
Electrochemistry in Mineral and Metal Processing VII

Editors:

F. M. Doyle

University of California
Berkeley, California, USA

G. H. Kelsall

Imperial College London
London, United Kingdom

R. Woods

Griffith University
Nathan, Queensland, Australia

Sponsoring Division:



Industrial Electrolysis and Electrochemical Engineering



Published by
The Electrochemical Society

65 South Main Street, Building D
Pennington, NJ 08534-2839, USA

tel 609 737 1902
fax 609 737 2743
www.electrochem.org

acs**transactions**™

Vol. 2 No. 3

Copyright 2006 by The Electrochemical Society, Inc.
All rights reserved.

This book has been registered with Copyright Clearance Center, Inc.
For further information, please contact the Copyright Clearance Center,
Salem, Massachusetts.

Published by:

The Electrochemical Society, Inc.
65 South Main Street
Pennington, New Jersey 08534-2839, USA
Telephone 609.737.1902
Fax 609.737.2743
e-mail: ecs@electrochem.org
Web: www.electrochem.org

Printed in the United States of America

ECS Transactions, Volume 2, Number 3
Electrochemistry in Mineral and Metal Processing VII

Table of Contents

Preface	iii
Electrochemistry of Flotation	
Electrochemical Studies on Heazlewoodite Flotation from Inco Matte <i>R. Rao and J. Finch</i>	3
Improving the Flotation Behavior of a Sulfide Ore by Controlling Electrochemical Interactions during Grinding <i>S. Grano and G. Huang</i>	9
Single Particle Microelectrodes for Electrochemical Analysis of Sulfide Flotation Processes <i>J. D. Miller, T. Vermaak and M. Moats</i>	21
Electrochemical Study of the Interaction Galvanic Between Pyrite and Arsenopyrite Through Measurements of Electrode Potentials and Determinations of Contact Angle <i>M. Monte, C. Albuquerque, Jr. and A. Dutra</i>	35
Electrochemical Interactions in Flotation and Leaching	
Use of an Evaporated Gold SERS Substrate to Detect 2-Mercaptobenzothiazole on Sulfide Mineral Surfaces <i>G. A. Hope, F. Buckley, R. Woods and K. Watling</i>	49
A SERS Investigation of the Interaction of Sulfur with Gold <i>K. Watling, G. Parker, G. A. Hope and R. Woods</i>	61
Frequency Changes Observed with the EQCM Resulting from Hydrophilic/Hydrophobic Transitions <i>R. Woods and M. I. Jeffrey</i>	73
Surface Stoichiometry of Lead Sulfide and the Sorption of Xanthates <i>P. Nowak</i>	83

Specific Characteristics of Noble Metal Nanoparticles on Sulfide Minerals Observed by XPS and STS <i>Y. L. Mikhlin, A. Romanchenko and L. Makhova</i>	95
XPS, Static SIMS and NEXAFS Spectroscopic Investigation of Thiol Adsorption on Metals and Metal Sulfides <i>A. N. Buckley, S. Goh, R. Lamb, L. Fan and Y. Yang</i>	107
Surface Products on Gold Leached in Ammoniacal Copper(II) Thiosulfate Solution <i>K. Watling, G. A. Hope, M. I. Jeffrey and R. Woods</i>	121
Galvanic Interactions Between Gold and Sulfides during Thiosulfate Leaching <i>M. I. Jeffrey, D. Thompson, C. Chu and P. Breuer</i>	133
Electrochemical Study of a Flotation Zinc Concentrate in Sulfuric Acid: Galvanic Interactions Affecting the Rate of Dissolution of Sphalerite <i>J. Nava, I. González and D. Nava</i>	143
Electrochemical Behavior of the Oxidation and Reduction Processes for Pyrargyrite (Ag_3SbS_3) in Acidic Media <i>R. Luna-Sánchez and I. González-Martínez</i>	155

