

Table of Contents

Preface

Chapter 1: Metal-Based Coatings

Corrosion Behaviors for Galvanizing, Galvalume and Chromate Treated Steels in 1% NaOH Solution

K.M. Moon, S.Y. Lee, J.H. Jeong and M.H. Lee 1

Influence of the pH and Stirring Speed of the Electrodeposition Bath in the Performance of Zinc and Zinc-Nanocomposite Coatings

P. Marcolin, M. Longhi, L.P. Zini, B. Proen  a, C. de Fraga Malfatti, L.C. Battisti, E.S. Rieder, A.J. Zattera, S.R. Kunst and C.T. Oliveira 7

The Effect of Current Densities in Zinc Electroplating Process on Mild Steel for Soil Water Environment Application

F.F. Zainal, N.S.M. Rahim and W. Rajaselan 13

Effect of Doping of Nanoparticles on the Properties of Zn-Ni Composite Coatings

N. Belhamra, A.R. Boulebtina, K. Belassadi, A. CHALA and M. Diafi 18

Structure and Performances of 7075 Aluminum Alloy Surface Subject to Hot-Dip Zinc

N. Xu, X.Y. Qiao, X. Yang, Y.C. Li, H.Z. Li and W.P. Tong 26

Characterization of Ni-P and Ni-P-Al₂O₃ Heat Treated Layers

L. Balint and G.G. Istrate 35

Effect of Heat Treatment of AZ91 Magnesium Alloy on the Electroless Ni-P Deposition

C. Singh, S.K. Tiwari and R. Singh 41

Factors Affecting on the Corrosion Resistance of Electroless Ni-Zn-P Coated Steel

P. Rattanawaleedirojn, K. Saengkietiyut, Y. Boonyongmaneerat and J. Wanichsampan 47

Fabrication of Superhydrophobic Ni-SiO₂ Nanocomposite Coating with Excellent Corrosion Resistance on Mild Steel

T. Xiang, S.B. Ding, C. Li, S.L. Zheng, M. Zhang, W. Hu and J. Wang 53

New Composite Materials Based on Intermetallics for Protection Details of Hydropower Equipment from Cavitation, Hydroabrasive and Corrosion Wear

O. Poliarus, O. Umanskyi, I. Boiko and Y. Puhachevska 59

Influence of Composite Nano-Coating of Ni-Co-SiC Obtained by Electrodeposition on the Corrosion Resistance of API 5L X80 Steel

R.F.d.C. Pereira, E.S.D. de Oliveira, D.L. Alves e Silva, A.S. Ribeiro, O.O. de Ara  o Filho, M.A.G. de Andrade e Lima and S.L. Urtiga Filho 65

Corrosion Behavior of As-Plated and Annealed Cr-C-Deposited Steels

C.A. Huang, J.Y. Chen and U.W. Leu 71

Metal Matrix Composites as Environment-Friendly Protective Coatings

R. Bernasconi, A. Tucci, L. Magagnin and L. Nobili 75

Electrodeposition and Corrosion Resistance of Cu/Zn/Cu Multilayer Coatings

J.H. Sun, H. Li, Q.D. Zhong, C. Xiao, Z.R. Huang and Y.L. Li 81

Study on Corrosion Process of Al-Mg Coatings Based on Electrochemical Impedance Spectroscopy

H. Tong, W.L. Han, Z.P. Xu, Y.J. Zhang, Z. Lin and S.C. Wei 86

Chapter 2: Inorganic Coatings and Pretreatments

Characterization and Structure Analysis of the Anodic Film Formed on AZ31 Mg Alloy in KOH Alkaline Solution with Various Additives

K. Nishinaka, S.A. Salman, K. Kuroda and M. Okido 91

Surface Morphology and Phase Transitions of Anodic TiO₂ Films Induced by Hydrothermal Exposure

