

Recent Advancement on Material Science and Manufacturing Technologies

**Selected, peer reviewed papers from the 2nd International Conference on
Materials Science and Manufacturing (ICMSM2013)**

Advanced Materials Research Volume 721

**Zhangjia Jie, China
29 - 31 March 2013**

Editors:

Qinzhong Xu

**ISBN: 978-1-62748-930-0
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 and Organizing Committee

Chapter 1: Novel and Advanced Materials, Materials Science and Technologies

Microstructural Stability of a Single Crystal Superalloy DD10 under Stressed and Un-Stressed Thermal Exposure at 980 °C J.Y. Chen, L.J. Liu, X.H. Li, M. Xue and L.M. Cao	3
Effect of Zinc Ion on the Electrochemical and Thermal Performance of Polyaniline/Activated Carbon Composites Prepared by <i>In Situ</i> Emulsion Polymerization C. Li, Y.H. Tian and X.J. Zhang	8
Investigation on Fatigue Damage of the Al5Zn2Mg High Strength Aluminum Alloy X.L. Sun, A.Q. Tian, W.B. Chen, S.S. Ding and S.L. Yang	12
Annealing Temperature Effect on the Photoluminescence Properties of Er-Doped Silicon-Rich Silicon Oxide Films C.Q. Li, P.J. Liu, Y.M. Wang and K. Murakami	16
Saponification of Adsorbent BLPAMA Q.X. Yao, J.J. Xie and J.X. Liu	20
Properties of High-Quality LaAlO₃ Film Deposited by <i>In Situ</i> Plasma-Enhanced-Atomic-Layer-Deposition D. Cao, X.H. Cheng, T.T. Jia, D.W. Xu, L. Zheng, Z.J. Wang, C. Xia and Y.H. Yu	24
Number Modeling of Deformation Behavior for Al-Based Powders Coated on Magnesium Alloy by Supersonic Particles Deposition X.M. Wang, S. Zhu, Q. Chang, X.Q. Feng and Y.X. Liu	29
Growth and Characterisation of Ag₂S Films on ZnS/Indium-Tin-Oxide Coated Glass H.C. Pan, X.P. Li, W.H. Liu and Y.B. Ren	33
Preparation and Characterization of PbO₂ Electrode Modified with Praseodymium S.D. Li, F.W. Wang, M. Xu, W.Y. Fang and X.Y. Yan	37
Electro-Catalytic Reduction Performance of La-Doped Nano-TiO₂ Electrode X.Y. Yan, F.W. Wang, M. Xu and B. Xu	41
Preparation and Characterization of Positively Charged Quaternized Chitosan/PEI Composite Nanofiltration Membranes R.L. Han	45
Effect of Different Tempering Processes on Microstructure and Hardness of Q690 Steel L.P. Zhao, H.M. Zhang, W. Liu and W. Yu	49
Effects of Film Thickness on Laser Induced Voltage (LIV) of La_{2/3}Ca_{1/3}MnO₃:Ag_{0.05} Thin Films Grown on LaAlO₃ Substrates X. Liu, Y.Z. Yan, Q.M. Chen, H. Zhang, M.G. Cao, Y.A. Yang and P.X. Zhang	54
Microstructures and Electrochemical Hydrogen Storage Properties of La_{0.7}Ce_{0.3}Ni_{3.83}Mn_{0.43}Co_{0.25-x}Al_{0.26}Cu_{0.48}(Fe_{0.43}B_{0.57})_x Y. Zhou, X.Y. Peng and B.Z. Liu	59
The Preparation of Fluorescent Fibers from FCNPs and Calcium Alginate Y.X. Zhang, Z.H. Zhao, W. Xu, R.C. Pan and Y.Z. Xia	63
Impact of <i>In Situ</i> NH₃ Plasma Treatments on the Interface between HfLaO_x Thin Film and InP Substrate T.T. Jia, X.H. Cheng, D. Cao, D.W. Xu, Z.J. Wang, C. Xia, L. Zheng and Y.H. Yu	67
Preparation of New Anti-Slip Flooring Coatings: Hydrophobic MMA Floor Coatings S.L. Lin and H.H. Cai	73
Flow Behavior of 430 Ferritic Stainless Steel at Elevated Temperatures J.B. Zhang, D.M. Yu, S.R. Niu and G.S. Ji	77
Investigation on Hot Deformation Behavior of 430 Ferritic Stainless Steel J.B. Zhang, D.M. Yu, S.R. Niu and G.S. Ji	82
Preparation and Characterization of Dimer Fatty Acids-Based Vinyl Ester Resin Monomer S.H. Li, X.J. Yang, K. Huang, M. Li and J.L. Xia	86

