

# Table of Contents

## Preface and Committee

## Chapter 1: Materials Science and Technology

|  |     |
|--|-----|
| <b>Low-Temperature Preparation of the BaO-B<sub>2</sub>O<sub>3</sub> Matrix Composite Ceramics</b><br>S. Chen and D.G. Zhu   | 3   |
| <b>AISI H13 Hot-Work Steel with Hard Chromium Plating Thermal Fatigue Behavior Evaluation</b><br>S.H. Yeh, L.H. Chiu, S.C. Lin and Y.T. Pan  | 8   |
| <b>The Galvanic Corrosion between Anodized 6061 Aluminum Plate and C1100 Copper Plate Couple</b><br>L.H. Chiu, K.H. Chen, C.Y. Tsai and S.R. Lee   | 14  |
| <b>The Quality Interaction of Molten Salts in the Systems SiO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub></b><br>M. Šolc, E. Grambalová and M. Šofranko  | 20  |
| <b>The Effect of Corrosive Medium CaCl<sub>2</sub> on the Quality of Shaped Refractory Materials</b><br>M. Šolc and Š. Markulík  | 26  |
| <b>Correlation between Applied Voltage and Electrochemical Properties of Micro Arc Oxidation Coatings Formed on AZ31B Magnesium Alloy</b><br>X.H. Song, J.H. Lu, X.J. Yin, J.P. Jiang, A.T. Kuan and J. Wang             | 32  |
| <b>The Role of Friction Stir Welding Process Parameter on Mechanical Properties of Magnesium Alloy AZ31B</b><br>S. Vijayan and S. Prasath  | 38  |
| <b>Preparation of Silk Fibroin/Gelatine Blend Nanofibres by Roller Electrospinning Method</b><br>N. Sasithorn and L. Martinová   | 45  |
| <b>Mechanical Properties of AISI 316L Austenitic Stainless Steels Welded by GTAW</b><br>N.V. Amudarasan, K. Palanikumar and K. Shanmugam   | 50  |
| <b>Corrosion Behavior of Various Surface Treatments Ti-6Al-4V Alloy - A Review</b><br>Y. Yusuf, N. Binti Omar, M. Azwar Azhari and M.A. Bin Md Johari  | 58  |
| <b>Study of Microstructure and Mechanical Properties of Sintered Aluminum Alloy Composite Reinforced with Al<sub>2</sub>O<sub>3</sub> Nanoparticles</b><br>R. Senthilkumar, N. Arunkumar, M.H. Mohammed and R. Vijayaraj | 62  |
| <b>Diffusion Characteristics of Moisture in Polymer Composites under Different Hygrothermal Conditions</b><br>Y.C. Zhong and S.C. Joshi  | 69  |
| <b>Microstructural Evolution and Quenching Properties of 22MnB5 Steel for Hot Stamping during Resistance Heating</b><br>C.N. Sun and H.H. Zhang  | 75  |
| <b>Characterization of Hot-Mix Asphalt Made with Recycled Concrete Aggregates that Have Been Cured for 4 Hours in the Oven</b><br>A.M. Rodríguez Pasandín, I.P. Pérez Pérez and B. Gómez Mejjide                         | 81  |
| <b>Numerical Evaluation of Effective Material Constants for CNT-Based Polymeric Nanocomposites</b><br>M. Chwał   | 88  |
| <b>Free Vibrations Analysis of Carbon Nanotubes</b><br>M. Chwał  | 94  |
| <b>Properties of High Pressure Water Hydraulic Components with Modern Coatings</b><br>J. Pobędza and A. Sobczyk  | 100 |
| <b>Optimization and Modeling Composite Structures with PZT Layers</b><br>P. Kędziora   | 108 |
| <b>Preparation and Characterization of PLA-PEO Bicomponent Fibers with Porous-Smooth Surface by Co-Electrospinning</b><br>S. Pavasupree, K. Srikulkit and R. Rangkupan   | 115 |

|  |     |
|--|-----|
| <b>Effect of Silane Treated and Untreated Talc on the Properties of Thermoplastic Polyurethane/Polypropylene Blends</b><br>E.G. Bajsić, F. Veljko and V.O. Bulatović       | 121 |
| <b>Influence Factors of Landfill Leachate Treatment with CWAQ Method</b><br>Q.Y. Wang, W.L. Chen and J.B. Lin  | 127 |
| <b>Characterization and Process Optimization of Transition Metal Compound Catalyst in CWAQ Applications</b><br>P. Li, Y.L. Zhang and J.B. Lin                              | 132 |
| <b>Optimization of Process Conditions on Landfill Leachate Treatment by CWAQ Method</b><br>Y.L. Zhang and Y.L. Sun   | 137 |
| <b>Reduction of Hexavalent Chromium in Water Using Iron-Aluminum Bimetallic Particles</b><br>S.S. Chen, Y.C. Huang and T.Y. Chen   | 142 |
| <b>Synthesis and Characterization of Co<sub>3</sub>O<sub>4</sub> Nanoflowers for Lithium Ion Batteries</b><br>X.X. Qing, K. Yu, X.F. Wang, X.Q. Tian, X.Q. Pang and N. Liu | 147 |
| <b>Preparation and Characterization of Fibroin/Chitosan/Hydroxyapatite Porous Scaffold</b><br>T. Sukhachiradet and W. Wattanuchariya                                       | 151 |
| <b>Physical Properties of Woven Fabric from Paper Mulberry Yarn</b><br>S. Chonsakorn, K. Piromthamsiri and C. Sirikasemlert  | 157 |

