

# Table of Contents

## Preface

## Chapter 1: Chemical Engineering and Technologies

|                                                                                                                                                                                                               |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Studies of Chemical Adsorption Membrane in the Steel Surface on Application</b><br>Z.M. Chen, P. Lu, Z.T. Yu and N. Zhao                                                                                   | 3  |
| <b>Synthesis of (S)-(+)-1,3-butanediol by asymmetric reduction of 4-hydroxy-2-butanone with Immobilized yeast cells</b>                                                                                       | 7  |
| <b>Synthesis of (S)-Tert-Butyl 3-Hydroxybutyrate by Asymmetric Reduction of Tert-Butyl Acetoacetate with <i>Saccharomyces cerevisiae</i> B5</b><br>Z.M. Ou, W.F. Feng and L. Xu                               | 12 |
| <b>Supercritical Fluid Extraction of <i>Polygonum cuspidatum</i> and Subsequent Isolation by Simulated Moving Bed Chromatography</b><br>M.T. Liang, R.C. Liang, S.Q. Yu, R.A. Yan and K.Y. Liang              | 18 |
| <b>Anodic Plasma Electrolytic Nitrocarburizing of Low-Carbon Steel</b><br>P.N. Belkin, S.A. Kusmanov, A. Naumov and Y. Parkaeva                                                                               | 31 |
| <b>Anodic Plasma Electrolytic Saturation of Steels by Carbon and Nitrogen</b><br>P.N. Belkin, A. Naumov, S. Shadrin, I.G. Dyakov, A. Zhironov, S.A. Kusmanov and T. Mukhacheva                                | 37 |
| <b>Interaction Mechanism between Bovine Serum Albumin and Polyethylene Glycol Revealed with Elastic Light Scattering Spectroscopy</b><br>W.Z. Zhang, K. Zhang, J.L. Zheng, H.S. Chen, W.X. Chen and X.L. Jing | 43 |
| <b>COD Removal of Textile Printing and Dyeing Wastewater by Photocatalysis</b><br>W. Zhao and H.Y. Xie                                                                                                        | 51 |
| <b>Quaternary Reciprocal Systems with the Inner Diagonals: Variants of Polyhedration</b><br>V. Lutsyk, V. Vorobjeva and M. Parfenova                                                                          | 55 |
| <b>Study on Extraction of Cucurbitacin B from the Pedicel of <i>Cucumis melo</i> L. by Acid Hydrolysis</b><br>X. Xu, L. Tang, H.F. Shan, Z.Q. Wang and W.G. Shan                                              | 61 |
| <b>Recovery of Uranium (VI) from Water Solutions by Membrane Extraction</b><br>G. Zakrzewska, P. Bieluszka, E. Chajduk and S. Wolkowicz                                                                       | 66 |
| <b>Self-Assembled Au Electrode for Direct Electrochemistry of Horseradish Peroxidase and Detection of Hydrogen Peroxide</b><br>H. Cui, Z.H. Wang, Q.J. Wan and N.J. Yang                                      | 72 |
| <b>Comparison of One-Step Method and Two-Step Method of Ilmenite Concentrate Smelting Titanium Slag</b><br>R.J. Pan and S.L. Yang                                                                             | 77 |
| <b>Preparation of GR/HRP/Chit Modified Electrode and its Electrochemical Behaviors</b><br>H. Shu, Y.L. Shang, H. Cui, Q.J. Wan and N.J. Yang                                                                  | 87 |
| <b>The Synthesis and Investigation of Crystallographic and Adsorption Properties of TiO<sub>2</sub> Powders</b><br>A.Y. Stepanov, L. Sotnikova, A. Vladimirov, D.V. Dyagilev and T.A. Larichev                | 92 |
| <b>A New Primary Lithium Battery with Fluorinated Ketjenblack Cathode</b><br>J.C. Lu, Z.C. Liu, P. Huang, Q. Fang and M.H. Zhu                                                                                | 98 |

## Chapter 2: Materials Science and Technologies

|                                                                                                                                                                                      |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>The Influence of Different Surface Compressive Stress on the Wettability of Ion-Exchanged Float Aluminosilicate Glass</b><br>X.Y. Li, L.B. Jiang, X.W. Zhang, X. Zhang and Y. Yan | 105 |
| <b>Microstructure and Anti-Friction Effect of Ball-Milled Expanded Graphite</b><br>H. Zhang                                                                                          | 110 |