Z.X. Chen, L.M. Ren, Y.H. Yan, X.W. Qi and Y.L. Yang 97

Effect of Surface Strengthening on Corrosion Property of Ti-6Al-4V in 3.5% NaCl

C.H. Zhang, W. Song, Y.M. Wang and G.Z. Xiao 102

Investigation in the Influence of Surface Treatment on Mechanical and Electrochemical Corrosion Properties of Ti-6Al-4V Alloy	107
Z.R. Huang, Y.L. Li, Q.D. Zhong, C. Xiao, H. Li and J.H. Sun	
The Effect of Potential on Surface Characteristic and Corrosion Resistance of Commercial Pure Titanium Processed by Anodic Oxidation Treatment	111
T.L. Fu, S. Liu, Y. Gao and Z.L. Zhan	
Effect of Current Density on the Microstructure and Corrosion Properties of MAO Coatings on Aluminum Alloy Shock Absorber	117
Y. Shen, H.X. Wang and Y.P. Pan	
Superhydrophobic and Corrosion Protective Coating on Aluminium	128
A.M. Escobar Romero, O. Rius-Ayra, N. Llorca-Isern, E. Valles Gimenez and A. Serrà i Ramos	
Optimization of MAO Process Parameters and Effect of Subsequent Sealing Treatment on Corrosion Resistance of Aluminum Alloy	134
D.T. Bui and S. Yang	
Effect of Frequency and Duty Cycle on Growth, Structure and Corrosion Resistance of Micro Arc Oxidation Coating on RZ5 Magnesium Alloy	143
V.R. Kumar, V. Muthupandi, K. Sivaprasad and P.B. Srinivasan	
Incorporation of Composite Zirconia-Silica Nanoparticles into PEO-Coatings on Magnesium Alloys	150
I.M. Imshinetsky, S.V. Gnedenkov, S.L. Sinebryukhov, D.V. Mashtalyar, A.V. Samokhin and Y.V. Tsvetkov	
Protective Coatings Formed by PEO and Fluorine-Containing Compound	155
K.V. Nadaraia, S.V. Gnedenkov, S.L. Sinebryukhov and D.V. Mashtalyar	
Efficient Micro-Arc Oxidation Technology for As-Cast AZ80 Magnesium Alloy	161
Y.F. Chen, J.X. Zhou, X.C. Song, H.T. Liu and Y.S. Yang	
Graphene Oxide Coatings Deposited on Steel Substrate Using Electrophoretic Deposition and Electrochemical Evaluation of Coatings in Saline Media	171
Z.U. Rehman, M.A. Raza, F.A. Ghauri, R. Kanwal, A. Ahmad and A. Inam	
Effects of Al₂O₃ Additive on Manganese Phosphate Conversion Coating of Carbon Steel	178
Y.T. Noh, Y.M. Byoun, H.Y. Kim, H.S. Kang, J.K. Park, S.G. Seo and C.H. Lee	
Permanganate - Based Hybrid Nano-Conversion Coating on Aluminium	188
M. Oki and A.A. Adediran	
Study of Microstructure and Corrosion Resistance of Zinc Electrodeposits before and after Black Chromating	196
K. Saengkietiyut, P. Rattanawaleedirojn, A. Thueploy, J. Wanichsampan and Y. Boonyongmaneerat	
Ceria Coatings Prepared by Sol-Gel Approach on AZ91 Magnesium Alloy	202
H.M. Han, D.T. Wang, H.Q. Yu, M. Zuo, L.H. Wang and D.G. Zhao	
Enhanced Corrosion Resistance of SiC_p/ 2009 Al by Cerium and Lanthanum Conversion Treatment	214
I. Aziz and Q. Zhang	
Entrapment of Hard Particles into Cr(VI)-Free Conversion Layers of Electrodeposited Zinc Coatings to Improve Corrosion Resistance	219
P. Jehl, B. Halbedel, M. Lerp, U. Schmidt, G. Teichert and F. Schlüter	
Effect of the Bluing Solution on Corrosion Resistance of the Oxide Film Prepared in Steel	225
H. Li, J.H. Sun, Q.D. Zhong, Z.R. Huang and Y.L. Li	
Metallic-Ceramic Combination of HVOF Deposited Layers for Corrosion Protection Applications	230
A.V. Bîrdeanu, I.A. Perianu, C. Ciucă, C. Orha and M. Bîrdeanu	
Morphology, Structure and Corrosion Resistance of Nano-Enamel Coating Changed on Ti-6Al-4V Alloy	235
Y.L. Li, Z.R. Huang, Q.D. Zhong, C. Xiao, H. Li and J.H. Sun	
Electrochemical Behaviour of TiCN and TiAlN Gradient Coatings Prepared by Lateral Rotating Cathode Arc PVD Technology	239
J. Baronins, V. Podgursky, M. Antonov, S. Bereznev and I. Hussainova	
Effect of CH₄ Content on the Characteristics of Surface Layers of Low Temperature Plasma Nitrided 2205 Duplex Stainless Steel	244
I. Lee	

