

Table of Contents

Preface

Chapter 1: Chemical Composition, Microstructure, Physical Properties and Technologies of Producing and Processing of Inorganic Materials

Influence of Mixing Environmental Conditions on Flowability of Lactose Blends X.Y. Lu, L. Chen, R.L. Heng, Y.Z. Cheng and U.L. Opara	3
Preparation of Xonotlite Nano-Fibres Using the Silica Source from Coal Fly Ash and Ca(OH)_2 J. Yang, X. Zhang, H.W. Ma, M.W. Wang and H. Wu	7
Characterization of Co-Modified $\gamma\text{-Fe}_2\text{O}_3$ Based Composite Nanoparticles J.M. Li, J. Li, L.L. Chen, X.M. Gong and H. Mao	11
Synthesis of Spherical Nano-Hydroxyapatite by Hydrothermal Method with L-Lysine Template Y.Q. Chen, X.F. Xing and W.M. Gao	17
Synthesis and Performance Characterization of Highly Active Samarium Doped TiO_2 Nanopowder J. Xu	21
Preparation and Characterization of Wire-Like NiFe_2O_4 Nanoparticles with High Specific Area and Excellent Magnetic Properties via a Template-Assembled Sol-Gel Method P.Z. Gao, B. Yan, D.Y. Li, X.X. Gan, P. Li and W. Liu	26
Aqueous Gelcasting Synthesis of Zirconium Diboride J.P. Wang, J. Wang, X.B. Zhou, L. Jing, P.R. Matli and Q. Huang	31
Preparation of Nano-Sized Wollastonite Using Calcium Silicate Residue of Potassium Feldspar after Extraction of Potassium and Alumina J. Chen, J. Yang and H.W. Ma	35
Improved Efficiency of TiO_2 Nanotube Arrays with TiCl_4 Treatment in Dye-Sensitized Solar Cells Q.T. Li, J. Zhang, S.Q. Li, J. Xie and H. Wang	39
Microstructure Analysis of SiC Ceramic Support by Isostatic Processing Y.F. Liu, K.Q. Liu, Z.Y. Zeng and Y.B. Yuan	45
Effects of $\text{Nb}_2\text{O}_5/\text{La}_2\text{O}_3$ Synergistic Modification on Phase Composition, Microstructure and Mechanical Properties of Al_2O_3 Ceramics Prepared by Microwave Sintering Y.L. Ai, K. Wu, X.H. Xie, B.L. Liang, W. He and W.H. Chen	49
Influence of Si_3N_4 Adding on the Performance of Al-Al_2O_3 Composite C.J. Li, Y. Li, H.X. Qin, J.L. Sun, J.H. Chen and W.D. Xue	53
Influence of Aluminum Contents on Phase Behavior and Properties of TiN-Sialon-Corundum Composites by Aluminothermic Reduction Nitridation L. Zhu, K. Chen, Z.H. Huang, M.H. Fang and Y.G. Liu	57
Effect of Mineral Composition and Sintering Temperature on the Synthetic Cordierite L. Li, R.L. Wen, X.G. Zhang, C.B. Wang, M.H. Fang, Y.G. Liu, X.W. Wu and Z.H. Huang	61
The Effects of Mineral Composition and Sintering Temperature on Synthetic Mullite L. Li, X.G. Zhang, R.L. Wen, C.B. Wang, M.H. Fang, Y.G. Liu, X.W. Wu and Z.H. Huang	65
Surface Densification of Silica Ceramic W. Hu	69
Preparation and Characterization of Layered Rare Earth Compound L. Zhang, W. Yang, Y.Y. Zhang, W.Y. Shi, D.Y. Jiang and Q. Li	73
Synthesis and Characterization of $\text{Ce}_{0.5}\text{Zr}_{0.5}\text{O}_2$ Nanocomposite and its Supported Pd-Only Catalysis Activity D.X. Yang, P. Ning, J.L. He, J.F. Zhu, T.T. Zheng and Y.F. Huan	77
Microstructure and Properties of Ti(C,N)-Based Cermets S.Q. Xiao and S.H. Wu	82
The Properties of Plastic Phase Mullite-SiC Bricks and its Utilization in Cement Kilns S.L. Ma, Z.H. Huang, C.H. Gao, M.H. Fang and L.J. Wang	88

