

Table of Contents

Preface

Chapter 1: Materials Synthesis and Preparation

ZrB₂ Nano-Powders Prepared by Sol-Gel Carbothermal Reduction	3
B.N. Wang, Y.B. Duan, J. Hu, Y.T. Wang, K.J. Wang and Y.M. Tao	
Preparation of Aluminum Nitride Whiskers	7
X.Y. Sui, J. Xu, H. Li, H.Z. Xu, C.H. Wang, C.L. Zhou and R.X. Liu	
Preparation of Aluminum Nitride Whiskers by Precursor Method	11
H.Z. Xu, H. Li, X.Y. Sui, C.H. Wang, C.L. Zhou, C.L. Zhou and R.X. Liu	
Fabrication of Plate-Like Sr₃Ti₂O₇ Particles Using Molten Salt Synthesis	15
S.J. Yang, F. Gao, M.J. Qin, Q.Q. Zhang and X.X. Huang	
The Preparation Technology of SnO₂ Nanowires Based on the System of Al-SnO-Cu₂O	20
J.S. Li, X.J. Wu, M.Y. Wang and F. Zhao	
Synthesis and Characterization of Flower-Like Co-La Oxide Micro/Nano Materials	25
S.J. Lin, W.T. Du, T.T. Ding, Y. Zhao, Y. Zhao, H. Rong and L.G. Tong	
The Particle Size Control of Organic-Inorganic Hybrid Silica by Surfactant-Mediated Assembly of Silsesquioxane	30
W.Y. Chen, Q. Wei, Y.J. Liu and Q.Y. Li	
Sol-Gel Synthesis of Na₂Ta₄O₁₁ Nanocrystals Showing High Efficient Photocatalytic Performance	35
Y.G. Su, X. Yang, T.T. Wang, B.L. Zhu and X.J. Wang	
Synthesis and Characterization of GdO⁺ Nanosheets Doped with Tm	40
Y.Y. Zhang, S.L. Sun, G.L. Zhou, D.Y. Jiang, T. Feng, W.Y. Shi and Q. Li	
Preparing Superfine Quartz Sand Powder by Ball Milling Method	44
B.F. Ma, B. Tan, W.B. Zhao, X. Liang, F.M. Hu, G.S. Yang, L.L. You, R.L. Wang, H.Y. Liu, J.G. Song, F. Wang and R.J. Liu	
Preparation of Sub-Micrometre Size Platinum Particles via Chemical Reduction of Hexachloroplatinic Acid in Aqueous Solution	48
L. Liu, J. Hu, Y.T. Wang, K.J. Wang and L. Su	
Solvothermal Synthesis of Carbon-Coated Nickel Nanoparticles in Ionic Liquid	52
F.Y. Li, C.Y. Xu, Y.Y. Yang, Y.X. Hua and J. Li	
The Preparation and Tribological Properties of Multi-Layer Graphene as Paraffin Liquid Additives	56
H.C. Zhao, Y.L. Qiao, Y. Zang and Q. Zhang	
Study on the Preparation and Fluorescence Performance of Graphene Oxide	61
C.X. Li, X.D. Zhang, D.Y. Jiang and Q. Li	
Low-Temperature Synthesis and Photoluminescence Properties of Wurtzite Three-Dimensional ZnS Nanostructures	65
H.F. Qi, J.L. Li, Y. Shi, J.J. Xie and F. Lei	
Synthesis, Characterization and Photocatalytic Activity of BiOCl Nanomaterials	69
M.L. Sun, Q.H. Zhao, C.F. Du and Z.L. Liu	
Study on the Factors Affecting the Hydrophobic Property of Silica Membranes	74
Y.J. Liu, Q. Wei, W.Y. Chen and Q.Y. Li	
Borneol-Shellac Nanofiber Membranes Fabricated Using a Modified Coaxial Electrospinning	78
D.G. Yu, Y. Xu, S. Liu, Y.H. Wang, X. Duan and X. Wang	
Preparation and Characterization of Calcium-Magnesium Phosphate Cements	83
K. Li, Q.Y. Shen, Y.T. Xie and X.B. Zheng	

