity for companies to add value. At corporate level, diversification within the base metal industry represents another chance to introduce differentiating elements of competitiveness. Yet, those innovations must be at the forefront of our minds as otherwise it never happens.

In consequence, our people must be at the centre of our organizations and systems. In order to properly tackle the huge challenges we are already facing in the industry, our people are and will be the key to success in developing our plans. We have to put more focus on the training of our high performance executives and collaborators but also attract external talents to our companies at all possible levels and develop them to their utmost capacity.

Leadership within the industry is a must. Good Leaders are naturally followed by people and those leaders will guide the business to sustainable growth without doubt, thus keeping active the social license to operate. That sustainable growth means to operate with respect for the environment and communities, coherence and equilibrium between business benefits and social development.

Beyond these facts, we still embrace some dreams for the mining industry. Chalcopyrite ore leaching under economic conditions, processes with low energy and water demand, better recoveries, lower reagents consumption and impurities control are some of them.

Welcome to HYDROPROCESS 2010 for each and every one of you. We, as the Organising Committee, are very pleased to receive you for this 3-day round of technical discussions, networking and friendship. We are convinced that this event will contribute to a better understanding of hydrometallurgy's state of the art and its implications for the mining business, environment, communities, and society as a whole.

 Marcelo Jo

HYDROPROCESS 2010 CHAIRMAN

3rd International Workshop on Process Hydrometallurgy

Preface

The HYDROPROCESS 2010 workshop, held on 11–13 August 2010 in Sheraton Hotel & Convention Center, Santiago, Chile, is the third of a series of biannual international workshops on hydrometallurgical processing initiated in 2006 by Gecamin in the city of Iquique, Chile.

The event turned out to be once more a unique opportunity for executives, operators, researchers and suppliers from the global hydrometallurgical industry to analyse and discuss recent developments in technological innovations, process and equipment design, and new projects and plant expansions. The main objectives of the HYDROPROCESS workshop were: (i) To enhance the exchange of knowledge and experiences in the aqueous processing of copper, gold, silver and other metals, industrial materials and solutions, (ii) to identify best practices as well as new, outstanding technologies and procedures and (iii) to generate a global networking platform among professionals engaged in hydrometallurgical processing of ores, concentrates, and industrial minerals.

These Proceedings contain 37 papers from 16 different countries, including Canada, Colombia, Chile, Equator, Finland, France, Germany, Kazakhstan, New Zealand, Nicaragua, Peru, South Africa, Spain, Sweden, United Kingdom and USA.

These papers have been organised by area of interest, including Keynote Lecture (1), Geometallurgy, Testing and Scale-Up of Hydrometallurgical Processes (6), Solution Purification and Wet Treatments (3), Gold, Silver and Precious Metals Hydrometallurgy (5), Ore and Concentrate Leaching, Studies, Operations and Processes (4), Solvent Extraction and Ion Exchange Developments (5), Modelling of Leaching Operations (3), Wet Processing of Industrial Minerals and Materials (5) and Technical Applications and Developments (5).

 Jesús Casas

HYDROPROCESS 2010 HEAD EDITOR

3rd International Workshop on Process Hydrometallurgy

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The Organising Committee also wishes to thank the following sponsors (as of 21 July in alphabetical order) for their support:

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Finally, we would like to thank all the delegates who attended the Workshop exchanging their valuable knowledge and expertise, thus contributing to the great success of this third version of the International Workshop of Process Hydrometallurgy. We are looking forward to seeing you all again during the next edition of HYDROPROCESS, in the year 2012.

•• Organising Committee

HYDROPROCESS 2010

3rd International Workshop on Process Hydrometallurgy