Densification Behavior and Microstructure Evolution of LTCC Film Constrained by Rigid Substrate	
S.S. Qi, R.Z. Zuo and Z.S. Ma	93
Sulfate-Ion Pillared Layered Hydroxide of $\text{Eu}_2(\text{OH})_4\text{SO}_4 \cdot n\text{H}_2\text{O}$: Controlled Hydrothermal Processing, Thermal Decomposition, and Photoluminescence	
X.J. Wang, J.G. Li, Q. Zhu and X.D. Sun	98
Synthesis and Photo-Catalytic Performance of ZnO/Graphene Composites	
C.X. Li, X.D. Zhang, D.Y. Jiang and Q. Li	103
Etching Morphology of Vitreous Silicon Dioxide in HF-Based Solution	
Z.F. Shao, S.Z. Tian, H. Wang and Z.K. Xiang	107
Preparation of Porous Hydroxylapatite Using Polystyrene Microspheres as Pore Former	
Y. Gai, F. Wang, J.X. Shen and L.L. Yang	112
Performance and Phase Behavior of Quartz-Aluminum Matrix Composites	
J. Liang, Z.H. Huang, K. Chen, X.C. Li, M.H. Fang, Y.G. Liu and X.W. Wu	117
Effect of Cerium on Manganese Base Catalysts by Co-Precipitation for Low-Temperature SCR of NO with NH_3	
L.J. Zhang, S.P. Cui, H.X. Guo, X.Y. Ma and X.G. Luo	121
A Novel Approach of Reusing Kerf Loss Wastes in Preparation of β-SiC/$\text{Si}_2\text{N}_2\text{O}$ Bonded SiC Refractory	
T. Wang, Y. Li and J.L. Sun	125
A Study on the Influence of Coarse Aggregate on Rheological Properties of Self-Compacting Concrete	
Y.C. Jiang, D. Huo, H.W. Teng and J.E. Xu	130
Preparation and Property of the Steel Fiber Concrete Modified by Acrylic Acid Emulsion	
H.H. Xia, Z.G. Chen and J. Zhou	136
Penetration of Chlorine Ion in Concrete under the Coupling Effect of the Continues Pressure Load and the Corrosion Environment	
W.H. Li and Y.Y. Xu	140
Preparation and Properties of Low-Temperature Glaze Used in Coke Oven Cordierite Bricks	
T. Wang, H.Z. Gu, M.J. Zhang, A. Huang, G.Q. Li and G.X. Jin	145
Calcium Carbonate Bio-Deposition Technique by Using Fine Waste Mortar Particles as Bacteria-Immobilization Medium	
G.Y. Li, Z.Y. Pan, Y. Yu, H.L. Kuang, F.X. Feng and D.M. Liu	149
Identification and Assessment of Natural Sodium Bentonite	
Y.Z. Liu, Y.F. Mei, H.B. Liu, D.H. Xu and C. Peng	154
Structural and Mineralogical Characterization of Green Nephrite in Hetian, Xinjiang, China	
M. Shi, B.S. Yu, Y. Guo, Y. Yuan and Y.N. Ng	159
Loess Based Copolymer Composite for Removing Basic Fuchsin	
L. Wang, W.J. He, Y.F. He, H. Li and R.M. Wang	165
Factors on Leaching Zinc and Copper from Zinc Leach Residue	
L.J. Yang, N.C. Chen, X.P. Zhong, J. Gao, Y.X. Lang, Z.F. Wang, C.M. Liu and Z.Y. Wu	169
The Microstructure Evolution of AA7050 in the Process of Homogenization	
Z.H. Geng, K. Li and P. Wu	173
Study of Evolution Rule of Aggregates in Ceramic Suspension	
Y. Ding, K.Q. Liu, X.H. Xie and Y.F. Liu	179
Thermodynamic Analysis of Chemical Vapor Deposition Progress for SiC Coatings	
M.W. Chen, H.P. Qiu, J. Jiao, X.Q. Li, Y. Wang and W.J. Xie	183
Influence of Reinforcing Phase on the Oxidation Model of ZrB_2 Based Multi-Phase Ceramics	
J.G. Song, F. Wang, X.Q. Wang, S.B. Li and G.C. Ji	189
Microstructure and Properties of Al_2O_3-ZrO_2 Ceramics Prepared by Microwave Sintering	
Y.L. Ai, X.H. Xie, W. He, B.L. Liang and W.H. Chen	193
Defect Control and Interfacial Microstructure of Laminated Composites of TiB_2-Based Ceramic to 1Cr18Ni9Ti Stainless Steel by Reaction Fusion Bonding	
D.J. Yin, Z.M. Zhao, B.J. Wu, L. Zhang and Y.L. Song	198

