

# Table of Contents

## Preface, Committee

## Chapter 1: Steel and Alloys

<b>A Systematic Testing Procedure to Investigate the Influence of Oxide Morphology, Composition and Thickness on Changes in the High Temperature Oxidation Kinetics of AISI 316L Stainless Steel</b>	
J. Graham, S. Malinov, R. Douglas and R.M. Stalker	3
<b>Preliminary Study on Properties of Aluminium-Silicon (Al-Si) Alloys Reinforced by <i>In Situ</i> Titanium Diboride (TiB<sub>2</sub>)</b>	
R.E. Ibrahim, R. Rosmamuhamadani, M. Talari, S.M. Yahaya, S. Sulaiman and M.I.S. Ismail	11
<b>Effect of Carbon Addition on the Cast and Rolled Microstructures of FeCoCrNiMn High Entropy Alloys</b>	
J.Y. Ko and S.I. Hong	16
<b>Creep Behaviors of CrMnFeCoNi High Entropy Alloy at Intermediate Temperatures</b>	
Y.B. Kang, K.H. Lee and S.I. Hong	21
<b>Influence of Annealing of Al-5Ti-1B Master Alloy on Hot Tearing of Cast Al-7Si-3Cu Alloy</b>	
S.K. Rath, A. Sharma and M. di Sabatino	27
<b>Studies on the Mechanism of Work Hardening of Austenitic High Manganese Steel Alloyed with Chromium and Vanadium</b>	
N. Duong, L. Thi Chieu and P.M. Khanh	32
<b><i>In Situ</i> Decomposition of Silicon Nitride Particles in Titanium Composite and its Mechanical Properties</b>	
H. Imai, H. Yamabe, K. Kondoh, J. Umeda and A. Khantachawana	38
<b>Microstructural Evolution and Mechanical Properties in a Mn<sub>1.05</sub>Fe<sub>1.05</sub>CoNiCu<sub>0.9</sub> High Entropy Alloy</b>	
S.M. Oh and S.I. Hong	44
<b>Failure Analysis of Weld Crack of P92 Steel</b>	
S.H. Yin, Y.Z. Wei, G.G. Wang, T.Z. Liu, P. Cheng and J.L. Zhang	50

## Chapter 2: Technologies of Structural Materials Processing

<b>Method for the Determination of Hard Alloys' Maximum Performance Temperature in the Context of the Metal-Cutting Tools' Usage Quality Estimation Technique</b>	
D.S. Vasilega and A.S. Shtin	59
<b>The Increase in Effectivity of Material Processing with Employment of Liquid CO<sub>2</sub> during Aluminium Die Casting</b>	
I. Nováková, M. Seidl and J. Moravec	64
<b>A Study on the Welding Line Strength of Composite Parts with Various Venting Systems in Injection Molding Process</b>	
P.S. Minh, T.D. Thanh, M.T.U. Tran and P.T. Nhan	70
<b>Investigation on Hole Punching Process with Combined Punch to Improve Surface Quality during the Materials Forming Process</b>	
P.P. Yao and Q. Wang	77
<b>Modelling Kerf Width in WEDM Titanium Alloy Using Response Surface Methodology</b>	
J.B. Saedon, N. Jaafar, M.A. Yahaya, N.H. Mohamad Nor and H. Husain	83
<b>Effect on Hardness and Microstructures of Rail Joint with Ultra-Narrow Gap Arc Welding by Post Weld Heat Treatment</b>	
L. Gong, L. Zhu and H.X. Zhou	90
<b>Evaluation of Surface Quality and Signal Characteristics in Milling Process of Al7075-T651</b>	
M.C. Hwang, J.Y. Koo, Y.K. Choi, H.J. Kim and J.S. Kim	95
<b>The Selection of Appropriate Process Parameters of Diffusion Bonding in Heterogeneous Weld of 355J2/AISI 316L Steels</b>	
J. Moravec and I. Nováková	101

