Industrial Materials – Applications, Products, and Technologies

Selected, peer reviewed papers from the 2013 World Congress on Industrial Materials – Applications, Products and Technologies (WCIM 2013)

Advanced Materials Research Volume 739

Beijing, China 1 – 2 April 2013

Editors:

D. Zeng

ISBN: 978-1-62993-333-7

ISSN: 1022-6680

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 Trans Tech Publications Ltd. All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact Trans Tech Publications Ltd. at the address below.

Trans Tech Publications Ltd. Laubisrutisr 24 CH-8712 Stafa-Zuerich Switzerland

Fax: +41 (44) 922 10 33 Fax: +1 (603) 632-5611

e-mail: sales@ttp.net

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Fax: 845-758-2634

Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

Preface

I. New and Advanced Materials

Preparation and Characterization of Copolymer of Lactic Acid and N, N-Bis (hydroxyethyl) Glycin	
J.X. Xie, Y. Song and S. Zhao	3
Reconstruction of the Growth History of a Large Synthesized Diamond Crystal by Synchrotron Topography W.L. Yu, X.P. Jia and Q.X. Yuan	7
Reduction Nitridation Synthesis of Bauxite Based β-SiAlON by Aluminum / Silicon Compound Y.Q. Guo and Y.W. Wang	12
Experimental Study on Unsupported Nano-MoS ₂ Catalyst for Deep Desulfurization Fuel Oil Y.Q. Zhu	16
Carbon-Coated, Bismuth-Substituted, Lithium Iron Phosphate as Cathode Material for Lithium Secondary Batteries X.Y. Mo, X.S. Feng, Y. Ding and C.R. Kang	21
Study on a Novel Structure of Zn Phenanthroline Malic Acid Hydrate, [Zn (C ₁₂ H ₈ N ₂)(C ₄ H ₄ O ₅)(H ₂ O)](H ₂ O) H.X. Liu, J.Z. Xiao, H.M. Guo, Q.H. Zhang, Z.X. Yu, G. Zeng and K.Q. Ye	26
Study on a Structure of 2,6-pyridine-dicarboxylic Acid Cobalt Calcium Hexahydrate H.X. Liu, J.Z. Xiao, H.M. Guo, Q.H. Zhang, Z.X. Yu, G. Zeng and K.Q. Ye	30
Study on a Structure of Manganese Oxide, Mn ₃ O ₆ (H ₂ O) ₂ H.X. Liu, H.M. Guo, K.Q. Ye, J.Z. Xiao and G. Zeng	34
Study on the Crystallinity and Mechanical Properties of PC/PLA/LLDPE/ Montmorillonite Blends Y. Chen, Y. Peng, W.Y. Liu, G.S. Zeng, X.G. Li and X.H. Yan	38
Annealing Treatment of Ferroelectric Pb (Zr _{0.52} Ti _{0.48})O ₃ Thin Films with La _{0.5} Sr _{0.5} CoO ₃ Buffer Layer	30
J. Guo, W. Liu and S.Q. Man	42
Atomistic Study on the Structural Stability and Site Preference of Rh _{7-x} T _x B ₃ (T = Fe, Cr and Mn)	4.5
X.X. Wang, P. Qian, Z.W. An, Z.F. Zhang, J. Shen and N.X. Chen Validity of Several Thermal Conductivity Models in Metal Oxide Nanoparticles Filled	47
Polycarbonate M. Akbarzadeh, H. Ebadi-Dehaghani and M. Sadeghi	51
Characterization and Preparation of Modified Coarse Wool by KMnO ₄ H.Y. Zhang and X.M. Hu	57
Characterizations of the Perpendicular Magnetic Anisotropy in Ultrathin Films of Ta- CoFeB-MgO by X-Ray Photoelectron Spectroscopy C.W. Cheng, H.M. Chen, C.H. Shiue, Y.Y. Lin, Y.Y. Li and G. Chern	61
Thermodynamic Properties of Mg-Ni-H Compounds Prepared Assisted by a High Magnetic	01
Field J. Liu	66
The Study on the Effects of Physical Factors on the Machinability of GDL-4 Tool Steel Y.L. Liang, F. Gao and J. Liu	71
Electrochemical Characteristics of the Self-Assembly Film on 6061 Aluminum Alloy Y.Q. Wen, H.M. Meng and W. Shang	76
Anti-Oxidation Stability and its Mechanism of Waste Oil Biodiesel J. Wu, B.S. Chen, J.H. Fang and J. Wang	80
Service Life Prediction for the Neoprene Used in Seawater O.Z. Wen, C. Yu and I.H. Zhu	85