The Effects of Sulfate Anion Exchange on Structural Feature and Thermal Behavior of $\text{Y}_2(\text{OH})_5\text{NO}_3 \cdot n\text{H}_2\text{O}$ Layered Hydroxide Nanosheets	204
W.G. Liu, X.L. Wu, Q. Zhu, J.G. Li and X.D. Sun	
Influences of Working Power on Properties for Boron Films Deposited by R. F. Magnetron Sputtering	210
Y.M. Yang, B. Ren, J. Huang, K. Tang, J.N. Wang, H.Z. Yu and L.J. Wang	
Effects of V_2O_5 and ZrO_2 on Chipping Ratio of MnZn Ferrite Core	214
Y.Y. Lin and J.T. Huang	
Effect of Boric Acid on the Properties of Magnesium Slag Powder	218
F.L. Han and L.E. Wu	
Influence of Laser Ablation on the Oxygen Permeability of $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ Membranes	225
Z.G. Shen and D. Li	
The Hydro-Thermal Stability of Hornblende Syenite in NaOH Solution	230
C. Zeng, J. Yang, H.W. Ma and C.J. Liu	
Influence of Cooling Ways on the Structure and Hydraulic Activity of Blast Furnace Slag	234
H. Wang, S.P. Cui and Y.L. Wang	
Influence of $\text{SiO}_2/\text{Al}_2\text{O}_3$ Content on Structure and Hydration Activity of Granulated Blast Furnace Slag	240
S.P. Cui, L.L. Liu, J. Chen, Y.L. Wang, J.F. Wang, H. Wang and S.J. Dong	
Performance Studies on <i>In Situ</i> Spinel Solid Solution Bonded Periclase Refractories	245
X. Lin, Y. Li, Y.J. Li, J.J. Zhang, C.H. Gao and J.L. Zhang	
Effect of Mullite Homogenized Grog on the Properties of Mullite-SiC Bricks	249
S.L. Ma, Z.H. Huang, L.J. Wang, F. Ma, Z.F. Wang, W.B. Xia and J.J. Zhang	
Preparation and Luminescence Properties of SrMoO_4 Doped with Pr^{3+}	253
C.L. Gan, X.L. Xu, J.H. Yang and Z.F. Peng	
Electrical Characterization and Microstructures of $\text{Bi}_{4-x}\text{Gd}_x\text{Ti}_3\text{O}_{12}$ Thin Films	257
M. Chen, X.A. Mei and J. Liu	
Effect of Gd Substitution on Electrical Characteristics and Microstructures of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ Ceramics	261
X.A. Mei, M. Chen, J. Liu and R.F. Liu	
Ferroelectric Properties and Microstructures of Tb_2O_3-Doped Bismuth Titanate Ceramics	265
X.A. Mei, M. Chen, C.Q. Huang and R.F. Liu	
Effects of the Substrate Temperature on the Structure and Properties of $\text{Cd}_{1-x}\text{Mn}_x\text{Te}$ Films	269
J.N. Wang, L. Wang, H.H. Ji, B. Ren, Y.M. Yang, J.J. Zhang, J. Huang, K. Tang and L.J. Wang	
Effect of pH Value on the Properties of SnO_2 Nano-Crystalline for Dye Sensitized Solar Cells	273
J.G. Song, L. Hua, Q. Shen, F. Wang and L.M. Zhang	
Correlation between Light Response Uniformity and Longitudinal Transmission in 600 mm BGO Crystals	277
Z.M. Ji, H.H. Ni, L.Y. Yuan, J.F. Chen and S.H. Wang	
Ice-Formation Expansion of Salt Solution and its Effect on Frost Damage of Concrete	281
Z.Q. Jin, T.J. Zhao, S. Gao and S.Y. Zhang	
Influence of Different Diameters and Materials of Posts on the Fracture Resistance of Endodontically Treated Teeth	286
L.X. Zhang, Y.X. Liu, Y.L. Liu and Q. Rong	
Effect of Annealing Temperature on the Structures and Properties of $\text{Bi}_{4.15}\text{Nd}_{0.85}\text{Ti}_3\text{FeO}_{15}$ Thin Films	290
Y. Pei and F.M. Pan	
Effect of Maintenance Technology on the Properties of Quartz Sand Unfired Porous Materials	295
J.G. Song, F. Wang, X.Q. Wang, M.H. Xu, D.M. Du, S.B. Li, G.C. Ji and R.J. Liu	
Performance Study on Masonries of Different Aerated Concrete Blocks	299
P.F. Peng, X.M. Qin and Y.S. Wu	
TiO_2 Added Zn-Bi Based Varistors: Microstructure, I-V, Flow and Aging Characteristics	303
S.Z. Hao, H.F. Zhou, R.L. Guo, D.J. Chu, X.L. Chen, C.Z. Hu, B.C. Chang, Y.D. Qin and L. Fang	
Effect of Pr_6O_{11} Doping on the Microstructural and Electrical Properties of $\text{ZnO-Pr}_6\text{O}_{11}\text{-Co}_3\text{O}_4\text{-Cr}_2\text{O}_3\text{-SnO}_2$ Varistors	308
X.L. Fu, H. Feng and Z.J. Peng	