Chapter 2: Material Properties, Characterisation and Application

The Influence of Etching Time on the Surface Morphology of Electroless Nickel Plated Acrylic Resins Microsphere	89
P. Huang, J. Hu, K.J. Wang and Y.T. Wang	
A Noise Removal Method in Measurement of Particle Size Distribution by the Shifrin-Transform	93
Y. Han, Z.L. Yang, Y.N. Yuan and B. Dai	
XPS Study and First-Principles Calculations of the Structural and Electronic Properties of Type-VIII Clathrates $Ba_8Ga_{16-x}Cu_xSn_{30}$	97
D.C. Li, Y.H. Quan, D.H. Ren and S.K. Deng	
First-Principles Calculation of Tetragonal Phase Properties of ZnO under High-Pressure	102
C. Yang, D.C. Li, X.P. Li and D.H. Ren	
Structural and Magnetic Properties of New Type $Ca_xSr_{1-x-y}La_yO \bullet nFe_{(2n-z)/n}Co_{z/n}O_3$ Magnets	107
X.S. Liu, J.L. Yang and H. Yang	
Theoretical Study of Structural, Elastic Properties and Phase Transitions of Cu_2ZnSnS_4	113
Y.F. Zhao, Z.M. Liu and D.C. Li	
Effect of Different CaF_2 Powder on Micromechanism and Dissolution Rates of CaF_2 Block	118
P. Wang, X. Ma, L. Kang, C. Zhang and H.Q. Nian	
Theoretical Studies on an Energetic Material: Di-s-Tetrazine Derivatives	122
H. Zhou, Z.L. Ma, J.H. Guo and J.L. Wang	
Heat Resistance Properties of an Cured ATPU/Epoxy Resin	127
W.Y. Chen and J.G. Guan	
Magnetotransport Investigations of Two-Dimensional Electron Gas for AlGaN/GaN Heterostructure	132
M. Lv, G.L. Yu, Y.G. Xu, T. Lin, N. Dai and J.H. Chu	
Sensing Characteristics of Sulfur Dioxide Gas Sensor Utilizing YSZ and Sulfate Salts	136
W.Y. Shi, L.H. Li, L.Q. Xu, Q. Li and T. Feng	
The Study of NO_2 Gas Sensor Based on NASICON	140
B.X. Xie, Y.W. Xu, J. Sun, D.Y. Jiang and T. Feng	
The Effect of the Limestone on the Strength of the Foam Concrete	145
X.G. Yu, L. Hu, C. Gao and G.L. Wu	
Effect of Controlling Concentration on the Properties of SnO_2 Nanocrystalline for Dye Sensitized Solar Cells	149
J.G. Song, L. Hua, Q. Shen, F. Wang and L.M. Zhang	
Impact of Domain Wall Pinning on the Dielectric Loss of Relaxor Ferroelectrics	153
L.B. Li, G.L. Li, Y.P. Zhou and G.Z. Zang	
Optical Diagnosis of Atmospheric Pressure Gas-Liquid Diffuse Discharge Excited by Nanosecond Pulse Voltage	158
Y.B. Wei, L. Zhang, P.C. Jiang, S. Zhang and D.Z. Yang	

Chapter 3: Composites and Ceramics

Hot Deformation Behaviors of SiCp/Al Composites	165
S.M. Hao and J.P. Xie	
Preparation and Characterization of SiC/SiC Micro Ceramic Matrix Composites	170
M.W. Chen, H.P. Qiu, J. Jiao, X.Q. Li, Y. Wang and H. Zou	
Effect of MgO-Y_2O_3 Additions on Microstructure and Mechanical Properties of Al_2O_3-TiCN Composites	176
Z.L. Zhang, W.M. Guo, S.H. Wu and Y. You	
Study on Preparation and Property of Carbon Fiber/HA Composites by Centrifugal Slip Casting Method	180
Q. Li, J.Y. Yu and X.J. Meng	
The Preparation, Structure and Electrical Conductivity of Ag-Doped $La_{1-x-y}Sr_xCu_yMnO_{3-\delta}$ ($0.05 \leq x \leq 0.4$, $y=0.1$) Ceramics	185
Y. Cao, B.P. Lin, H. Yang and Y. Sun	
Effect of Doping Ions on Structure and Electrical Properties of Lead-Free KNN Ceramics	190
N. Yin, A. Jalalian, Z.G. Gai, L.L. Zhao and X.L. Wang	

Densification Mechanism of Antimony-Doped Tin Oxide Ceramics by Spark Plasma Sintering	196
Q.Z. Li and Q.C. Li	
Adsorption-Desorption Performances of Humidity Controlling Diatomite-Based Ceramics	200
X.S. Cheng, Z. Li, H. Wang, P.A. Liu, A.Z. Shui and L.K. Zeng	
Preparation and Properties of Si₃N₄-SiC-C Refractory Materials Composed with Sucrose and Phenolic Resin	205
Z.Y. Yin, Z.H. Huang, M.H. Fang, Y.G. Liu and X.W. Wu	
Impact of the Mineral Composition and Sintering Temperature on the Synthesis of Anorthite Ceramics	209
X.G. Zhang, L. Li, Z.H. Huang, M.H. Fang, X.W. Wu and Y.G. Liu	
The Effects of Sodium Bicarbonate Concentration on the Synthesis of Tris-acetylacetone-iridium(III)	213
G. Xu, J. Hu and Y.T. Wang	
Preparation and Properties of YAG Powder and Porous Ceramics	217
W.B. Zhao, X. Liang, F.M. Hu, L.L. You, B.F. Ma, R.L. Wang, H.Y. Liu, G.S. Yang, B. Tan, J.G. Song, F. Wang and F. Chen	
A Comparative Study on Radio-Frequency Thermal Plasma Spheroidization for Two Types of Alumina Ceramic Powder	221
H.L. Zhu, H.H. Tong, F.Z. Yang, Q. Wang and C.M. Cheng	