Power Loss Analysis Based on Leakage Currentin PN Junctions W. Pengchan, T. Phetchakul and A. Poyai	90
Optimization of Porous SiO ₂ Antireflective (AR) Coatings Used in Encapsulating Solar Modules	94
J. Tian, S.K. Deng and P.Z. Yang Enhanced Adhesion of Human Osteoblast-Like Cells on Femtosecond Laser Treated Ti-6Al-	94
4V R. Wang, Y. Xu, X.L. Yu and Y.M. Zhou	101
Reconstruction Image of Discrete Structure of Materials by Projective Computer	101
Tomography A. Grebennikov	106
An Investigation on Polypropylene/Nylon 66/TiO ₂ Blend Nanocomposites: Rheological Models	
A. Asgari, H. Ebadi-Dehaghani, D. Ashouri, S. Mousavian and N.J. Ansari	111
Polycarbonate Nanocomposites via Melt Compounding: The Relation between Compatibility and Rheological Properties	
H. Sadeghipour, F. Ghorbani, M.R.J. Felavarjani, H. Ebadi-Dehaghani, D. Ashouri and S. Mousavian	117
II. Material Processing Technology	
The Phase Diagram of Butylated Hydroxytoluene and Paracresol System Y.F. Wang, Y.W. Hou, Y.W. Liu and Z.L. Sha	125
Parallel Extrusion of Aluminum Alloy Heat Sink with Round-Fin L.H. Zhang, K.S. Wang, Y. Han and J.Y. Ying	131
The Study on Preparation of a B ₄ C/Al Composite Fabricated by the Sponge Impregnant Method Y.Q. Chen, P. Li, X.X. Sun, H.S. Liu, J.R. Yang, L. Yao and S.Y. Wang	136
Experimental Study on Dynamic Adsorption of Xenon over Adsorbents G.L. He, H.H. Yi, X.L. Tang, F.R. Li, Y.D. Li and K. Li	142
Rectifying Process Problems in Production of Thin Sheets of Special Alloys P. Martínek, P. Podaný, I. Poláková and J. Tuček	148
Experimental Investigation of Temperature-Current Rise in Fine PCB Copper Traces on Polyimide, Aluminium and Ceramic (Al ₂ O ₃) Substrates K.O. Petrosyants and A.A. Popov	155
Accelerated Carbide Spheroidisation of Chromium Bearing Steel by Induction Heating J. Dlouhy, D. Hauserová and Z. Novy	161
Numerical Analysis of Superplastic Forming for Sandwich Structure of 5083 Al-Alloy S.F. Liu, X.L. Dou and S.L. Wu	167
Evaluation of Process Wear of Selected Tool Steels for Injection Molds F. Greškovič, Ľ. Dulebová, B. Duleba and J.W. Sikora	171
Support Vector Linearly Inseparable Algorithm and its Optimizing Microwave Calcining Technology of Ammonium Uranyl Carbonate Q.Z. Du	177
Analysis of Mechanism and Main Factors of Honeycomb Weave Honeycomb Effect J.P. Lin	183
The Effect of Hot Tearing in Semi Solid Casting of Aluminum A201 Alloy S. Janudom, J. Wannasin, P. Kapranos and S. Wisutmethangoon	190
Solidification in Laser Cladding of a Ti-Si Graded Coating on Pure Titanium Substrate T.M. Yue, K.J. Huang and H. Xie	196
Prediction of Ploughing Effect Phenomena in the Cutting Zone during the Drilling of X5Cr18Ni9 Stainless Steel J. Jurko, A. Panda and M. Behún	201
Prediction of Selected Aspects of Machinability of Austenitic Stainless Steels J. Jurko, A. Panda, M. Behún and I. Mrkvica	201
Computer Extraction and Recognition Method Research on Weld Defect P.L. Zhang, Z.B. Wu, X.M. Niu and Z.Q. Zhao	210