The Design of Optical Switch for One-Dimension Photonic Crystal Constructed with TiO₂ and Liquid Crystal C.X. Luo and Y.M. Xie	90
Effect of Indium Addition on the Electrochemical Behavior of Zinc Electrodes in Concentrated Alkaline Solutions H.X. Liang and Z.L. Wang	95
Self-Assembling Poly(ethylene glycol)/Poly-γ-glutamic Acid Nanoparticles for Targeted Drug Delivery and Plasmid DNA Y. Ge, K.S. Lu and X.Y. Su	105
Investigation of the Crystal Defects in Synthesized Diamond by Synchrotron Radiation Topography W.L. Yu, X.P. Jia and Q.X. Yuan	109
Quenching Effect on the Dielectric Properties of PVDF/ZnO Composites H.L. Zhang, Q. Fu and W.P. Li	113
A Pre-Stitching Method to Manufacture Z-Pins Reinforced Woven Ceramic Matrix Composite Laminates W. Liu, G.Q. Jiao, J. Guo and H.T. Jiang	117
Dielectric Response of Structured Multilayered Polyvinylidene Fluoride Films L. Jiang, Q. Fu and W.P. Li	121
Effect of Heat Treatment on the Properties of PB-1/PP Blends W. Zeng, H.L. Hu and S.C. Li	125
Measurement and Evaluation of Ferrite Materials Surface Quality W.L. Liu, B. Lin and L.P. Sun	130
A Simulation Analysis Research on the Material Performance of Resin Concrete B. Wang, B. Lin and K. Zhao	135
Comparative Study on Preparation of Al₂O₃-ZrO₂ Composite Powders by the Complexing Precipitate and Carbonblack Coating Methods G.L. Yuan, Q.H. Xue and Y. Yang	139
Study on Photo-Degradation of Poly(ethylene terephthalate)/SiO₂/TiO₂ Hybrid Composites by Sol-Gel Method under Ultraviolet Radiation J. Zhu, X. Liu, Q. Xu and Q. Ren	144
On the Time Dependency of the Chloride Diffusion in High Performance Concrete Z. Chen, X.B. Zhao, Y.H. Yuan, Z.H. Wang, L.F. Yang and Q.M. Jiang	148
The Processing Characteristics and Mechanical Properties of Semi-Prepreg RTM Composites W.D. Li, G. Liu, X.L. Hu, X.F. An, X.Y. Zhong, Y. Li and X.S. Yi	153
The Investigation of a New NO₂ OTFT Sensor Based on Heterojunction F₁₆CuPc/CuPc Thin Films B. Zhang, H.L. Tai, G.Z. Xie, X. Li and H.N. Zhang	159
Experimental Investigation on Reduction Kinetics of Stainless Steel-Making Slag in Iron Bath Smelting Reduction B. Zhang, S. Niu, W.B. Chen, W.C. Li, F.T. Chen, T. Li, L.S. Liang and X. Hong	164
Thermo-Mechanical Behavior of Epoxy Shape Memory Polymer Y. Gu and S.X. Li	169
Study on Synthesis and Synergetic Effect of Novel Bio-Based PVC Thermal Stabilizer from Dimer Fatty Acid and Polymerized Rosin M. Li, J.C. Jiang, S.H. Li, K. Huang and J.L. Xia	173
Experimental Study of Cu-Al-Ni-Fe-Mn Aluminum Bronze Strengthened by Ce J.M. Ji, G.C. Meng, Y.Y. Lu and J. Wu	177
The Analysis of Mechanical Behavior for UMo/Al Dispersion Fuel on Different Fuel Volume and Burnup X. Liu, D.Z. Qian, Z.H. Zhang and B. Tang	184
Synthesis of SBA-15 within Short Reaction Time J. Zhang, L. Mi and S. Yan	190
Effects of Film Thickness on Resistive Switching Characteristics of ZnO Based ReRAM J.H. Xi, X.P. Chen, H.X. Li, J. Zhang and Z.G. Ji	194
Structure-Property Relationship of Dodecylbenzenesulfonic Acid Doped Polyaniline Y. Liu, Q. Wen, J.L. Guan, S.J. Zhao, Q.X. Hu, Z.F. Hou and Q.Z. Yu	199