Effect of Gas Content and Treatment Temperature on the Characteristic of Surface Layers of Low Temperature Plasma Nitrided 316L Austenitic Stainless Steel

I. Lee 250

Stress Gradient Determination in Anti-Corrosion Multilayer Coating

P.A. Dubos, Q. Hatte, P. Casari, M. Richard-Plouet, P. Jouan, S. Branchu and N. Guitter 256

Improvement of the Surface Properties of Low Temperature Plasma Nitrocarburized Martensitic Precipitation-Hardening Stainless Steel by Aging Treatment

I. Lee 263

Chapter 3: Organic Coatings and Surface Treatments

Effect of Osmotic Pressure by Salt Concentration on Corrosion Resistance of Anti-Corrosive Paint

K.M. Moon, M.H. Lee and T.S. Baek 269

Deterioration Behaviors of Overlapping Layers between Al-5Mg Alloy Thermal Spray Coating and Heavy-Duty Paint Coating

S. Kainuma, J.X. Du, M.Y. Yang, K. Muto and H. Miyata 275

Metallographic Analysis of Filiform Corrosion

L. Hrabčáková and A. Mašlejová 279

A Comparative Study on the Wear and Corrosion Resistance of Coatings

C.Z. Chen, W.Z. Wang and K.D. Cheng 284

ZnO Nanoparticles for Anti-Corrosion Nanocoating of Carbon Steel

J.N. Hasnidawani, N.A. Hassan, H. Norita, N. Samat, N.N. Bonnia and S.N. Surip 289

Corrosion, Wettability, and Adhesion of Acrylic Coatings Containing Silane-Treated Mineral Fillers on Carbon Steel

B. Pajarito, A.J.F. Caguntas, N.B. Felices, H.O.S. Tubalinal and G.L.D. Leuterio 294

Influence of GPTMS Precursor Concentration as Pretreatment of Galvanized Steel

H.C. de Oliveira, O. de Almeida Neuwald, L.V.R. Beltrami, G.J.L. Gerhardt and S.R. Kunst 299

Bio-Inspired *In Situ* Fabrication of 11-Mercaptoundecanoic Acid Coating on Stainless Steel 304 for Corrosion Protection

S.T. Sun, Y.H. Lei, T. Liu, R.H. Fan and S.B. Sun 305

Behavior of Polypyrrole Film Chemically Polymerized with Lauric Acid on Copper Surface

B.R. Ferreira, A.S. Liu and L.Y. Cho 314

Preparation and Characterization of an Emulsion Paint Based on Arghel Extract as an Eco-Friendly Corrosion Inhibitor

F.M. Mahgoub, A. Hefnawy, M. El-Shnawie and A. Esmaiel 320

Optimization of Corrosive Properties of Carbon Fiber Reinforced Aluminum Laminates due to Integration of an Elastomer Interlayer

M. Stoll, F. Stemmer, S. Ilinzeer and K.A. Weidenmann 330

Chapter 4: Coatings for High Temperatures

Corrosion Behaviour of HVOF Sprayed Coatings on ASME SA213 T22 Boiler Steel in an Actual Boiler Environment

V.P. Singh Sidhu, K. Goyal and R. Goyal 337

Mechanical Properties of HVOF Sprayed CrC-NiCr Coating Exposed to Hot Corrosion Environment

J. Schubert, Z. Česánek and O. Bláhová 346

Degradation of HVOF Sprayed Hastelloy C-276 Local Mechanical Properties after Exposure to High Temperature Corrosion

Z. Česánek, J. Schubert and O. Bláhová 352

High-Temperature Corrosion of Aluminized Diffusion-Coating for Fe-Base Alloy in N₂/H₂O/H₂S-Mixed Gas

M.J. Kim and D.B. Lee 358

Improving the Corrosion Resistance of Hot-Working Mold Steel against Al Alloy Melt by Coating