Analysis of Carbonization Mechanism in ULCS Continuous Casting and Control Measures Z.M. Yi, J.L. Song and Q.C. Peng	214
Study on Extraction Technology of Chitin by Plant Lactobacillus Fermenting Shrimp Shell	
Protein Q.Q. Liu and H. Li	218
Thick Epitaxy Stepper Method for Special-Type Device Z.H. Tang, J. Chen, K.Z. Tan and B. Wang	222
Study on the Control of Gelatinous Membrane in the Process of Vinegar Trickling Fermentation	•••
H.M. Lu, L.P. Zhang, B.F. Zhang, X.L. Jiang and L.X. Dai	226
Dependence of Mold Temperature on its Cavity Filling Time for the Production of Lightweight Profile Applying the Extrusion Technology V. Kulik, J. Paško and S. Gašpár	233
Micro Machining Issues: Design and Machining Process S. Mekid	238
Strength Analysis of Yacht Hull Building by VIMP	
F.S. Sun, Y.N. Huang, W. Pan and Y.J. Liu	245
III. Building Materials, Structures and Construction Technologies	
Influence of the Steel Fiber Length on the Properties of Lightweight Concrete R.J. Huang, C. Shi and G.X. Li	251
Preparation of High Strength Mortar with Silica Fume and Steel Fiber R.J. Huang, G.X. Li and C. Shi	255
The Characterization and Application of Polycarboxylate as a Superplasticizer in Concrete X.Y. Mo, C.J. Yu, X.S. Feng and Y.J. Jing	258
Mechanical Properties of Polypropylene Fiber Reinforced Concrete Pavement	
C. Lu	264
Research on a New Kind of Waterproof Agent for Desulphurization Gypsum Materials Block J.Q. Li, M.Z. Gong and G.Z. Li	268
Analysis of the Influence on the Dynamic Characteristics of Base Isolated Frame Structure	200
for the Elastic Stiffness of the Isolation Layer F. Zhang	272
The Study of CTOD Test and Allowable Value Q.M. Yu and H.L. Sa	275
Seepage Characteristics Analysis of Geomembrane Earthrock Dams	213
Y.F. Peng and D. Hao	278
Three Gorges Reservoir Water Level Fluctuation Influents on the Stability of the Slope's Analysis	
L.M. Wu and Z.Q. Wang	283
Study on the Influence of the Tailing Sand on the Performance of Pre-Mixed Mortar Y.L. Wang, M.Z. Lan and H.B. Xu	287
Strength Properties and Chemical Composition of Materials Used in Weathering Steel Bridges	
V. Krivy, P. Konečný and V. Urban	292
Similar Constructive Method for Solving the Model of the Seepage in Multilayered Reservoir W. Li, R.J. Huang, S.C. Li and D.D. Gui	298
Experimental Bond Performance of CFRP Anchors	
Y.Ĥ. Wu, M.L. Lin and C.T. Lin	303
Seismic Fragility Analysis of Mid-Story Isolation and Reduction Structures Based Two Directions P.J. Chang	309
Research and Engineering Application of Wall-Outside Blasting Charge in Blasting	
Demolition of Underground Thin-Walled Structure D.Z. Chen and S.X. Xu	314