A Simple Route for the Synthesis of Monocrystalline Rutile TiO₂ Nanorods Y.Q. Yang, G.Z. Fu, G. Liu, B. Wang, G. Wei and L. Deng	206
Influence of Aluminum Hydroxide Particles on the Properties of Polyurethane Based on Unsaturated Polyester X. Wu, B.J. Zhou, F.Z. Meng, Q. Hu and J.L. Pan	210
Influence of Oxygen Annealing on Electromagnetic Properties of Low Temperature Fired Ferrite/Ceramic Composite Materials W.W. Ling, W.Y. Ma, C.X. Xu and Z. Chen	215
Performance of Nanomodified Asphalt Binder and Mixture B.Y. Tang, H. Yao, Y. Feng and X.D. Hu	219
Preparation of Molybdenum Coating on Surface of SiC Particles by Sol-Gel Method S. Li, M.J. Zhu, M. Liu and S.X. Bai	224
Material Study for Porous Ceramic Filtration Applied on Ballast Water Treatment M.X. Zhang, Q. Xue, X.J. Tang and Y.M. Zhu	229
Quantum Yield and Curing Velocity of Two α-Hydroxy Ketone Photoinitiators P. Li	233
The Microwave-Assisted Synthesis and Gas Sensing Properties for Ethanol of SnO₂ Nanomaterials Y.J. Liu, Q.P. Jiang, Y.H. Li and H.Y. Zhao	237
Preparation of Titania Nanorod Arrays by Hydrothermal Method J.R. Hou	241
Study on Combination Use of Polycarboxylate Based Water Reducer and Lignosulphate Based Water Reducer D. Lin, X.Q. Qiu and Z.H. Lin	252
Influences of Firing Process System on Foam Glass Properties Q. Wang, N. Wang, Z.Y. Ding and T.J. Wu	258
Microstructure Evolution of a Single Crystal Superalloy after Tensile Fracture at Different Temperature Z.X. Shi, S.Z. Liu, J. Yu, M. Han and J.R. Li	262
Preparation and Characterization of Terpene-Based Diol from Terpene-Maleic Anhydride Using Lithium Aluminum Hydride as Reductant X.D. Tang, J.L. Xia, S.H. Li, K. Huang, M. Li and Z.Q. Lu	266
Hot Deformation Behavior of Multi-Size Al₂O₃ Particles Dispersion Strengthened Copper Base Composite X.R. Yang, B.H. Tian, Y. Zhang and Y. Liu	270
Fabrication and Characterization of Vitamin E TPGS Loaded Silk Fibroin/Hyaluronic Acid Nanofibrous Scaffolds L.L. Ji, Q.L. Li, Z.H. Yang, W.J. Hu and K.H. Zhang	274
The Effect of the Distance between the Permanent Magnets on the Levitation Force in Hybrid Magnetic Levitation System J. Ma	278
A High Effective and Low-Cost Modifier for Hypereutectic Al-Si Alloys G.H. Qi	282
Wear Resistant and Refractory Nonmetal Material of CFB Boiler Y.P. Liu, Y. Liu and J.Y. Qi	287
High-Order Model of Thermo-Piezoelectric Composited Plate Y. Xie, B. Deng, J.J. Chen and D.K. Li	291
Wear Properties of Cast Aluminium Alloy 6061 Reinforced with Nanosilicon Carbide/Copper Hybrid Particles X.D. Li, H.J. Yin and J.P. Ma	295
Preparation Study of WO₃ Nano-Powder with Micro Emulsion Method X.Z. Diao	299
Wear Properties of (Ti,V)C/Fe Composite H. Xu, Y.C. Ding and J. Wang	303
Electronic Structures and Magnetic Properties in Ti-Doped ZnO Y.F. Chen, Q.G. Song and R. Li	308
Thermal Fatigue Behavior of a Nickel-Base Directionally Solidified Superalloy K. Zhao, H.J. Jiang, H. Lin, J.H. Yang and J. Chen	312

