

Table of Contents

Preface, Committee, Sponsor

Chapter 1: Advanced Ceramic and Glass Materials

Saman Tree Ash for Stoneware Glaze S. Tansripraparsiri	3
Preparation of Cerium Dioxide Film by Anodization in $\text{Na}_2\text{C}_2\text{O}_4\text{-NH}_3\cdot\text{H}_2\text{O-H}_2\text{O-(CH}_2\text{OH)}_2$ Electrolyte X.Z. Liu, W.R. Rong, X.Z. Liu, X.H. Ren, J. Chen and Y. Zhu	7
Effect of Heat Treatment on the Crystal Structure of the Anodic Cerium Oxide Films X.Z. Liu, Y.F. Ni, X.Z. Liu, L.T. Xia, J. Chen and X.Y. Zheng	12
Experimental Research on Preparation Technics of High-Purity Quartz Material Q.D. Zhang, X.L. Li, Y.S. Song and G.Y. Zhou	17
Preparation of Bi_2WO_6 Powders with Micro-Carbon Spheres Acting as a Template by Refluxing Method Y. Lin and H.F. Chen	22

Chapter 2: Composites, Polymers and Hybrid Materials

A Molecular Dynamics Simulation Study on the Relationship between Hydrogen Bond and Damping Properties of AO-70/NBR Composites J. Zhu, X.Y. Zhao, M. Song, Y. Han, L. Liu and S.Z. Wu	29
Effect of DFA Modification on Thermal Properties of Multifunctional Epoxy/Anhydride Systems M.M. Yu, L. Fang, M. Yang, H. Li, M.S. Ren and J.L. Sun	35
Interaction between Polyaramidic Electrospun Nanofibers and Epoxy Resin for Composite Materials Reinforcement S. Merighi, E. Maccaferri, J. Belcari, A. Zucchelli, T. Benelli, L. Giorgini and L. Mazzocchi	39
Ply Orientation-Driven Path Planning with Multi Reference Paths for Robotic Fiber Placement on Mesh Surface J.Z. Pei and X.P. Wang	45
Flame Retardant Effect of a Modified Intumescent Flame Retardant on a Rigid Polyurethane Foam P.B. Dai, L.Y. Yang, T. Zheng, C. Qin and Q.C. Tang	51
A Comparison of the Polymer Matrix Behavior and Mechanical Properties of the Glass Reinforced Plastics and Glass Reinforced Epoxy Pipes under Different Oil Field Chemicals M. Al-Samhan, A. Yussuf and S. Jacob	55
Flexural Properties and Vibration Behavior of Jute/Glass/Carbon Fiber Reinforced Unsaturated Polyester Hybrid Composites for Wind Turbine Blade A. Murdani, S. Hadi and U.S. Amrullah	62
Experimental Evaluation of the Chill Casting Method for the Fabrication of LM-25 Aluminum Alloy-Borosilicate Glass (p) Composites A. Hiremath and J. Hemanth	69
Effect of Graphene Oxide on Non-Isothermal Melt Crystallization Kinetics of Poly(Trimethylene Terephthalate) K.Y. Wang and B. Li	74
Influence of Zinc Oxide Nanograins on Properties of Epoxidized Natural Rubber Vulcanizates R. Suntako	79
An Alternative Crosslinking of Epoxidized Natural Rubber with Maleic Anhydride N. Srirachya, T. Kobayashi and K. Boonkerd	84
Emission Spectra Analysis of Atmospheric Pressure DBD Plasma Being Processed by Polypropylene Non Woven Fabric Y. Zhang, Q.N. Xu, Y. Li, T. Yang and Y.Z. Sun	91

Biocompatible Tough Hydrogels via Micellar Copolymerization of NIPAM and Stearyl Acrylate: Synthesis and Characterization X.D. Xu, J. Liu, Y.P. Wu and J.P. Deng	96
Electrodeposition of Chitosan Composite Film and its Application for Protein Conjugation T. Chen, C.L. Xiang, F. Xu and L. Sun	103