Evaluation of Earth-Air Heat Exchangers Efficiency in Hot and Dry Climates N. Oudjehani, K. Abahri, A. Tahakourt and R. Belarbi	318
IV. Environmental Engineering and Resources	
Biosorption of C. I. Reactive Red 2 from Aqueous Solution by Saccharomyces Cerevisiae L.F. Zhang and Y.L. Wang	327
The Feasibility of Producing Green Energy Crops on Pb-Contaminated Soil S.F. Cheng, C.Y. Huang, Y.T. Tu, S.J. Lin, G.L. Chen, J.R. Chen and C.Y. Lai	332
Office Materials Impact to Perceived Working Environment Quality M. Badida and I. Senitkova	336
Statistical Analysis for Structure and Regeneration Responses of Degraded Forests towards Quality Improvement X.Z. Liu	342
Research on the Degradation of Herbicide-Quinclorac by Microorganism X.Z. Zheng, W.A. Zeng, S.Y. Zhao, Y.N. Huang and Q.M. Zhou	349
Restoration of Destroyed Land due to Building of Water Reservoir L.Y. Sheu, Y.L. Lee, S.B. Wen, Y.H. Shen and J.L. Chang	355
Adaptation to the International Pollutant Control in Dynamic Framework X.J. Lv and X.Y. Zou	361
Research on Low-Carbon Tourism Development Path of Qinghai Lake Scenic Area J.H. Li, R.Z. Zhou and Y.B. Zhu	365
V. Research and Development in the Field of Mechanical Engineering	
The Numerical Simulation Analysis of Irregular Frame Structure Dynamic Characteristics F. Zhang	373
Circular Plate-Membrane with Small Deflection and Maximum Sensitivity B.M. Abdeev, D.E. Yelemes and M.A. Sakimov	376
Comparison of Bending Stress of a Spur Gear for Different Materials and Modules Using AGMA Standards in FEA S. Prabhakaran and S. Ramachandran	382
Validation of Bi-Material FEM Alveolar Bone Model C.T. Liao, C.G. Tseng, K.S. Shih and P.S. Lee	388
Light Distribution Design on Different LED Lamp S.B. Li, D.M. Wu, Y. Liu, Y.J. Zhang, J. Zhuang and Q. Zhang	394
Regenerative Chatter Stability and Hopf Bifurcation Analysis in Milling System D. Zhao and Q. Zhang	400
Power Losses of MOSFETs in DC/DC Converters Based on Single-Ended forward Topology and Resonant Reset Technology	
G.Y. Xu, H.S. Yu, H.C. Zou, M. Cheng and H. Yang Bearing Fault Detection Based on Multi-Scale Laplace Wavelet Transform Spectrum	408
Y.N. Wang Teager-Huang Transform Based Gear Crack Fault Detection and Diagnosis	413
Y.N. Wang Analysis of LED Backlight Design Based on Dynamic Regional Control Technology	418
D.Y. Cao and Y. Zou Study on the Dew Point Corrosion Mechanism of Atmospheric and Vacuum Distillation	423
Unit Low-Temperature Part H.X. Lin, Z. Qu and Y.G. Fan	427
Evaluation of Fatigue Endurance Foran Ultra Lightweight Inline Skate Frame H.K. Kim	431
Novel Service Lifetime Estimation for an Oil-Damper Rubber Bush for a Railway Vehicle H.K. Kim	437
The Study of Selection Method about Locking Point for Locking Type Hydraulic Torque Converter of Bulldozer L.Y. Zhang	442
	1 12