Photochemistry of Azobenzene Side-Chains Liquid Crystalline Containing Pendant Polyhedral Oligomeric Silsequioxanes (POSS) X.T. Wang, X.T. Ye, Z.H. Li and Z.F. Liu	316
Comparative on Wear Behavior of Nitrocarburized Low-Cost GDL-4 High Speed Steel to the Vane of Air Conditioning Z.G. Mu, M. Lei, Y.L. Liang, D.Y. Peng and D.W. Tang	324
Microstructure and Surface Oxides of Cutting Tool Material on 9SiCr4 Y.B. Fu and X.L. Chen	328
Effect of Processing Parameters on Porosity and Bonding Strength in Supersonic Particles Deposition of Al-Si Alloy S. Zhu, Y.X. Liu, X.M. Wang and G.F. Han	332
Optimizing Study of Solidification Agent with High Neutralization Degree Compound Phosphate-Bonded No-Bake Sand by Orthogonal Test D. He, L. Xia, Y.S. Zhang and J. Huang	337
Pure Al Coatings Prepared by Arc-Added Glow Plasma Depositing Technique and Subsequence Plasma Oxidation C. Wang, T.F. Chen and J. Tao	342
Inductively Coupled Plasma Etching of Pt/Ti Electrodes in Cl-Based Plasma Z.Q. Zhong, C.T. Yang, G.J. Zhang, S.Y. Wang and L.P. Dai	346
Research of Sericite in Mineral Technology Y.M. Nie, S.B. Wei, X.L. Lu and S.X. Liu	350

Chapter 2: Advanced Manufacturing and Control Technologies

Experimental Study on Technical Difficulties of Botswana First Circulating Fluidized Bed Boiler during Loading Process G. Zeng, S.L. Zhao, L. Wei, R.Z. Huang and M. Badirwang	357
Simulation of an Explosive Separation Device Used in Aerospace Craft Y.K. Ye, N. Yan, F. Ding and J.F. Man	363
Analog Circuits Fault Diagnosis Using Multifractal Analysis Y.K. Sun and Z.B. Yu	367
Software Technology Research on Control System of Ultra High Pressure Water Jet Rust Removal Equipment L. Sun, Y.J. Gong, Z.M. Zhang and Z.W. Wang	372
Simulation and Experimental Research of Bearing Crown Roller-Raceway by Non-Uniform Time Effect Electrochemical Mechanical Machining X.H. Zheng, Z.F. Wei and B. Tao	377
Mathematical Modeling and Experimental Study on Electrochemical Deburring of Miniature Holes Z.F. Wei, X.H. Zheng and Z.Y. Yu	382
Parameter Optimization on Bolt Supporting of Deep Roadway Surrounding Rock Y.K. Zhang and W.J. Yu	387
A Method of Improving Signal Capture Ability of Digital Oscilloscope J. Jiang and S.L. Tian	392
The FEM Simulation of the Pressure and Fine-Blanking Quality L.M. Wen, Q. Li and Y.M. Wang	397
A General Method for the Modeling of Bearing Systems T.N. Guo, Y.H. Cui and L.G. Cai	402
A Study of Primary Factors Influencing the Properties of Plating Throwing Power for Printed Circuit Boards Z.H. Tao, Y.M. Chen, S.X. Wang, W. He and J. Zhang	409
FEA Based Wind Loads Analysis for the Main Steel Structure of Bucket Wheel Stacker-Reclaimer P. Shang, X.G. Zhang, B. Xu, Y.C. Li and Y.M. Guan	414
A Mix Proportion Design Method of Manufactured Sand Cement Concrete Based on Ultra-Filled G.J. Ke, B. Tian and J.L. Wang	420