The Synergistic Effects of Freeze-Thaw, Salt Attack and Bending Stress on Behavior of Reinforced Concrete	313
P.F. Huang and Y.W. Bao	
Effect of Al_2O_3 on Surface Tension of the $\text{SiO}_2\text{-Al}_2\text{O}_3\text{-RO-R}_2\text{O}$ Glass System	322
Y.L. Tian, S.G. Guo and S.B. Sun	
Characterization of Swept Synthetic High Quality Quartz Crystal	326
S.F. Zhang and J.W. Shang	
The Effect of pH Value of Plating Bath on the Properties of Electroless Ni-P Coating on Phenolic Plastic Substrate	330
X.Y. Mao, X.P. Liang, J. Liu, L. Liu and K. Liu	
Mechanical and Adiabatic Properties of Silica Aerogel Doped with TiO_2 Nanowire	336
Z.K. Jin, X. Peng, H.Y. Gao, C.H. Peng and Y. Luan	
The Effect of LnAlO_3 ($\text{Ln}=\text{Nd,Sm}$) Additives on the Microwave Dielectric Properties of $\text{BaO-Nd}_2\text{O}_3\text{-5TiO}_2$ Ceramics	340
Y. Xu, R.L. Fu, J. Li, Z.X. Fu and H.J. Su	
Glass Forming Ability and Luminescent Properties of $\text{P}_2\text{O}_5\text{-ZnO-SrO}$ System Glasses	344
J.X. Wang and G.H. Chen	
Effect of MgAl_2O_4 Micropowder on Physical Properties of Corundum Castables	348
Y.S. Hu, P.A. Chen, B.Q. Zhu, Z. Ma and X.C. Li	
Surface Properties of Dental 3Y-TZP with Different Treatments	352
Y.H. Liu and Y. Wang	
Ballistic Performance of Laminated Composite with TiB_2 Based Ceramic to Ti-6Al-4V Alloy in Continuously-Graded Microstructure	357
Y.L. Song, B.J. Wu, L. Zhang and Z.M. Zhao	
Ferroelectric Properties of $\text{Bi}_{3.25}\text{Ho}_{0.75}\text{Ti}_{2.97}\text{V}_{0.03}\text{O}_{12}$	362
M. Chen, X.A. Mei and C.Q. Huang	
Electrical Characterization and Microstructures of $\text{Bi}_{4-x}\text{Dy}_x\text{Ti}_3\text{O}_{12}$ Ceramics	366
C.Q. Huang, X.A. Mei, M. Chen and B. Li	
Electrical Characteristics and Microstructures of Pr_2O_3-Doped $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ Thin Films	370
C.Q. Huang, X.A. Mei, M. Chen and B. Li	
Ferroelectric Properties of Bismuth Titanate Ceramics by $\text{Tm}_2\text{O}_3/\text{V}_2\text{O}_5$ Substitution	374