<b>Effect of in Addition on Microstructure and Properties of Zn-5Al Solder</b> R. Koleňák and I. Kostolný	107
<b>Analysis of Possible Application of Temperature Dependences of Processed Materials' Physical and Mechanical Properties to Define the Maximum Workability Temperature</b> D.S. Vasilega and V.A. Zyryanov	114
<b>Investigation on Wear Behavior of Bamboo Filler Reinforcement of Injection Moulded Plastic Gear</b> N.M. Mehat and S. Kamaruddin	119
<b>Research on Formability of Multi-Point Press Forming for 08Al and 2024-O Sheet</b> J. Chen, W.Z. Fu, M.Z. Li, Y. Wang and Y.S. Deng	124
<b>Examination of the Welding Processes when Welding of Steel in Protective Gas Atmosphere of Gases with the Application of Modeling and Numerical Simulation</b> H. Kraváriková	133

### **Chapter 3: Films, Coatings, Surface Engineering and Tribology**

<b>Effect of the Thickness of Al<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> Composite Oxide Films on the Electrical Properties of Anode Al Foils</b> L. Xiang and S.S. Park	143
<b>Effects of Chromium Content on Thermal Shock Cycle Resistance of (TiCr)N Hard Reactive Films</b> B.S. Dai and J. Zhang	150
<b>Effects on Surface Integrity of Ti6Al4V in High Speed Milling</b> Y.F. Fang and K.F. Tee	156
<b>A Study on Mechanical and Tribological Behavior of Brake Pad Materials</b> S. Kumar, D. Kumar and J. Jain	162
<b>Tribological Study of Heat Treated AZ91 Alloy against Al6351 under Dry Conditions</b> S. Kumar, J. Jain and D. Kumar	168
<b>Morphology and Wettability of Nanoporous Aluminium Oxide Film Prepared by Anodization</b> A. Watcharenwong, N. Saijaioup, Y. Bailuang and P. Kajitvitchyanukul	174
<b>Assessment of the Stress State of the Coating in Depending on the Porosity of the Cement Substrate</b> V. Loganina and J. Skachkov	179
<b>Influence of Aluminum Nanoparticles Additives on Tribological Properties of Base Oil</b> V.N.A. Le and J.W. Lin	184
<b>Crevice Corrosion of Low-Pressure Steam Turbine Materials in the Boiler Water Contained Impurity Ions</b> L.B. Niu and K. Kobayashi	192
<b>Real-Time Monitoring of the Dispersion Stability of Poly(Carbonate Urethane)s Using the Turbiscan Technique</b> T.H. Kim, J.C. Kim and B.K. Seo	198

### **Chapter 4: Polymers and Composites**

<b>Antibacterial and Mechanical Properties of the TiO<sub>2</sub>/ABS Composites</b> R. Sangkatip, W. Sriseubsai and K. Kiatkittipong	209
<b>Residual Stress/Strain Effect on the Bending Properties of the Cu/Al/Cu Clad Plate</b> Y.K. Kim and S.I. Hong	214
<b>Double-Channel Filter Based on the Structure of Two Symmetric Layers with Defects in One-Dimensional Photonic Crystals</b> B.Y. Jian, G.B. Wu and H. Wang	220
<b>Effect of Ni Plating on the Interfacial Stability of Multi-Layered Ni-Plated-Cu/Al/Ni-Plated-Cu Clad Composite</b> H.J. Kim and S.I. Hong	225
<b>Rheological Properties of Asbestos Waste Filler-Based Epoxy Composite Materials</b> M.A. Gavrilov and O.V. Tarakanov	231