Chapter 3: Materials for Photonics, Opto- and Microelectronics

Optical Characterization of Quaternary AlInGaN Multiquantum Wells Y.F. Wu and J.C. Lee	111
Polyester Gel Electrolyte with Three Dimensional Network for Efficient Quasi-Solid-State Dye-Sensitized Solar Cells C.J. Shen, Q.Z. Huang, J.F. Shi, Y.Y. Fang, G. Xu and Y.Q. Ge	116
Analysis of Carrier Transport Mechanism for p-Type SnO Thin-Film Transistor J. Qin and L. Qiang	122
Fabrication of Macroporous Silicon in Organic Electrolytes and their Luminescence W.L. Li, W.J. Yang, M. Long, G.R. Li, Y. Ma, X. Zou, Y. Xu and Y.F. Li	127
Influence of Support Structure on the Ultraviolet Photoluminescence Enhancement from Graphene/ZnO Hybrid Structures P.C. Zhang and Y.H. Zhou	132
Structures, Dielectric Properties and Luminescence Properties of Nb Doped Li₂TiO₃ Solid Solution Ceramics F. Wang, C.F. Yao, Q. Zeng, H. Zhou and Z.Y. Zhou	137
Studies on the Structure and Properties of ZnSb Thin Films Deposited under Various Sputtering Conditions H.J. Xu, J. Qin, P.F. Gao, W.M. Shi and L.J. Wang	143
Preparation and Properties of Glutaraldehyde Cross-Linked Silk Sericin Films F.Y. Zhan, K.Y. Wang and M.M. Niu	148

Chapter 4: Nanomaterials and Nanofabrication

Effect of Preparation on Microstructure of Ag-Loaded TiO₂ Nanotube Arrays S. Phocharin and U. Tipparach	155
Fabrication of TiO₂ by Rotating Horizontal Anodization and its CO₂ Photoreduction Activity S.S. Han, D. Li, Y.F. Chen and Z.K. Zhang	160
Antiwear Behavior of CuO Nanoparticles as Additive in Bio-Based Lubricant M. Gulzar, H.H. Masjuki, M.A. Kalam, M. Varman and N.W.M. Zulkifli	166

Chapter 5: Properties and Processing of Structural Metals and Alloys

Quasi-Static Compressive Characteristics of Cu-Containing Closed-Cell Aluminum Foams J. Wang, Z. Zhang, J. Ding, C. Qiu, X.C. Xia and W.M. Zhao	173
Semisolid Strip Casting of Aluminum Alloy by a Twin Roll Caster Equipped with a Channel Scraper T. Haga, S. Nishida and H. Watari	181
Effect of Casting Conditions on Fabrication of Lotus Type Holes in Ingot Cast by Core-Bar Pulling Method T. Haga, K. Toyoda and H. Fuse	187
The Removal of Impurity Silicon from Aluminum Melt by the Addition of K₂TiF₆ G.L. Zhu, R. Wang, W. Wang, D. Shu, A.P. Dong, D.H. Wang and J. Wang	192
Effect of Boosting Velocity on Forming Quality of High-Strength TA18 Titanium Alloy Tubes in Numerical Control Bending J. Fang, C. Liang, S.Q. Lu and K.L. Wang	197
Vertical Wall on an Aluminum Alloy Plate Fabricated by Friction Stir Forming T. Ohashi, H.M. Tabatabaei and T. Nishihara	202