B. Li, X.B. Liu, M. Chen and X.A. Mei	
Ferroelectric Properties and Microstructures of $\text{Bi}_{4-x}\text{Dy}_x\text{Ti}_3\text{O}_{12}$ Thin Films	378
B. Li, X.B. Liu, M. Chen and X.A. Mei	
Ferroelectric Characteristics of $\text{Bi}_{4-x}\text{Pr}_x\text{Ti}_3\text{O}_{12}$ Ceramics	382
R.F. Liu, X.A. Mei, M. Chen, C.Q. Huang and J. Liu	
Ferroelectric Properties of Bismuth Titanate Ceramics by $\text{Tb}_2\text{O}_3/\text{V}_2\text{O}_5$ Substitution	386
R.F. Liu, X.A. Mei, M. Chen, C.Q. Huang and J. Liu	
The Effect of La Substitution on the Ferroelectric Properties of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ Ceramics	390
X.B. Liu, X.A. Mei, M. Chen and B. Li	
Effect of $\text{Sc}_2\text{O}_3/\text{V}_2\text{O}_5$ Substitution on the Ferroelectric Properties of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ Ceramics	394
X.B. Liu, X.A. Mei, M. Chen and B. Li	
The Influence of Pulse Width on Microstructure and Mechanical Properties of CrNx Coatings Deposited by HPPMS	398
X.M. Xu, H. Zhang, Y.B. Jin, H.C. Zhao and S.W. Duo	
Influence of HF-SCG Immersion Treatment on Corrosion Resistance of the Ultrasonic Micro-Arc Oxidation Bio-Coating on Pure Magnesium	402
M.Q. Li, J. Liu, J.G. Li, D.S. Cai and Y.H. Zhao	
Ionic Conductivity and Coordination Number of Cations in $\text{Ce}_{1-x}\text{Y}_x\text{O}_{2-x/2}$	406
X.H. Xie, K.Q. Liu, F.R. Yang and Y. Ding	
Advances in Deformation Performance of Concrete with Steel Slag and Scrap Tire Particles	410
Z.Z. Yang, C.L. Liu, K. Sheng and D.P. Chen	
The Effect of n-TiO_2 on Corrosion and Biological Activity of Biocoatings Coated by Ultrasound Micro-Arc Oxidation on Pure Magnesium	418
C. Ma, Y. Gao, L.J. Qu, M.Q. Li, J.L. Yue, Y.Q. Yuan and J.Y. Wang	
Effect of $\text{Gd}_2\text{O}_3/\text{BaF}_2$ Addition on Dielectric Behavior and Energy Storage Properties of Strontium Barium Niobate Glass-Ceramics	422
J. Song, G.H. Chen and Y. Tang	