<b>The Effect of Silane Coupling Agent on the Properties of Natural Rubber Filled with Waste Silicon Carbide</b>	
A. Rattanapan, P. Sapsrithong and S. Tuampoemsab	236
<b>Synthesis and Characterization of PVA/TiO<sub>2</sub> Nanocomposite</b>	
R.K. Duchaniya and N. Choudhary	242
<b>Studies of the Physical Properties of Cycloaliphatic Epoxy Resin Reacted with Anhydride Curing Agents</b>	
T.H. Kim, D.Y. Kim, C.S. Lim and B.K. Seo	248
<b>Crystallization and Thermal Degradation of Green Nanocomposites Based on Lignin Coated Cellulose Nanocrystals and Poly(Lactic Acid)</b>	
M. Boruvka and L. Běhálek	256
<b>Mechanical and Thermal Properties of Epoxy Composites Containing Amine-Modified Silica Nanoparticles</b>	
H.R. Lee, M.I. Kim, H.R. Na, C.S. Lim and B.K. Seo	262
<b>Morphology and Mechanical Properties of Poly(Lactic Acid) and Propylene-Ethylene Copolymer Blends: Effect of Organoclay Types</b>	
S. Wacharawichanant, C. Ounyai and P. Rassamee	269
<b>Comparison of Mechanical Properties of Biocomposites between Polybutylene Succinate/Corn Silk and Polybutylene Succinate/Cellulose Extracted from Corn Silk</b>	
S. Likittheerakarn, S. Kurdpradid, N. Smittipornpun and T. Sritapunya	275
<b>The Influence of Fiber Surface Treatment and SBR as Impact Modifier on Rheological Behavior and Mechanical Properties of Wood Plastic Composite from Acrylate-Styrene-Acrylonitrile and Bagasse</b>	
P. Sapsrithong, K. Puksattee, K. Saewjaidee, N. Pensuk and A. Rattanapan	281
<b>Effect of Plasticizers on Morphology, Mechanical Properties and Water Absorption of Wheat Gluten and Epoxidized Natural Rubber Blend</b>	
S. Hemsri, P. Bunsripirat and P. Nakkarat	287
<b>Effects of Levan on the Biodegradability and Thermal Properties of Polybutylene Succinate</b>	
S. Manatsittipan, K. Kuttiyawong and S. Tiptipakorn	294
<b>Study the Interaction Mechanism and Mechanical Properties of PVA/HA by a Molecular Dynamics Simulation</b>	
M.M. Yang, Y.N. Wang, Q.H. Wei, W.H. Chai and S.M. Wei	299
<b>Study on the Rheological Behaviour of Sisal Fibre/HDPE Composites with Flame Retardant</b>	
A. Rattanapan	307
<b>Mechanical and Morphological Properties of Poly(Butylene Succinate)/Poly(Hydroxybutyrate-co-Hydroxyhexanoate) Polymer Blends: Effect of Blend Ratio and Maleated Compatibiliser</b>	
M.Z.A. Thirmizir, M.D. Hazahar and Z.A. Mohd Ishak	313
<b>Mechanical Properties of PM CNT-Dispersed Cu Composite</b>	
H. Imai, K. Kondoh and J. Umeda	320

## Chapter 5: Chemical Technologies and Materials

<b>Partial Characterisation and Colorimetric Characteristics of <i>Sargassum</i> sp. Colorant on Treated Polyester Fabric with Dendrimer</b>	
M.I. Ab Kadir, M.R. Ahmad and A. Ismail	329
<b>The Use of Oil Palm Empty Fruit Bunches (OPEFB) Fibers as Partial Replacement for Imported Recycled Fibers</b>	
A.B. Khairul Hafizuddin, R. Rohaizu and W.D. Wan Rosli	335
<b>Microwave Assisted Extraction of Avocado Oil from Avocado Skin and Encapsulation Using Spray Drying</b>	
T. Chimsook	341
<b>MWCNT from Carbon Black: Effect of Current Variation and Arc Application Time</b>	
N. Arora and N.N. Sharma	347
<b>Moisture Elimination of the Wet Hydrogen Gas Using the Electrochemical Hydrogen Compressor with a Modified MEA Composition</b>	
H.Y. Jeong, S.A. Jeon, H.N. Jeong, S.H. Go, M.S. Lee and H.G. Kim	354