Multi-Objective Optimization in Electrical Discharge Machining of 6061 Al/SiC_p Using RSM and NSGA-II	
B. Singh, S. Kumar and J. Kumar	207
Fractal Characterization Analysis in CNC Milling Aluminium Alloy	
Z.M. Zhang, B.L. Xing, J. Wang, H.Y. Cao and S.H. Li	212
Effects of Deformation and Annealing Temperature on the Microstructures and Hardness of Cu-29Zn-0.6Bi Brass	
I. Basori, R. Gadhu and B.T. Sofyan	218
Study on Fractal Characterization Laws of Cutting Force in CNC Turning Aeronautic Aluminium Alloy 7075-T651	
B.L. Xing, J. Wang, H.Y. Cao, S.Z. Zhang, W. Wei and Z.M. Zhang	224
Study on Surface Roughness of Al2024 Alloy during Shot Peening Process Based on Finite Element Method	
X. Zheng and D.W. Gao	229
The Effects of Water Flow Rate on Copper Corrosion	
M.H. Mahmood, Suryanto and M.H.F. Al Hazza	235
Annealing Effects in Nanograined Al-Cu-Mg Alloy Processed by Equal Channel Angular Pressing	
H.H. Ktari, J.P. Couzine, J. Bourgon, Y. Champion and N. Njah	240
Effect of Quenching Treatment on Microstructure and Hardness of Mg-9Li-4Al-1Zn-0.5Y Alloy	
C. Duan and J.L. Huang	245
Study on Aging Treatment Microstructure of Magnesium-Zinc Alloy	
Z.L. Wang	250
Experiments of Drilling Titanium Alloy with Varying Operation Parameters	
C.Y. Liu, B.S. Zhang and S. Shrestha	254
Simulation of Stress Field in High-Frequency Welded Pipe of Composite Aluminum Alloy	
Z.W. Wang, X. Li and H. Chen	259
Depth and Horizontal Distance of Surface Roughness Improvement on Vertical Surface of 3D-Printed Material Using Ultrasonic Cavitation Machining Process with Abrasive Particles	
W.L. Tan, M.S. Vohra and S.H. Yeo	264
A Grinding Wheel of Self-Lubrication with Solid Powder Lubricant and Centrifugal Impeller for Green Grinding Process of TC4 Alloy	
Y.F. Ding, W.G. Huo, X.D. Su and L. Zhang	269
A Study of the Interaction between Abrasive Waterjet and Target by CFD and FEM Method	
R.G. Hou, C.Z. Huang, H.T. Zhu, J. Wang and H. Yang	275
Ferrite-Martensite Dual Phase Treatment of AISI 1040 Steel and Mechanical Characterization	
B.M. Gurumurthy, S. Sharma and U.A. Kini	280
WELDOX960 Low Alloy High Strength Steel Welding Automation Manufacturability Research	
M. Hu	284
Evaluation of the Fire Resistance for Beams Designed with Fire Resistant Steel through a Fire Engineering Method	
I.K. Kwon	288

Chapter 6: Building Materials

Mechanical Properties and Microstructure of Graphene-Cement Composites	
R.S. Jiang and B.M. Wang	295
Effect of Silica Fume and Fly Ash on Compressive Strength and Weight Loss of High Strength Concrete Material in Sulfuric and Acetic Acid Attack	
W. Liu, H.L. Tan, C.L. Ni, Z.B. Chen, T.Z. Luo and L. Yu	301
Effect of Fibers Length and Fibers Content on the Splitting Tensile Strength of Coconut Fibers Reinforced Concrete Composites	
R.H. Lumingkewas, A. Husen and R. Andrianus	311

The Evolution Analysis of Mechanical Properties of Marine Submerged Concrete Based on GRA	
C.Y. Liang, C.X. Qian, W.C. Kang and H.C. Chen	316
Effect of Carbon Dioxide Curing on Strength Development of Cement Mortar	
M.G. Lee, W.C. Wang, Y.S. Huang, Y.M. Su and Q.Z. Jiang	323
Numerical Modeling on the Stress-Strain Behavior of Sand via Disturbed State Concept Model	
P.H. Tsai, Y.H. Liang and P.C. Lin	328
Research Progress on the Effect of Stray Current on Properties of Cement-Based Materials in China	
G.N. Li and B.M. Wang	333
Study on the Effect of $[Al_{13}]^{7+}$ over the Free Swelling Ratio of Expansive Soil	
L. Liu, H.L. Yao, Z. Lu, Z.W. Yin, X.W. Luo and R. Fang	341
Effectiveness of Non-Suction Controlled Method of Wetting-Drying Cycles for Unsaturated Compacted Loess Material	
Z. Hu and Y.Z. Cheng	346