Research on Drive-Part Control Strategy under the Influence of Environmental Temperature X.X. Hu, X.R. Xu, G. Chen and H.T. Chen	425
Simulation Analysis of Walking and Climbing Robot Based on ADAMS D.M. Liu and H.X. Yang	433
Research on Piezoelectric Tube Stack for Radial Vibration Mode C. Zhong, L.K. Wang, L. Qin, J.J. Zhou, C.Y. Chen and J.J. Liu	437
Influence of Pressure to Laser-Induced Breakdown Spectroscopy and Importance of Steady Ambient Atmosphere in Quantitative Analysis J.H. Xi, X.S. Hu, J. Zhang, H.X. Li and Z.G. Ji	443
Application of Inverter in Elevator Group Control System Simulation Equipment for Teaching Z. Yang, L. Wu and X.F. Dong	448
Analysis on Structure of Active Disturbances Rejection Controller Z.L. Han, H. Ma and L.L. Ge	452
Finite Element Thermal Analysis on Heat Transfer Performance of Rectangular Micro – Groove Flat Heat Pipe Y.B. Liu	456
Prediction Modeling of Hot Metal Silicon Content in Blast Furnace Based on PSO-LSSVM L.H. Wang, S. Gao, X. Qu and Y.G. Tang	461
Study on the Synchronizing Time and Shift Quality of Automated Manual Transmission (AMT) Z.S. Zhang, L. Ling, B.H. Wu, Z.S. Chen and J.H. Li	466
Applications Analysis of the Technology of Mold Electromagnetic Stirring in a Steel Mill Y.L. Liao and Y.F. Yao	471
Simulation Analysis of a New Type of Engine Fluid Hydraulic Mount’s Characteristic in Isolating Vibration H.X. Yang and D.M. Liu	475
Research of Dynamic Weighing System Based on Multi-Sensor Data Fusion Technology Y.X. Wang, C.H. Bao and C.L. Fan	479
A Finite Element Simulation of the Surface Acoustic Wave Devices Based on Polarized Piezoelectric Ceramic P. Cao and J.L. Zhu	483
New Method to Identify CT Saturation Based on EMD W.H. Xia, M.F. Gong, G.L. Li, J.Y. Zhang and X. Cheng	488
Studying of Fuzzy Control for Fuel Injection System of Electronic Unit Integrated Pump B.M. Chai, L. Hua and Z.Q. Xu	492
Application of High Performance Electro-Hydraulic Synchronous Servo System on NC Broaching Machine G.J. Chen, J. Ni, T.T. Liu and M. Xu	497
A Study on Active Engine Vibration Control by Applying Hydraulic-Piezoelectric Mount H.X. Yang, R.M. Wang and D.M. Liu	501
The Maintenance Decision-Making for Long-Term Reserved Equipment Based on the Failure Data Y. Xu, J.J. Su and J. Yang	505
Study on Theory of Solid-Plug Conveying of Centrifugal Extruder by Experiments J. Zhao and L. Wang	510
Experimental Research of the Performance of the Integrated Piston-Plunger Pump Z.Q. Dai, T.Z. Zhang and Y. Wei	515
Suppress of Substrate-Assisted Depletion Effects in Super Junction LDMOS on Thin Film SOI C. Xia, X.H. Cheng, Z.J. Wang, D.W. He, D. Cao, T.T. Jia, Y.H. Yu and D.S. Shen	521
Experiment of a Resistive Superconducting Fault Current Limiter Based on MgB₂ under Different Supply Voltages L. Yao, J. Mei, J.Y. Zheng, B. Liu and Y. Xu	527
Research and Experiment on the Thermal Characteristics of Hybrid Ceramic Bearings W.Y. Huang, B. Lin and X.F. Dong	531

Analysis of the Ship Loader's Vibration Mode in the Roll-On Process and the Reinforcement Scheme W.B. Zhang, S.M. Wan, B. Lin and M.L. Zhu	536
Dynamic Characteristics Analysis and Topology Optimization of Column Based on Finite Element Method J. Chen, Z.L. Yang and X.X. Li	541
Finite Element Analysis on the Blast Resistant Performance of Multibarrel Tube-Confined Concrete Column in Different Cross-Sections S. Wu, J.H. Zhao and E.G. Xiong	545
Analysis on Curve Negotiation Ability of the Rail Vehicle Based on SIMPACK L.H. Wang, A.N. Huang and G.W. Liu	551
Research on the Auto-Modeling Technology and Load Distribution Optimization for Multi-Bolt Composite Joints X.B. Peng, C. Hou and X.P. Wan	556
Conical Surface Sealing Performance of Pipe Connection Fits M.X. Qiu, J.J. Wang, Z.X. Wang and Z.Y. Li	564
Torsional Vibration Analysis of Drive System for 6-High Cold Rolling Mill Y. Hou, Z.J. Zhang, Y.X. Guo, J.Q. Feng and J. Luo	572
The Research for the 3D Morphology Measurement of Large-Scale Object by Using Digital Projection Speckle Correlation Method (DPSCM) X.O. Pan, J. Han, Q. Wang, J.S. Fu and J.N. Liu	579
Study for the Measurement of Cantilever Beam Deflection by Using Digital Projection Speckle Correlation Method (DPSCM) X.O. Pan, J. Han, Q. Wang, J.S. Fu and J.N. Liu	583
Video Object Detection Algorithm Based on Gaussian Mixture Models Z.X. Fu and L.M. Wang	587
Research on the Step by Step Sliding Mode Variable Structure Adaptive Control X.X. Hu, H.T. Chen, G. Chen and X.R. Xu	591