Y.Y. Yi, Z.M. Luo, T.L. Ngai, S. Ngai and L.J. Li 362

Stress Evolution and Element Diffusion in Bi-Layered Yb_2SiO_5 / Mullite Environmental Barrier Coatings under High-Temperature Molten Salt Corrosion

H.F. Chen, Y.X. Du, J. Feng, G. Yang and Y.F. Gao

368

Chapter 5: Corrosion Inhibitors

Adsorption Isotherm and SEM Investigating of Cucurbit[n]Urils Based Corrosion Inhibitors with Gossypol for Mild Steel in Alkaline Media Containing Chloride Ions

E. Berdimurodov, A. Kholikov, K. Akbarov, I. Nakhatov, N.K. Jurakulova and N. Umirov

377

Polarization Resistance Parameters of Anti-Corrosion Inhibitor of Cucurbit[N]Urils and Thioglycolurils in Aggressive Mediums

E. Berdimurodov, A. Kholikov, K. Akbarov and D. Nuriddinova

385

Corrosion Inhibition on Mild Steel Using PFOA Additives

W.L. Jiang, W. Zhou, J.F. Ying, K.C. Shen, X.Y. Gao, F.Q. Guo, Y.M. Gao and T.Y. Yang

398

Rhizophora apiculata Extract as Corrosion Inhibitor in 3.5% NaCl for API 5L Steel

F. Gapsari, P.H. Setyarini and A.N.F. Ganda

406

Some Anionic Surfactants as Corrosion Inhibitors for Carbon Steel in Hydrochloric Acid Solution

R. Assem, A.S. Fouda, A.A. Ibrahim and M. Saadawy

411

Corrosion Inhibition by a Caesalpinia Sappan L Modified Imidazoline for Carbon Steel API 5L Grade X60 in HCl 1M Environment

N. Subekti, A.S. Arlan, J.W. Soedarsono and A. Rustandi

426

Neem Leaf Extract as a Corrosion Inhibitor on Mild Steel in Acidic Solution

A. Okewale and F. Omoruwuo

439

Revealing the Inhibition Efficiencies of Artesunate and Rutin for Corrosion of Steel: A Theoretical Study

G. Gece

452

Understanding the Inhibition Mechanism of a Supramolecular Complex as the Corrosion Inhibitor for Mild Steel in the Condensate Water

B.M. Fan, B.Y. Wei, H. Hao, Y.H. Feng and B. Yang

457

Novel Methodology for the Selection, Dosing and On-Line Control of Corrosion Inhibitors for Industrial Acid Pickling

M. de Sanctis, G. Lovicu, R. Ishak, M. Richetta and A. Varone

472

Modern Packaging Materials for Steel Products

L.G. Kolyada, E.V. Tarasyuk and S.A. Krylova

479

Accelerated Tests of Protective Properties of Packaging Materials for Cold-Rolled Steel

L.G. Kolyada, E.V. Tarasyuk and N.L. Medyanik

487

Ceftriaxone as Corrosion Inhibitor for Nickel in Acid Solutions

D.A. Duca, M.L. Dan and N. Vasilcsin

493

Corrosion Inhibition of 6063 Aluminum Alloy in 0.5 M Sodium Hydroxide Medium by Aqueous Extract of Seeds of *Garcinia indica*

D. Prabhu and Padmalatha

502

Evaluation of the Inhibition Efficiency of a Green Inhibitor on Corrosion of Cu-Ni Alloys in the Marine Application

G.A. Gaber, M.A. Maamoun and W.A. Ghanem

507

Chapter 6: Cathodic Protection

Influence of Ti on the Electrochemical Behavior of Al-Zn-In-Si Sacrificial Anodes

K. Worasaen and P. Mungsantisuk

528

Corrosion Behavior of Al-Zn-In Sacrificial Anode Alloys Produced by Conventional Casting and Semi-Solid Metal Casting Processes

C. Puridetvorakul, N. Poolthong and N. Tareelap

533

A Study on Galvanic Current Variation of Zn Sacrificial Anode Made by Including of Additive in Solutions with Various Conductivities

K.M. Moon, M.H. Lee and T.S. Baek

539