Acquiring Evaluation Data of Health Habits and its Application X.Q. Cai, Q.Q. Shi and L.N. Duan	446
Numerical Simulation for Two-Phase Flow Field of FGD Scrubber in Ship Y.Z. Gu, Z.F. Dong, Q.J. Kuang, J. Liu and Y.Z. Zhang	450
Series Switching Power Supply with Wide Input Voltage Based on Dual-Loop Control H.M. Xu and Y.G. Jin	454
An Experimental Investigation on Wear of Rail in Different Curve Radius W. Zhong, P. Chen and Y. Wang	458
Study on Wear of Wheel Steel under High Speed Working Condition W. Zhong, L. Dong and X.Y. Liu	462
Optimization of Gearbox for Construction Machinery J.P. Ye and Q.S. Jiang	466
$\label{eq:continuous} Effect\ of\ Al_2O_3\ Nanoparticles\ Additives\ on\ Thermo-Elastohydrodynamic\ with\ Newtonian\ Lubricant$	
S. Rattapasakorn and M. Mongkolwongrojn	470
Five DOF Pneumatic Vehicle Vibration Model and Stability Analysis C.L. Wei	476
Application of Passive Thermal Infrared Imaging to Study Ice and Snow Accretion on Automobiles in Cold Regions	
S.V. Muhammad	481
VI. Automation, Mechatronics and Information Technology	
Split-Current Magnetoresistor T. Phetchakul, P. Taisettavatkul, W. Yamwong and A. Poyai	489
The Research and Application of Crop Environment Remote Monitoring System Based on GPRS and Kingview L. Min	493
Design Fuzzy Logic Control System of Automatic Irrigation Based on MINI2440 and	493
C8051F410 MCU H.X. Zhang, D.C. Chi, L.X. Wang, T.T. Chen and Y.T. Wang	499
The Stability Studies of the Message Transmission in CAN Bus Y. Liu	505
Research for "Network Engineering" Professional Personnel Training Mode Based on 3+1 in the Era of the Internet of Things	£11
J. Wang and L.H. Shao Mining of the Unexpected Event from Customer Feedback Comment	511
W.C. Yang, H.Y. Zeng and R. Li The Research and Simulation of a Prey Pursuit Algorithm	515
W.C. Yang, G.J. Lin and J.Y. Wang	522
Investigation of Data Treatment Methods for Wireless Tracing System in Automotive Industry	
Y.M. Yang, D. Salvatore, S.H. Yang, M.H. Wu and A. Oraifige	527
Focal Points in Supervising Building Intelligent System Y. Zhang and Y.S. Zhang	532
Determination of Dimethyl Ether in Air by Cataluminescence-Based Gas Sensor C.X. Gu, Z. Xing, X. Cai, J. Zhang, B.J. Gao and K.W. Zhou	537
Heat Design and Temperature Characteristic Experiment of Fiber-Optic Gyroscope Y.X. Huang and Z.K. Shi	543
Missile Autopilot Design Based on Fuzzy Self-Tuning Immune PID Control X.S. Gan, X.Q. Tang and J.G. Gao	550
A Computer Vision Measurement System for Linear Deformation of Line Heating Z.Q. Xiang and Z.H. Liu	555
Research on Student Model of Adaptive Learning System Based on Semantic Web J.Q. Xiao	562
Database Design of Portable Mine Fan Performance Tester W. Gao, Q.L. Ling and X.H. Cui	566