<b>Microwave-Ultrasonic Synergistic Extraction of Crude Se-Polysaccharides from Se-Enriched Tea</b>	
T. Wang, W. Li and T.X. Li	360
<b>Synthesis and Characterization of Monodisperse Magnetite Nanoparticles by Hydrothermal Method</b>	
A. Watcharenwong, Y. Bailuang and P. Kajitvitchyanukul	367
<b>Characterization of Pulse Anodized Titanium Dioxide Nanotubes</b>	
A. Watcharenwong, A. Jindanant and P. Kajitvitchyanukul	373
<b>Ex Situ UCG Model Experiments with Oxygen Enriched Air in an Artificial Coal Seam</b>	
F.Q. Su, K. Itakura, A. Hamanaka, G. Deguchi, K. Sato and J. Kodama	379
<b>Biodiesel Production from <i>Jatropha oaxacana</i> Oil by Reactive Vacuum Distillation: Optimization by Response Surface Methodology</b>	
A. Regalado-Méndez, J. Mentado-Morales, E. Peralta-Reyes, C. Estrada-Vázquez, G. Martínez-Villa, M.E. Cordero and L.G. Zárate	385
<b>The Design and Performance Study of Polymer Electrolyte Membrane Using 3-D Mesh</b>	
A. Tugirumubano, K.S. Kim, H.J. Shin, C.H. Kim, L.K. Kwac and H.G. Kim	393

## Chapter 6: Materials and Technologies for Environmental Engineering

<b>Investigation of the Structural Properties of Amorphous Philippine Bentonite Clay and its Potential Use for Topical Applications</b>	
E. Olegario-Sanchez and J.C. Felizco	401
<b>Characterization of Philippine Natural Zeolite and its Application for Heavy Metal Removal from Acid Mine Drainage (AMD)</b>	
E. Olegario-Sanchez and C.M. Pelicano	407
<b>Research on the Dust-Capturing Capacities of Environmental Friendly Materials Based on the Typical Garden Trees and the Morphological Structure of Leaves in Suzhou</b>	
R.Y. Wang, X.H. Yao, Y.Y. Liu, Y.C. Guo, S. Wang and B. Wang	412
<b>Test Study on the Adsorption Property of the Environmental Friendly Adsorption Materials to Reduce Nutrient from Surface Runoff</b>	
L.X. Wu, L.H. Liu and H.D. Zhou	417
<b>Study of Metalworking Fluids Biodegradability Potential Enhancement by the Prior Application of Ozone</b>	
K. Gerulova, M. Soldán and Z. Szabova	422
<b>Heavy Metal Removal from Wastewater of Palm Oil Mill Using Developed Activated Carbon from Coconut Shell and Cow Bones</b>	
A.R.O. Adeleke, A.A. Abdul Latiff, Z. Daud, N.F. Mat Daud and M.K. Aliyu	428
<b>Preparation Process Optimization of the Solid Chlorine Dioxide as an Environmental Friendly Disinfectant for Drinking Water</b>	
Q. Li, X.W. Li, Z.C. Li, X.H. Zhao, Y. Wang and C.H. Liu	433

## Chapter 7: Construction Materials and Structures

<b>Shear Failure of Patched Reinforced Concrete Beam without Web Reinforcements</b>	
S. Kristiawan, A. Supriyadi, S. Sangadji and H.B. Wicaksono	441
<b>The Analysis of Long-and-Short Concrete Column Structure under Horizontally Seismic Process Based on Finite Element Method</b>	
Z.H. Wang and X.C. Yan	448
<b>Damage Detection with FBG Sensors for Pre-Stress Concrete Girders</b>	
S.C. Lee, K.J. Shin, J.M. Kim and H.W. Lee	454
<b>Experimental Study of Inner-and-Outer Steel Flanges Subjected to Tension and Bending Loads</b>	
B. Xue, Y. Chen, C. Chen and J.Y. Wang	459
<b>Study on Estimate of Load Ratio of Doubly Reinforced Concrete Beam Exposed to the Standard Fire</b>	
J.H. An, I.H. Yeo, K.S. Jeon and K.H. In	465