Chapter 3: Bio and Sustainable Manufacturing Technologies

Protective Effect of Herbal Compound Beverage of <i>Radix astragali</i> on Immunosuppressed Mice Induced by Cyclophosphamide Y.P. Liu, Y.G. Qi, A.J. Liu, X.W. Zhang, A.G. Teng, J. Tang, W.J. Zhang and L.G. Shi	603
Risk Assessment for Niclosamide Residues in Water and Sediments from Nan Ji Shan Island within Poyang Lake Region, China D.G. Huang, J.H. Zhen, S.Q. Quan, M. Liu and L. Liu	608
Limited Irrigation System of Spring Maize in a Semi-Arid Area of Northeast China G.H. Yin, W.H. Li, J. Gu, L. Hao and Z.X. Liu	613
Experiment Research on Comprehensive Recovery of Carbon and Iron from Flue Dust Y.M. Nie, B. Wang, M. Chen and S.X. Liu	618
Research on the Selection and Evaluation Content of Green Materials X.Y. Lou	622
Interaction of Human-Like Collagen with Copper (II): Effect on Thermal Characteristics Y.Y. Yu	625

Chapter 4: Advanced Design Technology

The Product Types Choosing Based on Product Service Characteristics Table H. Hao, Y.J. Lu, J.Y. Qin, L.L. Liang and L. Lin	631
An Analysis on Parametric Design of Sports Building Structural Form B. Gao, Y. Dong and D.M. Liu	636
Development of Seedling Vegetable Harvester Based on SolidWorks H.B. Sun, Y. Guo and S.B. Tian	640
Thermal Stress Analysis of High Temperature Autoclave by ANSYS H. Gao and Y.Z. Li	644

An Optimized Design of Injection Molding Process Parameters for Supporting-Foot Plastic Part Based on CAE X.Y. Chen	648
Design of Laboratory Type Ring Inflatable Flotation Machine L.L. Yang, X.Y. Tang, J. Shi, H. Zou and X. Wang	652
Design on Control System of Seedling Vegetable Harvester Based on Single Chip Y. Guo, S. Dong and S.B. Tian	656
Design of Wearable Lower Limb Rehabilitation Device J.J. Mo, Y.J. Chiu and D.Z. Chen	661
The Design and Application of the Turnover Drum Tooling of PROTOS Cigarette Machine Y.P. Liao, J.B. Deng and C.C. Fei	666
The Optimization of the Pass Structure of Double Regenerative Burner with the Numerical Simulation of Thermal Stress Field F.Z. Jiang, J.Y. Kong and D.G. Ouyang	671
Analysis on Lighting Source Configuration of Stadiums for College Physical Education S.F. Li and S.G. Niu	677
Design and Simulation of Cavity Parts Based on MasterCAM Y.B. Cui and H. Li	681
Main Structural Design and Motion Simulation of Stacker Reclaimer Based on Virtual Prototype Technology P. Shang, Z.P. Cui, W.T. Zang, S.W. Song and Y.M. Guan	686
Design and Simulation of Scalable Plastering Machine Based on Virtual Prototyping Technology Z. Li and X.J. Shang	691
A Vibration Monitor System Design for Bridge Model H.F. Lv and J.F. Zhao	695

Chapter 5: Civil and Building Manufacturing Technologies

Experimental Investigation and Finite Element Analysis on Concrete-Filled Steel Tubular Gusset Plate Connections W.F. Duan, C. Liu and B.Z. Cao	701
Application and Numerical Simulation of Advanced Small Pipes Grouting in Tunnel Engineering S.C. Xu and T.Y. Liu	706
Seismic Performance Analysis of Oil Pipeline with Crack Defects L.L. Wang, X.Q. Zhang and L.L. Xu	710
Application of Steel Plates on the Retrofitting of Current Reinforced Concrete Coupling Beams C. Bei, S.W. Li and R.K.L. Su	714
Axial Bearing Capacity of Steel Reinforced Concrete Short Column with Double Circular Steel Tubes J. Wang, J.H. Zhao, S. Wu and N. Li	720

Chapter 6: Related Themes

Propagation Characteristics of Coupled Wave through Micropolar Fluid Interlayer in Micropolar Elastic Solid S.Y. Dang, H.Y. Xu, Q.Y. Sun and B. Liang	729
The Research of Trivariate Normalized Tight Frames and Pseudoframes of Subspace Based on a Pyramid Decomposition Scheme S.H. Wang	733
The Stability and Perturbation of Bivariate Gabor Frames and Applications in Material Engineering D.Y. Yuan	737
The Characteristics of Orthogonal Wavelet Frames and Canonical Frames and Applications in Material Science Y.F. Xu	741

**On the Mechanism of Inter-Organizational Knowledge Creation in the Knowledge Network
from the Perspective of Nonlinear Interaction**

S. Peng, D.M. Wang and W.X. Yu

745