Research on Text Conceptual Relation Extraction Based on Domain Ontology D.W. Li	574
Multi-Sensor Data Fusion Technology Based on Convex Optimization Adaptive H.N. Wang, G.X. Yi, C.H. Wang and Y.G. Xie	580
Adaptive H_2/H_∞ Hybrid Filter Based on Convex Optimization H.N. Wang, G.X. Yi, C.H. Wang and Y.G. Xie	586
Experiment Research of Image Transmission over Wired and Wireless Environment X.J. Zhong and L. Yao	592
Inner Hole Diameter Measuring Based on Capacitive Sensor X. Sun, Y.Z. Ma, Y.X. Yu and Y.Z. Zheng	596
The Kalman Positioning Algorithm Based on TDOA/AOA Z.L. Deng and X.G. Wang	602
Performance Enhancement of Limited-Bandwidth Industrial Control Systems B. Al-Madani, A. Al-Roubaiey and M.F. Al-Hammouri	608
The Development of Interactive Information System for Flaw Evaluation in Recirculation Piping of BWR Nuclear Power Plant	
K.T. Chen, K. Ting, Y.Y. Chen, L.C. Lee and K.C. Hsieh Design of Digital Filter Based on DSP	616
J. He and F.Q. Xiong	624
The Framework Design of E-Box Multimedia System X.M. Chen and W.C. Feng	628
Design and Implementation of Online Virtual University Life System X.Q. Cai, H. Lu and H.Q. Yu	632
Research of Urine Analyzer Based on Color Sensor Q.X. Liu, H.Y. Chen and D.H. Lu	636
High Speed Desktop Ultra Precision CNC Micro/Meso-Machine S. Mekid	640
Research on the Fractal Interpolation Based on High Speed Milling W. Zhao, X. Pan, Y.J. Cai and G.H. Li	647
A Comparison between Moving Least-Square Method and Natural Neighbour Interpolation Z.F. Nie, X.L. Li and H.H. Wu	653
Flattening the Spectrum of Erbium-Doped Fiber ASE Source Combining with LPFG-Based Filter Technique	
J.G. Wang, Y. Bai, D.W. Han, H. Zhou and W. Zhang	657
VII. Product Design and Engineering Management	
Based on the Industrial Design under the "Harmony" Culture T. Ge	665
Research on the Visual Language of Interior Interface Design X. Su, K. Huang and Z.F. Zhang	669
Analysis on Domestic Factoring Risk Identification Based on Bussiness Processing	
Technology G.P. Cheng, D. Tang and B.B. Liu	673
The Characteristics of a New Product through User Knowledge in the Early Stages of a Design Process	 -
Z. Taha, H. Alli and S.H. Abdul-Rashid Design Research on Composite Running Washing Machine	678
Y. Liu	684
Study on the Man-Machine Hairdryer Shape Design Y. Liu	689
An Interactive Newsvendor Model Involving Market Risk and Product Quality Risk I.P. Huang and C.C. Chyu	694
Six Sigma Method Applying within Environmental Management R. Kralikova, M. Rusko and M. Badida	700

Research and Application of "Transition and Echo" in Molding Design of Farm Machineries	
W. Chen	706
Study on Manufacturing Enterprise Domestic Factoring Risk Control Methods B.B. Liu	710
Study on Nature Materials in the Application of Product Packaging A.Q. Shi, J. Yu and J. Wang	715
Workshop Layout Design Based on Genetic Algorithm S.Y. Zhang	721
Waist Circumference Measurement Extraction from 3D Scanner Data P. Elbrecht, J. Henno and K.J. Palm	725
Risk Assessment Based on Fuzzy Fault Tree for Waterproofing Accidents in Deep Excavation	
J.C. Wang, J.J. Liu and W.H. Hou	732
Operations Analysis: Practice on Performance Measurement in Supply Chain R.I. Borhan, O.W. Fhang and S. Sorooshian	737
Operations Analysis: A Case for Supply Chain Performance M. Nakaie, G.Z. Hau and S. Sorooshian	742
Construction of Virtual Petrochemical Enterprises Based on Virtual Reality Technology W.Y. Chai, G. Fu, T.B. Xiao and Q.Y. Sun	748
Aviation Accident Prediction Based on Auto-Regressive Integrating Moving Average Method	
X.S. Gan, J.S. Duanmu and J.G. Gao	754
Hybrid Prediction Method of Aviation Unsafe Events Based on Grey Catastrophe and Regression Analysis	
X.S. Gan, J.S. Duanmu and J.G. Gao	759
Analysis and Design of Bohai Sea Major Scientific Special Project Y.P. Jiang and W.X. Luan	764
Italian Energy Portfolio Analysis: An Interactive Renewable Investments Tool F. Cucchiella, I. D'Adamo and M. Gastaldi	768
Analysis of the Textile Materials and Art Forms of Minorities in Yunnan C.L. Wang, W.P. Hu and X.P. Yang	777
The Statistics Analysis of Degradation Data Based on the Degradation Amount Distribution J.S. Wang, Y.Z. He, J.H. Wu and J.W. Lei	781
Study on Interface Design of Bus Station Information Facilities in Korea J. Yu, A.Q. Shi, Y. Zhang and C.J. Han	785