

Advance Materials Development and Applied Mechanics

Selected, peer reviewed papers from the 2014 the 3rd International Conference on Advanced Materials Design and Mechanics (ICAMDM 2014), May 23-24, 2014, Singapore

von
Keishi Matsuda, P.S. Pa, Wiseroad Yun

1. Auflage

Trans Tech Publications 2014

Verlag C.H. Beck im Internet:
www.beck.de

ISBN 978 3 03835 177 1

Table of Contents

Preface, Committees and Sponsors

Chapter 1: Nanomaterials and Technologies

The Study of High Efficiency Photovoltaic Devices with Metal Nanoparticles L.Z. Hsieh, M.H. Lin and X.M. Duan	3
Thermal Bubble Nucleation in a Nanochannel: An Experiment Investigation M. Chen, K.P. Jiang, D.W. Jiang, D.D. Chen and Y.F. Zhao	7
Effect of Cosurfactants on Pore Sizes of Continuous Highly Ordered Mesoporous Silica Nanofibers Y. Zhou, W.P. Zhang, G. Wang, Y.Q. Zhang, J.H. Cao and D.Y. Wu	13
Influence of Uniaxial Stress on the Stress-Strain Curve Measured by Nanoindentation I. Ihara, K. Ohtsuki and I. Matsuya	17
The Preparation and Characterization of ZnO/Graphene Nanocomposites Z.P. Wang, G.L. Wu and Y. He	21
Study of Nano Coating Micron Calcite Reaction Process and Influence Factors N.B. Huo, S. Liu and X.J. Jia	28
Resistances of Nano-Titanium Dioxide on the Ultraviolet Aging of Poly(butylene succinate) L. Liu, Y.R. Wang, Y.P. Zuo, D. Liu and B.H. Guo	32
Advances of Study on the Developments and Applications of Carbon Nanotubes A.Y. Zhang	36
Monte Carlo Simulation of the Dispersion of Carbon Nanotubes in Cement Matrix B.M. Wang, Y. Zhang, M.L. Yu and Y. Han	40
Preparation and Antibacterial Activity of Silver Doping Nano Zinc Oxide Q. Li, X.H. Zhao, X.W. Li, L.P. Wang, Q.Q. Liu and C. Zhang	45
Preparation of Amorphous Silicon Carbide Nanostructures via Solvothermal Method H.X. Li, G.Y. Li, T.J. Hu, X.D. Li and Y.Q. Yang	49
Doped TiO₂ Nanotube for Lithium Ion Battery X.X. Hu, J.X. Liu, Z.Y. Wu, X.R. Zheng and M. Ma	53

Chapter 2: Advanced Material, Composite Materials and its Applications and Technologies

Information Systems for Composite Materials: Requirements and Challenges W. Dangelmaier, T. Sommer-Dittrich, J. Streichhan and M. Monhof	59
Mechanical Properties of DGEBA/Amidoamine Blend at Non-Stoichiometric Ratios B. Satheesh, N. Warrior and K.Y. Tshai	63
Research on Adsorption Kinetics Models' Fitting Values of H₂O₂ Oxidated Loofah Sponge on Methylene Blue Y.H. Dou, Y.W. Wang, X.H. Zhao, Y. Wang, X.W. Li, M. Wang, Q. Li and Q. Li	72
Thermal Tuning of Vibration Band Gaps in Thin Phononic Crystal Plates with Nitinol H.J. Zhao, R.Q. Liu and H.W. Guo	78
Synthesis of Cu₂ZnSnSe₄ Compounds Using Solvo-Thermal Method C.S. Chou, J.W. Jhang, P. Wu and W.H. Lu	84
The Effect of Guide Sleeves on Shear Behavior of 3D Weaving Composites X.C. Wu, Z.D. Shan, F. Liu and Y. Wang	89
The Microstructure and Mechanical Properties Research of FeCrWMoV-Series High Temperature Self-Compensation Lubricating Composite Materials Y. Han, Y.J. Wang, S.R. Wang and G.J. Xue	95
Continuously Large-Scale Preparation of Multi-Layer Graphene Grown on Polycrystalline SiC Microspheres J. Ma, G.Y. Li, Z.Y. Chu, T.J. Hu, Y.H. Li and X.D. Li	99

