

Critical Minerals 2013

Perth, Australia
4-5 June 2013

ISBN: 978-1-5108-2139-2

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by Australian Institute of Mining & Metallurgy (AusIMM)
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact Australian Institute of Mining & Metallurgy (AusIMM)
at the address below.

Australian Institute of Mining & Metallurgy (AusIMM)
P.O. Box 660
Carlton South Victoria 3053
Australia

Phone: 61 3 9658 6100
Fax: 61 3 9662 3662

publications@ausimm.com.au

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

CONTENTS

Keynote Presentations

- 1 Addressing Today's Market Concerns and Preparing for the Trends of Tomorrow *R R Bhappu*
- 12 Lanthanide Luminescence – An Enlightening World *J-C G Bünzli*
- 31 Defining 'Criticality' with Respect to Metals and Minerals *J Chegwiddden*
- 46 The Critical Materials Institute – Department of Energy's Newest Energy Innovation Hub *K A Gschneidner*
- 60 Rare Earths – Is Supply Critical in 2013? *D Kingsnorth*
- 70 Challenges and Opportunities with Change in the Rare Earth Industry *M Vaisey*

Finance

- 83 Financing Critical Minerals and the Role of Private Equity *R R Bhappu*
- 96 Tin – The Search for New, Sustainable Supply *W Bramwell*
- 112 Financing of Critical Minerals Projects *M Carlile*
- 122 Global Overview – Critical Minerals *S Ferguson*

National Critical Material Strategies

- 133 Risk Assessment of the Tungsten Market – Indicators for Price and Supply Risks *S Al Barazi, M Liedtke and U Dörner*
- 144 Critical Path – A UK Perspective on the Evolution of the Critical Minerals Agenda *A Bloodworth and R A Shaw*
- 159 An American Perspective on Critical and Strategic Minerals in 2013 *D A Holmes*
- 168 Strategy and Research and Development on Rare Metals Including Rare Earth Elements in Korea *T-S Kim and B-S Kim*

Processing

- 188 Hydrometallurgical Production of Antimony *N Guresin*

Processing (Rare Earths)

- 205 Development of a Processing Flow Sheet for the Ngualla Rare Earth Project *G Beer*
- 214 Processing of Rare Earths from Phosphate Rock via a Nitrate Processing Route *E Ho and K Soldenhoff*
- 228 Solvent Extraction of Rare Earths – An Overview *K Soldenhoff and E Ho*
- 238 Understanding Your Mineralogy – The Very First Step in Developing a Process *C Vernon*

Projects and Markets

- 247 Overview of World Antimony Mining and Markets *A Booyzen*
- 257 Scandium Resources for New Markets *C Hartley, P Alves and K Stanaway*
- 264 Lithium all Around Us *I Tan*

Rare Earth Projects

- 280 The Pilot Plant – Key to Successful Process and Market Development: Dubbo Zirconia Project, New South Wales *I Chalmers*
- 292 Kvanefjeld – Taming the Beast *D Krebs*
- N/A Stromberg Heavy Rare Earth – Discovery to District Potential *E A Lamb, T Page, L Petrella, A Phelan and I Bamborough*
- N/A Xenotime – A Solution to the Shortage of Heavy Rare Earths *R Wilson and R Jones*

Tantalising Markets

- 311 Hastings Project, Process Development *S Mackowski, D Collier, C Griffith and K Soldenhoff*
- 322 Drivers – The Incentives for a Recycling System of Critical Minerals *N Pajunen and K Heiskanen*

The Added Value Markets

- 329 The Role of ‘Critical Materials’ in High-Efficiency Electric Machines – From Wind Generators to Electric Vehicles *S J Collocott*
- 344 Indium and Tellurium Availability *R G Eggert, M Lokanc and M Redlinger*
- 364 Critical Minerals Markets and Wind Power Generation *D Kingsnorth and D J Packey*
- 400 Preparation and Application of Rare Earth Sulfide *J Liu, J-M Zhai, C Zhang and R-F Bian*
- 414 The US ‘Conflict Minerals’ Legislation (s.1502 of the Dodd-Frank Act): Rhetoric v Reality *M Sumich*