Electrochemistry of Leaching

The Active-to-passive Transition of Chalcopyrite <i>G. Viramontes-Gamboa, B. Rivera-Vasquez and D. G. Dixon</i>	165
Gold Enhanced Observation of Surface Products in Chalcopyrite Dissolution <i>G. A. Hope, G. Parker and R. Woods</i>	177
Reductive Leaching of Chalcopyrite by Aluminum <i>F. Doyle and G. Lapidus</i>	189
The Electrochemistry of the Leaching Reactions in the Caron Process. I. Anodic Processes <i>A. N. Nikoloski and M. Nicol</i>	197
Electrochemical Characterization of Galena under Simulated Carbonate Rich Weathering Conditions <i>R. Cruz, R. Lara-Castro and M. Monroy</i>	209
Electrochemical Aspects of the Nitric Acid Leaching of Lead Sulfide Concentrates: on the Way to a Highly Effective Method for Pb Recovery <i>Y. L. Mikhlin, A. Kholmogorov, G. Pashkov and E. Mikhlina</i>	221

Model Predictions of Metal Leaching from Waste Electrical and Electronic Equipment in Chlorine-Containing Acidic Aqueous Chloride <i>G. Kelsall, C. Cheng and A. Robson</i>	231
A Rotating Disk Electrochemical Dual Autoclave for the Study of Electrochemistry and Leaching at High Temperature and Pressure <i>I. Lazaro and M. I. Jeffrey</i>	243

Tuesday Evening Poster Session

The Influence of Galena Galvanic Interaction on the Reactivity of Chalcopyrite Flotation Concentrate <i>D. Nava and I. González</i>	255
--	-----

Electrodeposition

The Effect of Additives on the Electroless Deposition of Gold from a Thiosulfate-Ascorbic Acid Bath <i>M. I. Jeffrey and A. Angstetra</i>	267
EQCM Study of the Influence of Copper Ions on the Adsorption of Polyethylene Glycol and Bis(sodium sulfopropyl) Disulfide at a Copper Cathode <i>F. Doyle, R. Ding, X. Zhang and J. Evans</i>	281
Electrodeposition of Iron in Aqueous Ferrous Sulfate Solution: Role of Ammonium Ion <i>K. Osseo-Asare, M. Deelo and K. Weil</i>	293
Hydrodynamic Modeling of Copper Electrodeposition at a Vertical Rotating Cylinder Electrode <i>C. P. Fabian, P. Mandin, M. Ridd and M. Sheehan</i>	303
Gold Electrowinning from Acidic Aqueous Chloride in a Packed Bed Electrode <i>G. Kelsall, C. Cheng, M. Diaz and A. Robson</i>	317
Electrocristallization Behavior of Copper Electrodeposited from Aqueous Sulfuric Acid with Thiourea and Chloride Additives <i>C. Huang, J. Chang and F. Hsu</i>	329
Evaluation of the Effects of Additives, Pulsing, and Temperature on Morphologies of Copper Electrodeposited from Halide Media <i>M. Free, A. Rodchanarowan, N. Phadke and R. Bhide</i>	335

Cathode Guides for Conventional Copper Electrorefining Reactors Employing Starter Sheet Cathodes <i>E. Guerra and J. Shepherd</i>	345
Electrochemical Study of Copper(II) Reduction from Ammonia-Chloride Solutions <i>R. Cruz and J. Vazquez</i>	355
Development and Scale-up of the FFC Cambridge Process <i>D. Hodgson, D. Fray, L. Slevin, D. Jackson, A. Fones, I. Mellor, S. Brewer and S. Male</i>	365
Development of Inert Anode Materials for Electrowinning in Calcium Chloride Melts <i>K. McGregor, E. Frazer, A. Urban, M. Pownceby and R. Deutscher</i>	369
Density, Viscosity, and Conductivity of Tetraalkyl Phosphonium Ionic Liquids <i>J. W. Vaughan, D. Dreisinger and J. Haggins</i>	381
Electrochemical Preparation of Fe-Mn Alloy Film in Organic Bath <i>G. A. Hope, P. Liu, Q. Yang, G. Li and Y. Tong</i>	393
Formation Processes of Chemically Deposited Copper Sulfide Thin Films <i>C. G. Munce, G. Parker and G. A. Hope</i>	401
Characterization of Cr-Ni Multilayers from Chromium(III)-Nickel(II) Baths Using Pulse-Current Plating <i>C. Chen, C. Hsu, U. Liu and C. Huang</i>	413
Author Index	419