The Electrochemical Society

Corrosion Protective Coatings and Inhibitors

at the 208th ECS Meeting

ECS Transactions Volume 1 No.9

October 16-21, 2005 Los Angeles, California, USA

Printed from e-media with permission by:

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

ISBN: 1-56677-486-1

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

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

> > ISBN 1-56677-486-1

Printed in the United States of America

ECS Transactions, Volume 1, Issue 9 Corrosion Protective Coatings and Inhibitors

Table of Contents

Chapter 1			
Inorganic Coating an	d Surface Modification		

Applications of Metal Surface Modification in Microdevice Fabrication <i>G. Zhang</i>	3
High Voltage Anodization of a NiTi Shape Memory Alloy J. Kawakita, A. Hassel and M. Stratmann	17
Corrosion Protection of Steel by Using ZnCoFe Alloy Coating (Replacement for Cadium Coating) Z. F. Lodhi, H. Terryn, J. De Wit and A. Hovestad	27
Chapter 2 "Smart" Corrosion Protective Coatings	
Inhibition by Polyaniline of Corrosion-Driven Coating Delamination on Carbon Steel: Aspects Regarding the Role of the Counteranion A. Cook, A. Gabriel, N. Laycock, N. McMurray and G. Williams	37
Design of Cathodic Inhibitors for AA2024-T3 Guided by Understanding Heterogeneous Cathodic Reaction Kinetics J. R. Scully and M. A. Jakab	47
Salt Fog Accelerated Weathering Testing of High-Silica-Zeolite MFI Coatings on Aluminum Alloy 2024-T3 D. Beving, N. Anderson, C. O'Neill and Y. Yan	65
Chapter 3 Corrosion Inhibition - Nonferrous Metals	
The Effects of CPC Coatings on the Corrosion/Fatigue Behavior of AA7075-T6	75
R. Kelly, F. Cui and S. E. Galyon	

High Throughput Corrosion Assessment of AA2024-T3 in the Presence of Corrosion Inhibitors B. D. Chambers and S. Taylor	87
Development and Characterization of Corrosion Resistant Coatings Using the Natural Biopolymer Chitosan <i>G. Kumar and R. Buchheit</i>	101
Inhibition of Oxygen Reduction on Copper in Neutral Sodium Chloride M. Kendig, M. Hon and J. Sinko	119
Chapter 4 Corrosion Inhibition - Galvanized Steel	
Evaluation of the Corrosion Resistance of Different Galvanized Steels Treated in Cerium Salt-Based Solutions F. Mansfeld, Y. Song and L. Speckert	133
Cut Edge Corrosion Protection in Organically Coated Galvanized Steels Using Ion Exchanged and Naturally Occurring Clay Mineral Pigments D. A. Worsley, N. McMurray and D. Williams	153
Drying Effects on Corrosion Properties of Cr(VI)- and Cr(III)- Treated Electrogalvanized Steel X. Zhang, C. van den Bos, W. Sloof, A. Hovestad, H. Terryn and J. De Wit	165
Investigation into the Effects of Metallic Coating Thickness on the Corrosion Properties of Zn - Al Alloy Galvanizing Coatings D. A. Worsley, D. Penney and J. H. Sullivan	177
Chapter 5 Coating and Inhibition of Steels	
The Inhibition Activity of Low- and High-Molecular Compounds with Triazole Cycle under Acidic Iron Corrosion S. A. Kaluzhina and E. I. Neupokoeva	189
Corrosion Inhibitor Fe Interactions: A Study Combining Surface Science and Electrochemistry G. Bhargava, T. Ramanarayanan, I. Gouzman and S. Bernasek	195
An Electrochemical Impedance Study on the Influence of Flow on the	207

Corrosion Inhibition of Carbon Steel by Fatty Amines in Association with Phosphonocarboxylic Acid Salts N. Pebere, N. Ochoa and B. Tribollet	
Degradation of Organic Coatings on Steel Investigated by Dynamic Electrochemical Impedance Spectroscopy M. Itagaki, A. Ono, K. Watanabe, H. Katayama and K. Noda	215
Dissolution and Inhibition Mechanism of 1018 Steel in Simulated Cooling Water by Adding Phosphononoacetic Acid Compound under Two Flow Conditions M. Galicia, R. Hernandez, H. Castaneda and L. Zamudio	223
Relative Inhibitors Efficiencies in Systems Containing Stainless Steels G. O. Ilevbare and G. Burstein	241
Corrosion Inhibition of Carbon Steel in CO ₂ -Saturated Brine by Phosphate Monoester T. M. Devine and P. Chou	253
The Mechanism of Inhibitor - Scale Interaction in Carbon Dioxide Corrosion of Mild Steel W. Sun, K. Chokshi and S. Nesic	265
Author Index	277