Effects of Mechanical Alloying on Microstructure and Properties of Powder Injection Moulded SiC_p-Reinforced Aluminium Composite T. Patcharawit, S. Klahan, P. Rupkrathok and N. Chuankrerkkul	103
Hydrothermal Synthesis and Upconversion Properties of Yb³⁺, Tm³⁺ Co-Doped Gd₆MoO₁₂ Phosphor with Regular Morphologies J.Y. Sun, B. Xue, Q.M. Di, Q.G. Xu and L. Han	109
A First-Principles Study of Electron-Phonon Coupling of OsB₂ Y.Q. Wang, J. Gao and S.P. Yan	113
Photoluminescence and Energy Transfer from Sm³⁺ to Eu³⁺ in Na₃YSi₂O₇ Phosphor for Light-Emitting Diodes J.Y. Sun, D.P. Cui, Q.M. Di, Q.G. Xu and L. Han	117
Compressive Properties of Corevo[®] Foam under Uni-Axial Loading Based on Experimental and Numerical Analysis M.A. Sulong, V. Mathier, T. Fiedler, I.V. Belova and G.E. Murch	121
Fine Spin Filtering Effect in Co-Phthalocyanine Molecule Induced by the Spin Polarization of Co Atom Y.H. Zhou, X.H. Qiu, L.L. Zhou and Y.L. Peng	127
Recent Developments in Molecularly Imprinted Solid Phase Extraction Technology G.J. Shen and H.Y. Pei	131
Effect of Cooling Rate on the Microstructures and Mechanical Properties of Mg-Y Alloys G.C. Sim, K.S. Tun, X.H. Tan, C.K.J. Weng, K.W.R. Onn, M. Gupta and T.K. Lee	135
Observation of Corrosion Resistance of 13Cr-2Ni-2Mo Stainless Steel Quenched by Induction Heating K. Kida, K. Okamoto, M. Ishida, K. Mizobe and T. Shibukawa	140
Study on the Use of Fleshings-Derived Collagen in Post Tanning Operations M. Puccini and D. Castiello	144

Chapter 3: Films, Coating and Surface Engineering

Ionic Distribution in Plasma for the Process of Electron-Beam Physical Vapor Deposition C.Y. Ho and W.C. Wu	153
Flaking Initiation Life under Rolling Contact Fatigue of Ceramic Coated Steels Quenched after Coating Process H. Tanabe, K. Ogawa, M. Nishizawa, Y. Izumi and T. Takamatsu	157
Preparation, Characterization and Dielectric Property of Novel Poly(cyanate ester) Thin Films X.Y. Zhao, Z.Y. Sun and M.Z. Wang	161
The Influencing Factors for the Thickness of Silica Sol-Gel Film by the Dip Coating Process J.H. Lei and R.D. Zhang	165
Preparation and Properties of Pyrolytic Carbon Coating on Carbon Materials Used in Czochraski Single Crystal Silicon Furnace W. Zhao, B. Zhu and W.W. Cao	170
Effects of Laser Parameters on the Formation of Al₂O₃-TiC Coating by Laser-Assisted Combustion C.X. Lu, H.P. Li, P. Chen, L.H. Xue and Y.W. Yan	175
A Study on the Resistive Switching of La_{0.7}Sr_{0.3}MnO₃ Film Using Spectromicroscopy H.S. Lee, K.M. Kang, W.J. Han, T.W. Lee, C.S. Park, Y.J. Choi and H.H. Park	184
The Production of ITO Transparent Conductive Materials and the Development Prospect in the Field of Biological Information J.J. Liu, H. Men, Q.T. Zheng, W.K. Jiang, H.H. Gao and X. Zhao	188

Chapter 4: Machining and Forming Materials Technologies, other Manufacturing Technologies

A Method to Select Optimal Cutting Force Model Using the Measured Process Transfer Function M. Zhu, X.X. Yu, W.W. Xiao and K.M. Mao	195
---	-----

