

# Table of Contents

## Preface

## Chapter 1: Biomedical Materials

|                                                                                                                                                                                                                                 |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Biofilm Formation of Respiratory Pathogens on Vanillin-Incorporated Denture Base Resin</b><br>S. Thaweboon, B. Thaweboon and F. Nakazawa                                                                                     | 3  |
| <b><i>In Vitro</i> Study of <i>Streptococcus mutans</i> Biofilm Formation on Vanillin-Incorporated Orthodontic PMMA Resin</b><br>S. Thaweboon and B. Thaweboon                                                                  | 9  |
| <b>Development of a Self-Adhesive Cellulosic Hydrogel Wound Dressing</b><br>T. Tumolva, S.H. Aquino, K.M. Cabeguín and J.F. Imperial                                                                                            | 15 |
| <b>Fabrication of Bioactive Glass with Titanium Ion Doping via Various Reactive Environments</b><br>W. Fang, B.R. Huang, T.H. Liu, J.A. Chen, C.F. Chang and C.L. Huang                                                         | 21 |
| <b>Degree of Conversion of Experimental Light-Cured Orthodontic Adhesives</b><br>K. Nimcharoensuk, N. Anuwongnukroh, S. Dechkunakorn, V. Sattabanasuk, P. Sunintaboon and W. Wichai                                             | 27 |
| <b>Effect of Surface Treatment on Physical and Mechanical Properties of Nickel-Titanium Orthodontic Archwires by Fine Particle Shot Peening Method</b><br>W. Mongkolchart, P. Santiwong, R. Chintavalakorn and A. Khantachawana | 33 |
| <b>Frictional and Mechanical Properties of Surface Modified Nickel-Titanium Orthodontic Archwires</b><br>N. Tantiwinyupong, R. Chintavalakorn, P. Santiwong and A. Khantachawana                                                | 39 |

## Chapter 2: Composite Materials and Structures

|                                                                                                                                                                                                                             |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Composite Solutions for Glulam Joints</b><br>M. Vodiannikov and G. Kashevarova                                                                                                                                           | 47  |
| <b>Material Selection of Natural Fibers for Composite Automotive Component Using Analytic Hierarchy Process/Analytic Network Process in Concurrent Engineering Approach</b><br>M. Mohammad Taha, S.M. Sapuan and M. Noryani | 53  |
| <b>Study on Stacking Sequence of Plies in Green Sandwiches for Low Velocity Impact Application</b><br>V. Mahesh, J. Sharnappa and S.M. Kulkarni                                                                             | 59  |
| <b>Evaluation of 3D Embedded Element Technique in the Finite Element Analysis for the Composite</b><br>J.H. Gao and X.X. Yang                                                                                               | 65  |
| <b>Determination of Mode II Interlaminar Fracture Toughness of CFRP Composites Using Numerical Simulations</b><br>F. Sedlacek, T. Kalina and K. Raz                                                                         | 71  |
| <b>FE Analysis of FRP Pressure Vessel</b><br>B. Srikumar, J. Sharnappa and S.M. Kulkarni                                                                                                                                    | 77  |
| <b>Experimental Investigation, Modeling and Optimization of Tribological Parameters of AA6061/SiC/B<sub>4</sub>C Hybrid Nano Composites</b><br>S. Das, S.K. Tamang, M. Chandrasekaran and S. Samanta                        | 83  |
| <b>Effect of Kevlar Hybridization on Dry Sliding Friction and Wear Behaviour of Bamboo/Epoxy Composites</b><br>S. Samanta and T.J. Singh                                                                                    | 89  |
| <b>Application of Variational Asymptotic Micromechanical Method to Strength Analysis of Composite Materials</b><br>D. Kumar and D. Harursampath                                                                             | 95  |
| <b>Hybrid Effect on Hybrid Composite Reinforced Carbon Fibers and Flax Fibers</b><br>A.V. Nguyen, K. Charlet, B.C. Bouzgarrou, K.N. Pham, T.D. Vu and A. Béakou                                                             | 101 |