|                                                                                                                                                                                                            |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Microstructure and Electrochemical Properties of Ce-Containing 7072 Al Alloy</b><br>J. Feng, D.Y. Ding, W.L. Zhang, Y.J. Gao, G.Z. Chen, Y.W. Huang and J.S. Tang                                       | 114 |
| <b>First Principles Calculation on Adsorption of S on Fe(111)</b><br>F.C. Zhang, C.F. Li and Z.L. Ran                                                                                                      | 120 |
| <b>Mechanical Properties and Fatigue Behavior of Age Treated Die Cast AlMg5Si2Mn Alloy</b><br>Z.Q. Hu, L. Wan, S.S. Wu and X.Q. Liu                                                                        | 126 |
| <b>Dissolution, Crystallisation, and Sintering of a Raw Matt Glaze for Porcelain Tiles</b><br>J.L. Amorós, M.P. Gómez-Tena, A. Moreno, E. Blasco, S. Cook and M. Galindo                                   | 132 |
| <b>Surface Characteristics of Anodized AZ91D with Potassium Permanganate in Alkaline by Various Time</b><br>Y.K. Kim, D.J. Yoon, C.H. Shin, R.M. Hee, Y.S. Jang and M.H. Lee                               | 141 |
| <b>High Temperature Resistance Effect of SrO/(SrO+CaO) in Alkali-Free Boro-Aluminosilicate Glasses</b><br>Y.L. Tian, X.L. Guo, M.K. Zhu, S.B. Sun, Y.L. Li, W.T. Liu and J.Y. Ding                         | 149 |
| <b>Influence of Different Cooling Systems on Surface Roughness in the Turning of the Ti-6Al-4V Alloy Used as Biomaterial</b><br>L.C. Brandao, J.A. Oliveira, R.T. Coelho and S.L.M. Ribeiro Filho          | 155 |
| <b>Syntheses of Tabular Cobalt Ferrite Crystal Using Non-Equilibrium Crystallization Conditions</b><br>G. Jian, H. Shao, Q.X. Hu and S. Lu                                                                 | 161 |
| <b>Microwave Dielectric Properties and its Compatibility with Silver of Glass-Ceramic Based on Co-Fire at Low Temperature</b><br>H. Shao and G. Jian                                                       | 167 |
| <b>Solidification Paths within the Ceramic Systems</b><br>V. Lutsyk, A. Zelenaya and M. Parfenova                                                                                                          | 173 |
| <b>Preparation and Characterization of SiCOH Film Using a New Precursor Trimethoxy [2-(oxabicyclo [4.1.0] hept-3yl) Ethyl] Silicane</b><br>Z.J. Ding, S.J. Ding and Y.Z. Shen                              | 179 |
| <b>Effect of UV Radiation and Leakage Current on Hydrophobicity of RTV Silicone Rubber</b><br>J.H. Wang, G.G. Wang and Y.J. Zhao                                                                           | 185 |
| <b>Use of Strain Energy Density W and <math>Q_0</math> as Quality Indices for Rating the Quality of Cast Aluminium Alloy354 as a Function of Processing Parameters</b><br>P. Sibal, G.D. Babu and M.N. Rao | 189 |
| <b>Ultraviolet Detector Based on TiO<sub>2</sub> Thin Film</b><br>Q.Q. Ma, B. He, X.K. Huang, Y.L. He, X.Y. Yu and G. Peng                                                                                 | 195 |
| <b>Research on the Influence of Paper Smoothness on the Color Effect</b><br>Q.J. Meng and Z.J. Li                                                                                                          | 200 |

### Chapter 3: Nano Materials and Technologies

|                                                                                                                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Comparisons of Nanocrystalline Cu, Ag, and Al Prepared by Room-Temperature-Molding Method and Vacuum-Warm-Compaction Method</b><br>W. Liu and Q.H. Zhou                                          | 207 |
| <b>Study of Hybrid Photovoltaic Materials with Poly(3-Hexylthiophene) and CdS Nanoparticles by Spectroscopic Techniques</b><br>W.Z. Zhang, Y.J. Lin, J.L. Zheng, H.S. Chen, W.X. Chen and X.L. Jing | 212 |
| <b>Investigation of Nanomechanical and Aging Properties of Scratch-Resistant Coatings on Polycarbonate through Nanoindentation</b><br>X. Zhang, Y.L. Zhong, X.W. Zhang, L. Li, X.Y. Li and Y. Yan   | 220 |
| <b>Synthesis and Photoelectrical Properties of Graphene-Cu<sub>x</sub>O Nanostructures</b><br>Q.Q. Zhu, J.H. Yu, X.X. Wang, L.L. Xu, L. Cao and L.F. Dong                                           | 229 |
| <b>Morphological Studies of Polyphosphazenes and their Nano-Composites Using Solid-State Nuclear Magnetic Resonance Spectroscopy</b><br>C.C. Sun, P. Hazendonk, A.S. Borisov and P.G. Hayes         | 235 |
| <b>A Novel Solvothermal Route to Nanocrystalline Sn<sub>4</sub>P<sub>3</sub> with Red Phosphorous as Raw Material</b><br>X. Huang, J.J. Sun, H. Huang and B. Wang                                   | 241 |