A Pre-Processing Method of ProCAST Based on Pro/E and HyperMesh W. Huang, H.M. Shen, M.J. Hu, S. Li and X. Chen	203
Assessment of the Influence of Welding Parameters on Distortion F.R. Locatelli, W.J.P. Casas and R.F.L. Filho	208
Design and Optimization of Honeycomb Corrugated Chaff Forming Roller X.P. Yang, B. Zhong and C.J. Luo	213
Effect of Backplate Thermal Diffusivity on Mechanical Properties of Double Sided Friction Stir Welded Aluminum for Ship Structure A. Zubaydi, N. Muhayat, Sulistijono, M.Z. Yuliadi, B. Santosa, D. Setyawan and S. Haqi	219
Study on External Grind-Hardening Experiments and the Analysis of Hardening Effects for 40Cr Steel G. Yang, Z.T. Han and C.L. Du	223
Study of Spatial Ellipsoid Helix Interpolation Algorithm Based on Multi-Axis Lathe X.P. Yang, Z.M. Zhou, Y.J. Gu and L.X. Wang	228
Research on Flange State during Spinning of AZ31 Magnesium Alloy Rotators L.L. Li, Z.Y. Cai, H.Q. Xu, M. Wang, R. Zhang, D.L. Wang, Y.L. Zhang and X.F. Gao	233
Numerical Simulation and Analysis for Blow-Off Flow Field of a Wet Skin Pass Mill H.J. Qiao and D.R. Gao	238
Molecular Dynamics Simulation of Two-Phase Structures of Copper Formed by Laser Grooving P. Wen, G. Tao and P.J. Zhou	242
Study on Optimal Spacing and the Residual Height Parameter of Blade Part in MASTERCAM S.H. Xiao and W.C. Zhou	249
Effect of Preheat Temperature on Friction Stir Welded Aluminum Alloy 5052 Joints N. Muhayat, Triyono, B. Kusharjanta and R.T. Handika	253
FE Modelling of Residual Stresses and Validation Using Chip-Mechanism and Microstructural Analysis of Ultrasonic Vibration Assisted Turning of Ti Alloy Ti-6Al-4V S. Patil, D. Sheed and R. Singh	257
Research on Performance of Foundry Sand under the Effect of Chemical Binder Q.Z. Sun, J.G. Yan, P.Q. Zhang, Z.K. Zhao and H. Du	262
The Effect of the Initial Temperature of Ring Blank on Conical Ring Rolling Process W. Meng, G.Q. Zhao and Y.J. Guan	266
Effects of External Magnetic Field on Intensity of Plasma Flow C.Y. Ho, Y.H. Tsai and C. Ma	272
Formation and Distribution Mechanism of Intermetallic Compounds of Al/Mg Joint with Zn Transition Metal Q. Gao, K.H. Wang, H. Ma and W.G. Feng	276

Chapter 5: Applied Mechanics and Construction Engineering

Concrete Strength Variability in Italian RC Buildings: Analysis of a Large DataBase of Core Tests A. Masi, A. Digrisolo and G. Santarsiero	283
Buckling Behavior of Catheter Reinforced with Braids under Axial Compression after Torsion: Effect of Deformation Speed on Buckling Region Y. Kato	291
Effect of Fiber Volume Fraction on Compressive and Flexural Properties of High-Strength Steel Fiber Reinforced Concrete K.L. Ahn, S.J. Jang, Y.J. Yun, D.G. Yu and H.D. Yun	296
Analysis of Guyed Transmission Tower Dynamic Characteristic F.L. Gan and X.B. Jia	300
Analysis of the Forms of Attachment Frame and Stress Characteristics B. Li, J. Liu and K.W. Wang	304
Damping Analysis of Laminated Plates Using Complex Stiffness Method Q.Q. Wu and M.Q. Wang	308