Fracture Features of Mullite Ceramic Regenerative Material under Thermal Shock Condition	
Q.H. Shang, Y.X. Wang, B. Jiang, D.H. Zhang and T.T. Sun	427
Advances in Hygro-Thermal Deformation of Concrete Material	
K. Sheng, C.L. Liu, Z.Z. Yang and D.P. Chen	431
 Chapter 2: Techniques and Devices for Analysis and Testing of Materials Properties	
 Analyze the Growth Habit of Mullite Nanocomposites by First-Principles Calculations	
W. Wang, N.C. Chen, Q.H. Li, X. Tang and Y. Hu	439
A Proposed Solution to Quantitative Phase Analysis of Mullite	
K. Li, H.J. Li and P. Wu	443
A New Method for Determining Strength and Fracture Toughness of Ceramic Materials in Air at 1500-2000 °C	
D.T. Wan, Y.W. Bao, Y. Tian, Y. Qiu and H. Zhao	447
Creep Behavior of Building Silicone Sealant under Long-Term External Loading and its Time-Stress Equivalence	
X.G. Liu, Y.W. Bao and X.F. Wang	451
Measurement of Residual Stress in Diesel Engine Castings	
K. Liu, C. Zhang, Y.K. Pu, H.L. Hu and Z.A. Wu	455
Influence of Specimen Size on the Impulse Excitation Technique	
C.G. Wei, Y.W. Bao, Z.Q. Liu and D. Wang	459
Tribological Test of Different Ceramics in Different Humidity Conditions	
Y.H. Chen	463
Thermal Performance Analysis of the Vacuum Insulation Structure Panel Based on FLUENT	
L. Jiang, Y.W. Bao and Y.H. Chen	467
Determining the Thermal Shock Elastic Behavior of Mullite Ceramic Regenerator Material by Ultrasonic Testing	
T.T. Sun, Y.X. Wang, H. Yun, D.H. Zhang and Q.H. Shang	472
Input Impedance Adjustment and Property Optimization for Microwave Absorbing Slabs	
Z.Y. Zeng, H. Liu and Y.M. Guo	476
Analysis of the Surface Shape Effect on Optical Homogeneity Measurement of Large Calibre Optical Materials	
Z.F. Shao, Y.N. Jia, L. Wang and L.J. Nie	480
The Method to Test the Homogeneity of Concrete	
L. Liu and W. Yang	485
Design and Application of a Test Device for Concrete Durability under the Action of Multiple Factor Coupling	
W.H. Li, Y.Y. Xu and Y.H. Wang	490
Analysis of Advanced Research Methods of Cement-Based Materials	
Y. Zheng, S.P. Cui, Y.L. Wang, Z.M. Wang and Q.J. Mao	494
Riser Design of Cast System of Fused Zirconia-Alumina-Silica	
D.Y. Yang, M.X. Ma, R.Y. Liu, Y. Chu, Y.M. Yin, L.Y. Li and G.H. Wan	498
Application of Ant Colony Algorithm in Plant Leaves Classification Based on Infrared Spectroscopy Analysis	
M.L. Gao Sun, P. Wu, K. Li and Z.H. Gen	503
Performance Evaluation Method of Self-Consolidating Concrete	
P.F. Huang and Y.W. Bao	507
Sensing Properties of Sub-ppm Level NO₂ Gas Sensor Based on YSZ and WO₃ Sensing Electrode	
X. Sun, G.L. Zhou, C.L. Pan, C. Zhang and T. Feng	512
Microstructures and Properties of Typical Zirconia Tubes for the Determination of Oxygen Content	
P. Wang, G.L. Zhou, C.L. Pan, C. Zhang and H.Q. Nian	516

**Determination of 6 Toxic Elements in Biological Tissues by High Pressure Digestion:
Inductively Coupled Plasma Mass Spectrometry**

Y.R. Chen, H.J. Zou, R.S. Zhang, L.B. Zeng, H.Y. Qu, Y.R. Zhang and Y.S. Chen

520

**The Influences of Lightness Variation of the Non-Color Background on the Color of the
Blood Amber**

Y. Xiao, Y. Guo and D.P. Chen

524