## Chapter 3: Polymer Chemistry and Polymer Composites

|                                                                                                                                                                                  |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Effect of Hectorite Clay Loading on Thermal Properties of Superabsorbent Polymer Composite Based on Polystyrene-Graft-Polycrylic Acid/Hectorite Clay and Mung Bean Starch</b> |     |
| N.F. Deraman, N.R. Mohamed and A.Z. Romli                                                                                                                                        | 109 |
| <b>Mechanical Properties of Capsaicum Oleoresin (CO) Impregnated in Porous Silica/Poly(lactic Acid (PLA) Composites</b>                                                          |     |
| L. Techawinyutham and R. Dangtungee                                                                                                                                              | 115 |
| <b>Mechanical Properties of Bamboo Charcoal (BC)/Poly(Lactic) Acid (PLA) Composites</b>                                                                                          |     |
| R. Srisuk, L. Techawinyutham, W. Koetnuyom and R. Dangtungee                                                                                                                     | 121 |
| <b>Effects of Tourmaline Concentration on Natural Rubber Foam</b>                                                                                                                |     |
| P. Chayaphan and R. Dangtungee                                                                                                                                                   | 127 |
| <b>PLA Composite Films Based on Acetate Substituted Microcrystalline Cellulose</b>                                                                                               |     |
| B.M. Kale, S. Rwahwire, N.K. Kale and W.B. Musinguzi                                                                                                                             | 133 |
| <b>Fabrication and Surface-Enhanced Raman Scattering Activities of Cross-Linked Poly(vinyl Alcohol)/Ag Nanofibers</b>                                                            |     |
| K. Juntarasena, B. Samransuksamer, M. Horprathum, N. Triroj and P. Jaroenapibal                                                                                                  | 139 |
| <b>Synthesis of Diamine Containing Chalcone Structure by Nitroammoniation and Aldol Condensation</b>                                                                             |     |
| Y.K. Huang, Q.L. Mei, Z.X. Huang, Y. Qin and D. Zhu                                                                                                                              | 145 |

## Chapter 4: Surface and Coating Technology

|                                                                                                         |     |
|---------------------------------------------------------------------------------------------------------|-----|
| <b>Enhancing the Hydrophobicity of a Copper Pipe by Electrophoretic Deposition of Graphene Oxide</b>    |     |
| E. Hares, A.H. El-Shazly, M.F. El Kady and A.S. Hammad                                                  | 153 |
| <b>Enhancement of Graphene Oxide Deposition on Stainless Steel in Presence of Iodine</b>                |     |
| K. Madih, A.H. El-Shazly and E. Hares                                                                   | 160 |
| <b>Influences of Boron Concentration on Mechanical Properties of Ni-W-B Composite Coatings</b>          |     |
| K. Harachai, J.Q. Qin, Y. Boonyongmaneerat and P. Jaroenapibal                                          | 166 |
| <b>Characterization and Morphology of Nanosilver Coating on Zeolite of ZSM-5, Mordenite, and Y Type</b> |     |
| N. Budtri, S. Khongman, S. Aekram, J. Klinsuk, C. Somphong and W. Lertsiriyothin                        | 172 |
| <b>Carbon Dioxide Adsorbent Preparation by Coating Amine-Functionalized Pectin onto Zeolites</b>        |     |
| J.A.K.P. Jovellana and B. Pajarito                                                                      | 179 |

## Chapter 5: Nanofluids and Materials for Electrochemical Conversion

|                                                                                                                                              |     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Chemical Treatment and Dispersant Characteristics of CNTs Particle and its Applications on Nanofluid</b>                                  |     |
| S.D. Kim, J.H. Bae, J.H. Kim, S. Huh, J.P. Noh and H.M. Jeong                                                                                | 187 |
| <b>Effect of Using MgO-Oil Nanofluid on the Performance of a Counter-Flow Double Pipe Heat Exchanger</b>                                     |     |
| A.Y.M. Ali, A.H. El-Shazly, M.F. El Kady, H.I. Elqady and M.R. El-Marghany                                                                   | 193 |
| <b>A Study on Heat Transfer Suppression Characteristics of Ferrofluid with Various Magnetic Field Intensities</b>                            |     |
| J.H. Seo, N. Kim and M.Y. Lee                                                                                                                | 199 |
| <b>Preparation and Characterization of NiO/YSZ and Ni/YSZ Porous Composite Electrodes Synthesized via Glycine-Nitrate Combustion Process</b> |     |
| J.F. Imperial and R.B.M. Cervera                                                                                                             | 205 |
| <b>Liquid Capacitor Based on Hafnium Oxide</b>                                                                                               |     |
| M.U. Khan, G. Hassan, M.A. Raza and J.H. Bae                                                                                                 | 211 |