Influence of Axial Compression Ratio on Seismic Behavior of Reactive Powder Concrete (RPC) Beam-Column Joints Y.Z. Ju, C.Y. Li and D.H. Wang	312
Influence of Curing Temperature on the Compressive Strength of High Performance Concrete S.W. Kim, W.S. Park, N.Y. Eom, Y.I. Jang, H.D. Yun and D.G. Kim	316
Mechanical Properties of Reactive Powder Concrete Containing Fly Ash under Different Curing Regimes D.H. Wang, Y.Z. Ju and W.Z. Zheng	320
Static Stress Changes and Triggering Imposed by Wenchuan Earthquake on Lushan M7 Earthquake D.N. Lei, Y.J. Cai and H. Li	324
Structural Behaviors of Non-Ductile Reinforced Concrete Frames with Engineered Cement Composite (ECC) Wing Wall Elements D.H. Kang, W.G. Lim, H.R. Kim, M.H. Lee and H.D. Yun	328
The Influence of Base Pre-Tilting on the Dynamic Properties of Angle Towers Y.P. Li, L. Li and X.Y. Yang	332
Stress Analysis and Structure Improvement on Arm of Ladle Turret X.Y. Zhang and L.K. Guan	336
Cathodic Prevention and Cathodic Protection of Concrete Slab with Zinc Sacrificial Anode J.A. Jeong	341
Engineering Properties of Controlled Low-Strength Material Made with Residual Soil and Class F Fly Ash Y.N. Sheen, L.J. Huang and D.H. Le	345
On the Multiple Linear Regression and Artificial Neural Networks for Strength Prediction of Soil-Based Controlled Low-Strength Material L.J. Huang, Y.N. Sheen and D.H. Le	349
Measurement of Sliding Wear of Shot-Peened Partially Stabilized Zirconia Plate H. Koike, K. Iwanaka and K. Takahashi	353

Chapter 6: Robotics, Control System and Measurement Technologies

Application of Fuzzy Control Theory in Obstacle Avoidance Simulation of Intelligent Wheelchair F. Li	361
Research on Flexible Centroid Measurement Method for Segments of Large-Thrust Carrier Rocket X.L. Zhang, L.S. Zhang, W.Y. Tang, C. Wang and W.C. Liu	365
Simulation Research on the Compound Control System of Internal Model Add Feed-Forward Compensator S.B. Zhang	372
Wind-Induced Vibration Control for Transmission System Using Steel-Lead Viscoelastic Damper F.L. Gan and H.L. Jiang	376
Fuzzy PID Control of ABS Based on Real-Time Road Surface Identification B. Wang, P.P. Lu, H. Guan and J. Jing	380
The Application Research of Non-Nuclear Density Gauge Electromagnetic Technology in the Road Engineering J.L. Chai and Y. Wang	384
Lie Algebraic Structure and Poisson Conservation Law for One Class of Multi-Dimensional Coupled Oscillators Y. Sun, B.Y. Chen and J.L. Fu	388
Three-Level SVPWM Inverter with Li-Ion Battery Driven for Robot Motor S. Chen and C.C. Chen	393
Development of Practical Wrist Rehabilitation Robot by Mirror Effect I. Yamamoto, M. Matsui, N. Inagawa, T. Tsuji, K. Hachisuka, F. Wada and A. Hachisuka	397
K-MORE: Design of a Kinect Motion Oriented iRobotics Environment H.H. Ku, T.S. Kao and C.H. Chi	401