<b>Relaxation of Structural Concrete due to its Shrinkage in Terms of Age-Adjusted Effective Modulus Method</b> L. Zvolánek and I. Terzijski	471
<b>Quantitative Identification of Pipeline Crack Based on BP Neural Network</b> S.J. Liu, S.L. Li, M. Jiang and D. He	477
<b>Dynamic Characteristics Analysis of Long-Span Cable-Stayed Bridge with Steel Truss Stiffening Girder</b> B. Bai and J. Guo	481
<b>Air Quenching of Steel Slag to Enhance its Hydraulic Activity for Recycling the Slag as Materials in Cement and Concrete Applications</b> P. Xue, Q.X. Yang, G.Q. Liu, F.L. Han, L. Jiang, F. Engström and B. Björkman	488
<b>Seismic Response Analysis of Reservoir Water-Gravity Dam-Foundation System</b> Y.Y. Wang, J.Y. Liu, B.K. Ning and P. Zhang	494
<b>A Stress Analysis of the Post-Tensioned Anchorage Zones Using UHPC</b> J.S. Kim and T.H. Kim	500
<b>Anchor Spacing Design of Pre-Stressed Tunnel Concrete Lining with Un-Bonded Annular Anchors for Songhua River Water Supply Project</b> J. Pi, Y.F. Zhao, R.L. Cao and Z.X. Jia	505
<b>Finite Element Analysis of Constitutive Behavior of FRP-Confined Steel Fiber Reinforced Concrete</b> A. Gholampour and T. Ozbakkaloglu	511
<b>Self-Hardening of a Gypsum</b> V. Petropavlovskaya, A.F. Buryanov, T.B. Novichenkova and K. Petropavlovskii	517
<b>Variation of the Modulus of Elasticity and Anisotropic Factor over the Thickness of the Bamboo Wall</b> M.A. Smits, V.D. Pizzol, P.V. Krüger, M.A.P. Rezende, R.C. Alves, E.V.M. Carrasco and J.N.R. Mantilla	522
<b>Influence of Aging on Oil Rejuvenated Binder</b> T. Koudelka, M. Varaus and P. Sperka	528
<b>Properties and Ageing of Crumb Rubber Modified Bitumens</b> O. Dasek, P. Hyzl and P. Coufalik	535
<b>The Effects of Aging on Asphalt Binders Containing Visbreaking Residues</b> P. Coufalik, O. Dasek, I. Krcmova and P. Hyzl	541
<b>Use of Rejuvenators to Rejuvenate Asphalt Binders in RAP</b> I. Krcmova, P. Hyzl, P. Nekulova, P. Coufalik and O. Dasek	547
<b>Properties of Pavement Bitumens Assessed Using European and American Approach</b> P. Coufalik, O. Dasek, P. Hyzl and I. Krcmova	554
<b>Mechanical Properties of Unsaturated Polyester Resin (UPR)-Mortar and its Potential Application to Restore the Strength and Serviceability of Patched Reinforced Concrete Slab</b> S. Kristiawan, A. Supriyadi, A.B. Prokoso and S. Rahmi	560
<b>Thermal Insulator Made from Solid Natural Rubber: Part 1 - Formulation of Rubber Compounding, Appropriate Forming Condition and Basic Properties</b> T. Sopakitiboon, A. Rattanapan and S. Tuampoemsab	567
<b>Prototype of Geocell from Natural Rubber: Effect of Dual-Phase Fillers on Physical Properties of Rubber Compounds Reinforced with Silica and Carbon Black</b> S. Wongwilatnurak, S. Tuampoemsab and R. Dangtungee	572
<b>Tasks of Building Materials from the Viewpoint of Control Theory</b> I. Garkina and A. Danilov	578

## **Chapter 8: Materials and Technologies in Jewelry Production**

<b>Oxidation State of Ti Atoms and Ti-O Bond Length on Natural Sapphire Gem-Materials Probed by X-Ray Absorption Spectroscopy</b> N. Monarumit, W. Wongkokua and S. Satitkune	585
<b>Ancient Glass Bead from U-Thong Ancient City Site, Central Thailand</b> K. Won-In, S. Satitkune, N. Monarumit and N. Nimsuwan	590
<b>Lost Wax Casting Conditions with Tourmaline <i>In Situ</i></b> K. Wongpreedee, A. Peerawat, B. Phichaikamjornwut and D. Bootkul	595