Chapter 4: Films and Coatings

Structure and Optical Properties of ZnO:N Films Doped with Nitrogen Atoms	229
Y. Zhao, Y.L. Ding, X.Y. Liang, J.H. Min, L.J. Wang and W.M. Shi	
Electrical and Optical Stability of Two Kinds of Different Element Doped Tin Oxide Film Carrier Materials in an Acid Environment	236
X.L. Shi, Y.H. Jiang, Y.Q. Zhang and H.J. Wu	
The Influence of Sputtering Power on the Structural, Morphological and Optical Properties of ZnSe Thin Films Deposited by R.F Magnetron Sputtering	240
Y. Zheng, Q. Liang, B. Li, G.G. Zeng, W.W. Wang, J.Q. Zhang, W. Li and L.H. Feng	
Preparation and Electrical Property of Mg₂Si Thin Film by Pulsed Laser Deposition	244
M.J. Yang	
Study of Natural Dye Sensitized Solar Cells with TiO₂/ZnO Composite Thin Film as Photoanode	248
S.Q. Zhao, H.Q. Li, Y.L. Ma, Y. Ma, X.L. Li and H.M. Ji	
The Anti-Oxidation Coatings of Carbon/Carbon Composites	253
H. Li, H.Z. Xu, X.Y. Sui, C.L. Zhou, C.H. Wang, R.X. Liu and Y.Y. Wang	
Study on High Temperature Coating of C_f/SiC Composites	257
Y.Y. Wang, C.L. Zhou, C.H. Wang, R.X. Liu and K. Jiang	
Preparation of YAM Coating on the ZrB₂ Composites Ceramics by Co-Precipitation Process	261
S.B. Li, H.Y. Ru, J.G. Song and X.B. Bai	
Cavitation Erosion Resistance of Ti-Ni Intermetallic Coatings Prepared by Low Pressure Plasma Spray Process	265
Q.S. Lin, K.S. Zhou, C.M. Deng, C.G. Deng, Z.Q. Kuang and W. Zeng	
Application of Phosphate Process in Ceramic Insulated Magnet Wire	270
W.Y. Zhang, R.X. Liu, J. Yang, C.L. Zhou, X.Y. Sui and C.H. Wang	
Plasma Sprayed 4-Phase Ceramic Abradable Seal Coatings and their Thermal Shock Resistance on Nickel-Based Superalloy	274
J.G. Gao, F. Lu and M.Q. Guo	
Evaluation of PAN Based Composite Sheet Films with Modified Carbon Nanotubes	279
R. Liu, Y. Yuan, Y.X. Huang, Y.L. Liu, X. Zhang and Y.X. Wang	
Preparation of Silver Nanoparticles/Graphene Composite Films by Dip-Coating Method and their Surface-Enhanced Raman Scattering Property	285
N. Zhao, S.B. Ma, Q.Q. Yan, Y.Z. Zhou, X.Q. Fu, X.N. Cheng and J. Yang	
Preparation and Properties of Organic Silicon Atomic-Oxygen-Protection Film	290
C.H. Li, K.H. Zheng, S.S. Yang, Z.H. Li and D.T. Tang	

Chapter 5: Cathode Materials Research

Influence of Li, Al Substitution for Mn on Crystal Structure and Electrochemical Performance of $\text{Li}_{1+x}\text{Mn}_{2-x-y}\text{Al}_y\text{O}_4$ Cathode Materials

F. Luo, L. Zhang, Z.D. Li, J.H. Wang and Y.Z. Guo

297

Synthesis and Electrochemical Properties of Cathode Material $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ via Li, Mg, Al Doping

S. Yuan, L.B. Liu, Y.P. Tang, J.H. Wang and Y.Z. Guo

302

Impacts of Cr Substitution on Ion Distributions and Electrochemical Performance of $\text{LiNi}_{0.5-x}\text{Cr}_{2x}\text{Mn}_{1.5-x}\text{O}_4$ Cathode Materials

X.H. Shi, F. Luo, L. Zhang and Y.Z. Guo

307

Effect of Solid Reaction Temperature on the Cation Mixing and Electrochemical Properties of $\text{LiNi}_{0.4}\text{Co}_{0.2}\text{Mn}_{0.4}\text{O}_2$ Catode Materials in High Energy Li-Ion Batteries

L. Zhang, F. Luo, X.S. Zhang and Y.Z. Guo

312

Surface Coating and Electrochemical Properties of $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ Cathode in Lithium-Ion Cells

L. Zhang, F. Luo, J.H. Wang and Y.Z. Guo

317

Chapter 6: Biomedical Material Research

Inhibitive Effect of a New Dental Resin Composite on Enamel Artificial Caries

Y.M. Zhao, S.J. Hou and S.B. Li

323

Planar Morphology of Silver Leakage at Resin-Dentin Adhesion Interface

X.Y. Zhao, S.B. Li and X. Gong

329

The Effect of Norcantharidin on Proliferation and Invasiveness of SW579 Cell

S.T. Xu, Q. Cheng and S.M. Rao

335

Evolution Profile for Assessing Drug-Induced Arrhythmia Using Multifunctional Cardiomyocyte-Based Biosensor

T.X. Wang, K.Q. Su, N. Hu and P. Wang

339