|                                                                                                                                                                                                                        |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>A Simple and High-Performance Hydrazine Sensor Based on Graphene Nano Platelets Supported Metal Nanoparticles</b><br>Y. Liu, B.B. Li, W. Wei, Q.J. Wan and N.J. Yang                                                | 246 |
| <b>Amperometric Biosensor for Hydrogen Peroxide Based on Glucose Oxidase Immobilized in Au Nanoparticles and 2,3-Dimercaptosuccinic Acid Self-Assembly Monolayers</b><br>Z.H. Wang, Y.L. Shang, Q.J. Wan and N.J. Yang | 252 |
| <b>A Simple Hydrogen Peroxide Biosensor Based on Catalase Immobilized in Nano-Structural Composite Film</b><br>Z.H. Wang, H. Cui, Q.J. Wan and N.J. Yang                                                               | 258 |
| <b>A High-Performance Bimetallic Pd-Cu Nanoparticles Membrane on Glassy Carbon Electrode for Formic Acid Oxidation</b><br>W. Wei, Y. Liu, Q.J. Wan and N.J. Yang                                                       | 264 |
| <b>Preparation of Poly(Vinylbenzyl Chloride)@Lead Sulfide (PVBC@PbS) Core-Shell Nanospheres and Adsorption of Phenol</b><br>J. Ye, L.P. Sun and S.P. Gao                                                               | 270 |
| <b>Characterization of Iron Oxide Nanoparticles for Sol-Gel Dip-Coating Method Prepared Thin Films</b><br>J. Setina, A. Gabrene, I. Juhnevica and G. Mezinskis                                                         | 275 |
| <b>Electrical Transport Properties of Single SiC NW-FET</b><br>G. Peng, W.B. Ma, X.K. Huang, Y.Q. Zhou, Y.L. He, X.Y. Yu and B. He                                                                                     | 281 |

## Chapter 4: Polymer Materials and Technologies

|                                                                                                                                                                                                                  |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>The Influential Factors of Property on Polyether-Polyol Type Polyurethane Elastomer</b><br>F.C. Xie and F.Q. Guo                                                                                              | 289 |
| <b>The Study on the Influence of Molding Method and Thickness to Part Properties</b><br>W. Tao, Y. Yue and L. Lei                                                                                                | 294 |
| <b>Research on Hemocompatibility of Polypropylene Non-Woven Fabric Membrane Immobilized by N-Alkylglucosamides</b><br>Z.R. Xin, Z.F. Yang, S.J. Yan and B.B. Du                                                  | 301 |
| <b>Damage Progression in Unidirectionally Arrayed Chopped Strands Laminates with Different Slit Patterns under Tension</b><br>H. Li, W.X. Wang and T. Matsubara                                                  | 307 |
| <b>The Research on Adsorption Behaviors and Mechanisms of Geopolymers on <math>\text{Sr}^{2+}</math>, <math>\text{Co}^{2+}</math> and <math>\text{Cs}^+</math></b><br>Y.L. Chen, Y.Y. Tong, R.W. Pan and J. Tang | 313 |

## Chapter 5: Modelling, Numerical Simulation and Analysis in Material Engineering

|                                                                                                                                                                                           |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>A New Method of Calculating Recovery of Waterflooding Reservoir by Using Production Rate</b><br>L.B. Fu, L. Zhao, Y.F. Zhang, Z.M. Ji, Q.Y. Hou and Z.F. Fan                           | 321 |
| <b>Numerical Simulation of the Multi-Component Slurry Gasification with the Non-Premixed Combustion Model</b><br>X.X. Li, C.H. Yi, B.L. Yang, Y. Zhang, C.G. Men, G.L. He and H.D. Xu     | 326 |
| <b>Optimization of Extraction Technology of Flavonoids from Kandelia Candel Leaves by Using Response Surface Methodology</b><br>Y.P. Ji, C.P. Li, X. Xu, L. Tang and Q. Tong              | 332 |
| <b>Stress Analysis of the Underground Gas Storage Well Stored CNG Based on the Finite Element Method</b><br>C.L. Song and Y. Dan                                                          | 338 |
| <b>A Closed-Form Solution of Effective Young's Modulus for Composites Including Multi-Shape Inclusions Using Improved Mori-Tanaka Model</b><br>D.M. Luo, H. Yang, Y.Y. Xiao and W.X. Wang | 343 |
| <b>Li,Na,Rb,Li F System for Molten Salt Reactor: 3D and 4D Computer Models</b><br>V. Lutsyk, A. Zelenaya and Y.Z. Dai                                                                     | 349 |