## Chapter 6: Materials Processing and Forming

|                                                                                                                                                                                                                            |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Modeling of Artificial Neural Network for the Prediction of Hole Taper and HAZ Width of Nd:YVO<sub>4</sub> Laser Micro-Drilled Copper Sheet</b><br>S. Choudhury and K.K. Mandal                                         | 219 |
| <b>RSM Modeling and Taguchi Analysis of EDM of B<sub>4</sub>C and Flyash Reinforced Hybrid Nanocomposites</b><br>S. Mahanta, M. Chandrasekaran and S. Samanta                                                              | 227 |
| <b>Homogenization and Extrudability of 5056 Aluminum Alloy Billet</b><br>C.H. Hsiao, S.T. Kao and W.J. Chen                                                                                                                | 233 |
| <b>Experimental Study on Pore-Defect by Selective Laser Melting of 316L Stainless Steel</b><br>X.Y. Liu, L. Pan, W.H. Wang and S.Y. Li                                                                                     | 239 |
| <b>Preliminary Study of Ultrasound-Assisted Laser Hardening of AISI H13 Tool Steel</b><br>W. Charee and V. Tangwarodomnukun                                                                                                | 245 |
| <b>Effect of Atmospheric Pressure Plasma Treatment of Glass Fibers on the Composite Strength of Endless Fiber-Reinforced Injection Molded Components</b><br>T. Gebken, R. Sachs, M. Kühn, J. Ihde, K. Dröder and R. Wilken | 251 |
| <b>Influencing Intermetallic Layers of Hot Stamped Steel for Adhesively Bonded Plastic Metal Hybrids</b><br>M. Demes, J. Beuscher, M. Kühn and K. Dröder                                                                   | 258 |
| <b>Effect of Melt Temperature on Weld Line Strength</b><br>K. Raz and F. Sedlacek                                                                                                                                          | 264 |
| <b>Selective Laser Melting of Ti42Nb Composite Powder and the Effect of Laser Re-Melting</b><br>S. Huang, S.L. Sing and W.Y. Yeong                                                                                         | 270 |
| <b>Investigating the Void Content, Fiber Content, and Fiber Orientation of 3D Printed Recycled Carbon Fiber</b><br>P.H. Wang, R. Sterkenburg, G. Kim and Y.W. He                                                           | 276 |

## Chapter 7: Materials and Technologies in Waste Processing

|                                                                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Highly-Organized One-Dimensional Copper-Doped Titanium Dioxide Nanotubes for Photoelectrocatalytic Degradation of Acid Orange 52</b><br>E.C.R. Lopez, V.A.F. Cleofe, R.Y.A. Cañal, K.F.P. Boado and J.V.D. Perez  | 285 |
| <b>Physical Properties and Microstructures of Ceramics Fabricated from Mae Moh Lignite Bottom Ash</b><br>P. Sooksaen                                                                                                 | 292 |
| <b>Synthesis and Characterization of Composite of Al<sub>2</sub>O<sub>3</sub>/ Activated Carbon by Hydrothermal Method</b><br>Allwar, M.K. Sari, F. Rahmawati and A.N. Amatullah                                     | 298 |
| <b>Kinetics and Isotherm Studies of Methyl Orange Adsorption Using Polyethyleneimine-Graphene Oxide Polymer Nanocomposite Beads</b><br>J.E.T. Nolasco, E.N.O. Cañeba, K.M.V. Edquila, J.I.C. Espita and J.V.D. Perez | 304 |

## Chapter 8: Membranes and Membrane Technologies

|                                                                                                                                                                                                                                                |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>MOF-Modified High Permeability Polyimide Membrane for Gas Separation</b><br>D.P. Bernabe, A.R. Caparanga, C.C. Hu, S.J. You, K.R. Lee and J.Y. Lai                                                                                          | 313 |
| <b>Nanostructured Membrane of Sodium Montmorillonite Reinforced Cellulose Acetate for Adsorption of Ca(II) and Mg(II) Ions in Hard Water</b><br>R.R. Aquino, M.S. Tolentino, D.J.C. Ramolete, A.M. Calingasan, M.N. Dela Cruz and B.A. Basilia | 319 |
| <b>Novel Membrane Suitable for Membrane Distillation: Effect of Mixed Nanofillers on the Membrane Performance</b><br>M.R. El-Marghany, A.H. El-Shazly, M.S.A. Salem, M.N. Sabry and N. Nady                                                    | 325 |

|                                                                                                                             |     |
|-----------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Effect of Polysulfone/Organomontmorillonite Blends on Nanocomposite Membrane Properties</b>                              |     |
| R.R. Aquino, M.S. Tolentino, M.L. Esmalde, D.V.B. Condol and B.A. Basilia                                                   | 331 |
| <b>Effect of Adding Functionalized Graphene on the Performance of PVDF Membrane in Direct Contact Membrane Distillation</b> |     |
| M.S.A. Salem, A.H. El-Shazly, M.R. El-Marghany, M.N. Sabry and N. Nady                                                      | 337 |