Chapter 7: Measurements and Modeling of Materials Properties and Behavior

Preparation of Polyaniline/Cu-BTC Composite and its Sensing Application for Ammonia	
Y.J. Zou, Y. Yin, H.T. Zhang, F. Xu and L. Sun	353
Quartz Crystal Microbalance Coated with 18-Crown-6 Ether Film for 2,4,6-Trinitrotolurene (TNT) Vapor Detection	
P. Phuvanatai and T. Phetchakul	358
Study on Methane Adsorption Capacity of Sensor Probe Based on Lead-Free Piezoelectric Resonance Modified by Zeolite X	
J. Du, H.L. Du and Q.L. An	363
New Methodology of Controlling Mechanical Properties of Materials	
R. Kotowski, V.I. Alshits, E.V. Darinskaya, M.V. Koldaeva, E.A. Petrzhik and P. Tronczyk	369
Molecular Dynamics Simulation of the Variation in the Microstructure of a Polycrystalline Material under Tensile Load	
T. Uehara	375
High-Precision Determination of Residual Stress of As-Sprayed and Ground WC-10Co-4Cr Coating Using Optimized XRD-$\sin^2\psi$ Technique	
M.S. Zoei, M.H. Sadeghi and M. Salehi	381
Three-Dimensional Scanning Hall Probe Microscopy for Final Stage of Crack Growth of Chromium Molybdenum Steel SCM440	
T. Nakashima and K. Kida	386
Measurement Model for Young's Modulus of Axially Functionally Graded Materials	
X.L. Chen, L. Zhang and D.Y. Li	391
Modified Method to Predict Fatigue Crack Shape Based on Empirical Observation	
T. Matsueda and T. Nakashima	396

Chapter 8: Materials and Chemical Technologies in Environmental Engineering

Characterization and Photocatalytic Activity of $SmMnO_3$ Prepared by Sol-Gel Process	
J.Y. Min, L.L. Yu, P.S. Tang and H.F. Chen	403
Synthesis of $TbMnO_3$ by Microwave Assisted Method and its Photocatalytic Activity	
M.M. Jin, C.Y. Long, F.F. Peng, P.S. Tang and H.F. Chen	408
Preparation and Characterization of $Pr_2Ti_2O_7$ by Sol-Gel Process	
C.Y. Long, F.F. Peng, M.M. Jin, P.S. Tang and H.F. Chen	413
Preparation of Nanosized Ni^{2+}-Doped $ErFeO_3$ by Microwave Assisted Process and its Visible-Light Photocatalytic Activity	
L. Fang, Q. Yang, M.Y. Xu, J.W. Cao, P.S. Tang and H.F. Chen	418

Tunable Fabrication of Electrospun Polyvinyl Alcohol Nanofibrous Membranes for Effective Air Filtration J.Y. Zhao, Z.L. Liu and J.C. Shan	423
Preparation and Characterization of YMnO_3 by Microwave Assisted Process F.F. Peng, M.M. Jin, C.Y. Long, P.S. Tang and H.F. Chen	428
Preparation of Cobalt Phthalocyanine Supported Mg-Al Hydrotalcite and its Catalytic Activity for Degradation of Methylene Blue M.X. Qian, J.L. Ma and M.H. Xu	433

Chapter 9: Chemical Geology and Chemical Engineering

Investigation on Jurassic Shale Gas Reservoir Characteristics from Northern Qaidam Basin G.X. Xu, S.Z. Wang, X.R. Luo and Z.F. Jing	441
Water-Rock-CO_2 Interaction in Hot Dry Rock - A Review G.X. Xu and S.Z. Wang	446
Bioleaching and Desulfurization of Pyrite Roasting Residues by NB Bacteria for the Recovery of Cu, Zn and the Magnetic Materials X.L. Cui, H.E. Zuo, J.K. Wen, B. Wu and Y. Ning	451
Simulation on the Compression Molding Process of Biomass Material G.Y. Xu, H.F. Gao, G.W. Huang and D.W. Zhou	456