Dynamic Control of Gait and Posture Training on Robot C.C. Chen, S.H. Ciou, Y.S. Hwang, Y.L. Chen and S. Chen	407
Novel Strengthened Structure of Stair-Climbing Robots on Campus C.K. Wang, Y.H. Wu and Y.S. Cheng	411
 Chapter 7: Electrical Devices and Embedded Systems, Machine Elements, Systems and Mechanisms	
Computer Aided Design of a New Universal Clamping Mechanism J.Z. Li	417
Experimental Study of Corrosion Sensors for the Design Technology of Bridge Longevity J.A. Jeong	421
A Theoretical Study of the Phase Angle for the β Type Pulse-Steam Stirling Expander G.J. Lai, C.K. Lin, Y. Kobayashi, M. Matsuo and M.C. Chiu	425
Damage Identification of the Blade Based on Distributed Fiber Bragg Grating Sensors Y.H. Zhang and W.Y. Yang	431
Design of Electrochemical Biosensor on Naphthalene Content Detection in Water Based on SCM Y. Liu, Y.P. Yu, H.Y. Wu and R.K. Chang	435
Design of Reflective/Diffractive Objective Optical System for Handed Low-Light Night Vision Google N. Li and R.L. Zhang	439
Fault Diagnosis of Mechanized Bridge's Electrical System Based on I²C-bus and Virtual Instrument Technology Y.S. Sun, X.Q. Yang, L. Pei and S. Yan	444
Meshing Efficiency of Involute Helical Gears Based on Elastohydrodynamic Lubrication B. Wang and X.B. Chen	450
Research about Deformations Identification for Globoidal Cam Machine Based on Multi-Body System Theory L.P. Zhao, H.R. Chen, Y.Y. Yao, H. Zhao and P. Yan	454
Selective Tension Apparatus Development of Vibration Membrane for Stereo Speaker Production U.S. Kim, Y.J. Jung, B.W. Jeong, M.S. Kim, G.S. Yang and J.W. Park	458
The Establishment and Weight Calculation Method of Evaluation Indexes for the Float Board Propulsion System Y.Q. Cai, F.M. Zeng and J.L. Liu	464
The Simulation Studies of PWM Voltage Source Rectifier under Unbalanced Grid Voltage J.L. Zhang and Y.R. Li	468
The Skimmer Selection Based on Fuzzy Decision in Response to Oil Spill Y.D. Zhang and Y. Liu	472
Research on Manufacturing of Blade Screw in Solid-Liquid Separator J.J. Wang, K. Wang and Q. Wu	476
VLC-LED Receiver Condenser with Optimized CPC Z.X. Wu, Y.J. Nie, W. Jin, Z.X. Zhang, Q. Qiao and E.D. Gu	480
300 MW Coal Tangential Boiler Furnace Numerical Simulation H.X. Liu and B.X. Li	484
Optimization Design Analysis on Electrical Performance of ITER Axial Composite Insulation Break C.C. Yang	488
Research on Overloading Protection of Permanent Magnetic Coupler in Coal Mine W.Q. Yuan, Y. Liu, D. Li and G.Y. Meng	492
The Research of Drive Roll's Dynamics Characteristics S.H. Li	498
Analysis and Research on the Picking Roller of the Half-Feed Peanut Combine Harvester X.L. Lü, Z.C. Hu and B.L. Peng	502
Statics and Grasp Stiffness Analysis of an Underactuated Cable-Truss Mechanism N. Wu, R.Q. Liu and H.W. Guo	507

An All-Digital, Cyclic and Synthesizable TDC in the ADPLL-Based Clocking Digital Systems for Multidomain Power Management

S.H. Chen and M.B. Lin

515

Chapter 8: Vehicles, Transport and Navigation Development**A Novel Adaptive UKF and its Application in the SINS/GPS Integrated Navigation**

Y. Li, S.S. Gao and Y. Yang

521

A Variable Proportional Valve Braking Force Distribution Strategy Including SOC Constraints of Electric Vehicles

H.X. Yu and Z.Y. Lin

525

Finite Element Analysis of Key Component on Two Wheels Scooter

Z.D. Huang, Y.P. Du, B.Q. Liu, G. Yang, Y.F. Liu and X.G. Zhao

531

Multi-Objective Optimization for the Section Structure of Sandwich Plate Applied in the High-Speed Train Compartments

Y.Q. Wang, X. Chen, B. Wang, X.B. Kuang and X.G. Tian

535

Secondary Developments of ANSYS for Temperature and Stress Field Simulation of Brake Disc Based on VB

M.L. Wu, X.Y. Zhu and J.Y. Zuo

540

Simplified Dynamics Modeling of Seat-Passenger in Vehicle Frontal Crash

Y.Y. Wang, Z.Y. Lyu, L.L. Wang and Z.H. Yan

544

Study on the Stress Variation Mechanism for the Rails under the Wheels Repeated Rolling Effects

H. Song, L.B. Song, J.K. Yao, F.B. Lian and W. Li

551

SINS Transfer Alignment Based on Robust SDRE Filter

D.Y. Wang, P. Sun, J.Y. Peng and X.H.G. Xu

557