## **Chapter 2: Engineering Materials and Application**

|   |     |
|---|-----|
| <b>Current State of Gas Resource Utilization and Countermeasures of Energy Saving for Integrated Iron and Steel Works in China</b><br>Z. Qiao, X.F. She, J.S. Wang and Q.G. Xue   | 165 |
| <b>Direct Smelting of Chromite and Laterite Ores with Carbon under Argon Atmosphere</b><br>E.O. Yape and N.M. Anacleto  | 170 |
| <b>Biocompatibility Evaluation on Bio-Soluble Glass for Neural Application</b><br>R.Q. Lim, K.L. Tan, W.G. Chen, M.K. Je and M.Y. Cheng   | 177 |
| <b>Polyethylene Glycol-Coated Polyimide-Based Probe with Neural Recording IC for Chronic Neural Recording</b><br>K.L. Tan, M.Y. Cheng, W.G. Chen, R.Q. Lim, M.R.B. Damalerio, L. Yao, P. Li, Y.D. Gu and M.K. Je                | 183 |
| <b>Silicon-Based Multichannel Probe Integrated with a Front End Low Power Neural Recording IC for Acute Neural Recording</b><br>M.Y. Cheng, K.L. Tan, W.G. Chen, R.Q. Lim, M.R.B. Damalerio, L. Yao, P. Li, Y.D. Gu and M.K. Je | 189 |
| <b>Modeling of Flow Curve at High Temperature for a Ti-6Al-4V Alloy</b><br>J. Porntadawit, V. Uthaisangsuk and P. Choungthong   | 195 |
| <b>Determination of Damage Criterion Using a Hybrid Analysis for Advanced High Strength Steel</b><br>S. Panich, V. Uthaisangsuk, S. Suranuntchai and S. Jirathearanat   | 200 |
| <b>Constitutive Modeling of Advanced High Strength Steels Characterized by Uniaxial and Biaxial Experiments</b><br>S. Panich  | 207 |
| <b>Magnetocaloric Effect of LaFe<sub>11.5</sub>Si<sub>1.5</sub>C<sub>0.2</sub> Sinters Prepared by SPS Process</b><br>Y.Y. Wu and Y. Long   | 212 |
| <b>Materials for Extension Low-Income Housing: The Case of Bang Bua Community in Bangkok, Thailand</b><br>N. Tonmitr  | 218 |
| <b>Weibull Analysis of the Effect of Interrupted Aging Treatments on the Fatigue Life of Components Made of Cast Aluminium Alloy 354</b><br>S. Sainis, A. Kalra, G.D. Babu and M.N. Rao   | 223 |
| <b>Experimental Testing of the Weathering Steel Road Bridge in Ostrava</b><br>V. Urban, V. Křivý and L. Fabián  | 228 |
| <b>Simulation and Numerical Homogenization of Magneto - Rheological Fluids Using the Molecular Dynamic Technique</b><br>M. Barski and P. Pająk  | 234 |

|  |     |
|--|-----|
| <b>Study on Radar Absorbing Properties of Impure Sm<sub>2</sub>O<sub>3</sub>/Acrylate Coatings</b><br>H.M. Sun, M.X. Zhang and Z.Z. Gu                         | 242 |
| <b>Synthesis of Silsesquioxane-Contained Benzoxazine and the Thermal Properties of its High Performance Polymer</b><br>H.X. Yan, Y. Jia, Y.C. Feng and T.T. Li | 248 |
| <b>Safe Analysis of Construction Material after Being Sintered</b><br>H.Y. Zhang and S.Z. Li   | 253 |
| <b>EDS (Energy Sipersive Spectrometer) Analysis of Sintered Construction Material</b><br>H.Y. Zhang and S.Z. Li  | 257 |
| <b>Study on Thermal Stability and Aging Resistance of High Hardness Polyurethane Elastomer via Thermal Analysis</b><br>R.Y. Ma and Y.H. Yi                     | 261 |
| <b>The Research on the Polyurethane Elastomers Based on Diphenylmethane Diisocyanate and Diamine Chain Extenders</b><br>Y.H. Yi and L.J. Guo                   | 265 |
| <b>Heat Build-Up and Fire Performance of Wood-Polypropylene Composites Containing Recycled Mineral Wool</b><br>O. Väätsi and T. Kärki                          | 269 |