## Chapter 9: Chemical Engineering Technologies

|                                                                                                                                                |     |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Specific Energy Consumption Improvement with Applying Stainless Wire Mesh Porous Material for a Hot Air Dryer</b>                           |     |
| R. Luampon, S. Bunchan and B. Krittacom                                                                                                        | 345 |
| <b>Green Synthesis and Characterization of High-Purity Monodispersed Cupric Oxide (CuO) Nanopowder</b>                                         |     |
| Y.T. Foo, L.T. Foo, L. Shahcheragh, B.A. Horri and B. Salamatinia                                                                              | 351 |
| <b>Thermal Efficiency of Domestic Cooking-Gas Burner Using Open-Cellular Porous Media in the Case of Varied Outlet Diameter of Mixing Tube</b> |     |
| B. Krittacom and S. Sinjapo                                                                                                                    | 357 |

## Chapter 10: Building Materials and Structures

|                                                                                                                                     |     |
|-------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Effect of Admixtures on the Thermo-Physical Properties of Non Autoclaved Light Weight Block Using Marble Dust</b>                |     |
| V. Sood, S.K. Negi and B.M. Suman                                                                                                   | 365 |
| <b>Pre-Crack Behaviours of Cement Paste Containing <i>Bacillus pseudofirmus</i> ATCC 700159</b>                                     |     |
| R. Lomsri, A. Wongkvanklom, P. Chindaprasirt, A. Wongsas and D. Tanangteerapong                                                     | 371 |
| <b>Lightweight Geopolymer Concrete Containing Recycled Plastic Beads</b>                                                            |     |
| A. Wongkvanklom, P. Posi, S. Homwuttiwong, V. Sata, A. Wongsas, D. Tanangteerapong and P. Chindaprasirt                             | 377 |
| <b>Ladle Furnace Slag as a Sustainable Binder for Masonry Mortars</b>                                                               |     |
| S.Y. Chang, C.S. Chen, C.H. Tu and Y.W. Tseng                                                                                       | 385 |
| <b>Pervious Concrete with LLDPE Powder as Fine Aggregate</b>                                                                        |     |
| J. Prashanth, H. Narayana and R. Prasad                                                                                             | 391 |
| <b>Influence of Glass and Limestone Powders in High Calcium Fly Ash Geopolymer Paste on Compressive Strength and Microstructure</b> |     |
| P. Topark-Ngarm, T. Tho-In, V. Sata, P. Chindaprasirt and T. Cao                                                                    | 397 |
| <b>Effect of Cement-Asphalt Emulsion Mortar Based on a Laboratory Investigation</b>                                                 |     |
| P. Nanthavisit, P. Jitsangiam and P. Pichayapan                                                                                     | 404 |
| <b>An Evaluation of Relationship with Polished Stone Value and Skid Resistance Value Based on a Laboratory Investigation</b>        |     |
| P. Pichayapan, P. Chaleonpan, P. Jitsangiam and P. Wongchana                                                                        | 410 |
| <b>Phase Change Material to Reduce Cooling Load of Buildings in Hot Climate</b>                                                     |     |
| M. Haggag, A. Hassan and S. Abdelbaqi                                                                                               | 416 |
| <b>Delayed Casting of UHPFRC Elements</b>                                                                                           |     |
| D. Čítek, J. Kolísko, S. Řeháček and M. Krystov                                                                                     | 424 |
| <b>Utilization of Electric Arc Furnace Oxidizing Slag in Construction Materials</b>                                                 |     |
| H. Hsieh, C.S. Chen, S.Y. Chang and S.H. Chang                                                                                      | 430 |
| <b>Utilization of Brine Sludge in Controlled Low Strength Materials (CLSM)</b>                                                      |     |
| S.J. Chen, C.S. Chen, J.Y. Jhan and R.F. Chen                                                                                       | 436 |