### **Chapter 3: Manufacturing Technology and Process**

|  |     |
|--|-----|
| <b>Analysis of Macro-Performance of FA Ceramic Brick</b><br>H.Y. Zhang   | 279 |
| <b>Characterization of Microstructure of FA Ceramic Brick Using SEM</b><br>H.Y. Zhang and H.H. He  | 283 |
| <b>Numerical Investigation of Continuous Roll Forming for Three-Dimensional Surface Parts</b><br>M. Wang, Z.Y. Cai, Z. Sui and M.Z. Li                       | 287 |
| <b>Sensing in Aluminum Alloy Welding</b><br>P. Kah, E. Hiltunen and J. Martikainen   | 291 |
| <b>Using Semantic Technology to Enhance ESB Capabilities</b><br>G.Y. Jin, F.Z. Lv and Z.Q. Xiang   | 298 |
| <b>Design and Calibration of MIMU Based on Chip Size Micro Inertial Sensors</b><br>Y. Xu, X.H. Zhu and Y. Wang   | 302 |
| <b>Balance Equation - An Essential Element of the Definition of the Drying Process</b><br>I. Orlovský, M. Hatala and J. Duplák                               | 310 |
| <b>Welding Robot Dynamic Simulation</b><br>X.J. Zhang and X.J. Zhang   | 316 |
| <b>The Virtual Design and Movement Simulation of Small Snow Removal Vehicle</b><br>X.J. Zhang and X.J. Zhang   | 321 |
| <b>Optimization of Processing Factors for Particleboard Manufacturing Using Waste Tire Rubber Crumbs and Wood Particle</b><br>N. Sangsai and V. Laemlaksakul | 326 |
| <b>The Modern Tableware Design Based on Fengxiang Clay Sculpture Art Research</b><br>L.L. Chen, Y. Zhang and J.X. Chen                                       | 332 |
| <b>Electrospinning of Polycaprolactone in Dichloromethane/Dimethylformamide Solvent System</b><br>N. Kulpreechanan, T. Bunaprasert and R. Rangkupan          | 337 |
| <b>Measuring the Free Surface Velocity of Brass Plate Using F-P Interferometer</b><br>B. Zheng   | 343 |
| <b>Development of Embedded Intelligent Line-Following Robot Based on Image Processing</b><br>Y.J. Wen and Z. Liu   | 346 |
| <b>Research and Simplified Calculation of a New-Type Forging Flange under Bending Moments</b><br>Q. Li, C.C. Li and C.F. Zhou                                | 351 |
| <b>Welding of Ultra High Strength Steels</b><br>P. Kah, M. Pirinen, R. Suoranta and J. Martikainen   | 357 |
| <b>Physical Properties of Yarn from Paper Mulberry</b><br>S. Chonsakorn, K. Piromthamsiri and C. Sirikasemlert   | 366 |

## Chapter 4: Related Topics

|  |     |
|--|-----|
| <b>Research Progress and Potential Application of WO<sub>3</sub> Electrochromic Films</b><br>G. Chang and M. Xu  | 373 |
| <b>Life Cycle Cost Analysis of Coke Production from Delayed Coking Process</b><br>R.J. Sun, K.H. Chung, S. Ng and H. Wang  | 380 |
| <b>Effect of Chemical Treatments on ITO and OLED Device</b><br>N. Kumar Katam, C. Singh, M. Rawat and R.S. Anand   | 387 |
| <b>Numerical Investigation of Natural Convection of Nanofluids in L-Shaped Enclosures</b><br>N.A. Che Sidik and A. Safdari   | 391 |
| <b>Utilization of Tannery Wastewaters Sludge Ash in Waterproofing Membrane: A Technical and Environmental Feasibility Study</b><br>M. Puccini, M. Seggiani, D. Castiello and S. Vitolo | 397 |
| <b>Dynamic Temperature Profiles of Plasma Neutralization Induced by Microwave Irradiation</b><br>W.T. Chang and Y. Liang   | 405 |
| <b>Dynamic Analysis of Lifting Mechanism Based on Rigid-Flexible Coupling</b><br>X.K. Ge, D.W. Liu and B. Tian   | 411 |
| <b>Analysis of Mechanical Behaviour of the Concreat Filled Double Skin Steel TubesK-Joint</b><br>Y.Z. Jia, C.F. Zhou, C.C. Li and L. Zhang   | 417 |
| <b>Optimization Design on 500kV Substation Overhead Concrete Platform</b><br>X. Qi, X.G. Wei and Y.N. Li   | 422 |
| <b>Wavelet Method in Numerical Modeling of Quantum Dots Embedded in Matrix</b><br>A. Muc and A. Banaś  | 427 |
| <b>Research on Mine Gas Prediction Based on Cloud Computing Data Integrating Mode</b><br>Y. Zhang  | 435 |