

Table of Contents

Preface

Development and Application of Test Equipment for Torsion Strength of Non-Metal Materials

S. Ge, Y.C. Yin and Z.Q. Liu 1

Relationship between the Ratio of Young's Modulus to Hardness and the Elastic Recovery of Nanoindentation

Z.J. Peng, T. Wen, J.H. Gong, C.B. Wang, Z.Q. Fu and H.Z. Miao 5

Analysis of Load-Displacement Curves of Ceramics Measured with Low-Load Vickers Hardness Test: Indentation Size Effect

B. Xu and J.H. Gong 9

Fracture Behavior of SiC-TiB₂ Composite Measured by Different Test Methods

L. Jiang, Y.H. Chen, B. Chen and W.Z. Sun 14

The Influence of Specimen Grips on the Measurement of Micro-Tensile Bond Strength to Human Dentin

X.Y. Zhao, S.B. Li and X. Gong 18

Influence of Multiple Firing on the Bending Strength of Zirconia/Porcelain Bilayered Dental Ceramics

R.J. Lu, T.T. Ma, Y.F. Yi, L.Q. Shao, J.M. Tian, K.L. Hou, N. Wen and B. Deng 24

Comparison of Fracture Strength and Fracture Modes of Zirconia Dental Ceramics Manufactured by Four Different CAD/CAM Systems

D. Wang, Y.Z. Xu, C.L. Lu, Q.X. Yang, D.S. Zhang, L.Q. Shao and R.R. Wang 30

Fatigue Damage Modes of Bilayered Zirconia and Alumina Dental Composites

L.J. Zhu, Y.H. Liu, H.L. Feng, H.J. Chen, Q.H. Zhang, Y. Qiu and Y.W. Bao 35

Damage Mechanism of Short Carbon Fiber Reinforced SiC-Based Composite

J. Wei, Y.H. Chen and L. Jiang 39

Evaluating Impact Properties of Cement Clinker at Different Angle for Impact Indentation

X.F. Wang, Y.W. Bao, Y. Qiu, X.G. Liu and Y. Tian 43

An Experimental Study of the Nano-Scratch Behavior of Cement Composite Material

J. Xu and W. Yao 47

Microstructure of Interface between Zirconia and Veneer Porcelain

B. Deng, H.C. Liu, Y.F. Yi, L.Q. Shao, K.L. Hou, R.J. Lu, J.M. Tian and N. Wen 55

Effect of Temperature on the Interfacial Bonding Strength between PVB and Glass from RT to -50 °C

Y. Tian, Y.W. Bao, D.T. Wan, X.F. Wang and Z.M. Han 61

Effects of Surface Treatment on the Microstructural and Crystallographic Changes of Dental 3Y-TZP Ceramic

B. Gu, H.C. Liu, Y.F. Yi, L.Q. Shao, R.J. Lu, J.M. Tian, B. Deng and N. Wen 66

Mechanical Properties of Y-TZP Ceramic after Different Surface Treatments

Q. Liu, L.Q. Shao, C. Hu, B. Deng, Y.F. Yi and N. Wen 71

Evaluating Erosion of Engineering Materials Subject to Cavitation in Liquids on a Ultrasonic Vibratory Apparatus

J.S. Han, Y.P. Chen, Z. Li, Z.J. Chen and J.J. Lu 75

Evaluation on Structure and Tribological Properties of Carbon Nitride Films Deposited on YG8 Carbide Alloy Substrates

J. Liu, Z.G. Chen, K. Bi and Y.M. Wang 80

Solid Particle Erosion Behavior of 3YSZ Ceramics at Elevated Temperatures

F.J. Liu, M.H. Fang, X.J. Wang, Y.G. Liu and Z.H. Huang 85

Preparation of MgO-Partially Stabilized Zirconia Nano-Powder by Coprecipitation Pressing

J.F. Xia, C.X. Li, Z. Wang, D.Y. Jiang and Q. Li 89

Method and Equipment for the Measurement of the Uniformity and Cohesiveness of Concrete Mixture

W. Yang, J. Wang and J.L. Wu 93

Microstructure and Properties Evaluation of WTi(C,N)-06 Cemented Carbide with TaC and NbC	97
Y.F. Gao, Z.H. Huang, K. Chen, M.H. Fang and Y.G. Liu	
Investigation of Microstructure and Mechanical Property of the Fe₃Al/Al₂O₃ Composites Fabricated by Mechanical Alloying Process and Hot-Pressing Process	102
T. Jiang and X.P. Shi	
Comparison of the Low Temperature Degradation Properties of Two Y-TZP Ceramics for Dental Applications	107
Y.F. Yi, N. Wen, X.L. Wang, L.Q. Shao and C. Wang	
Microstructure Characteristics of the Black-Glazed Shreds Excavated from the Qingliangsi Kiln	112
Z.W. Liu, Z.G. Zhang, H. Li, W. Wu, J.J. Hua, G.F. Cheng and C.C. Lin	
Relationship between the Conductivity of Supernatant of 3Y-TZP Powder and Sintering Properties of its Ceramics	118
X.B. Wu, D.Z. Sun, D.Y. Jiang, H.F. Xu, D.X. Huang and B. Xu	
Densification Mechanism of the Low Temperature Co-Fired Glass-Ceramic Substrate	122
Q. He and Z.T. Geng	
Lateral Confinement and Ballistic Performance of TiC-TiB₂ Composites	126
Z.M. Zhao, L. Zhang, Y.G. Song and X.G. Huang	
Ballistic Performance of TiC-TiB₂ Composite Armour under the Impact of Long-Rod Tungsten Alloy Projectiles of 1.4 Km·s⁻¹	132
X.G. Huang, Z.M. Zhao, L. Zhang and C. Yin	
Microwave Sintering of SiCp/Al Composite	138
Y.H. Chen, J.J. Ma, W.J. Guo, L. Jiang and P.Y. Yang	
Structure and Characteristics of Spherical-Pore Silicon Carbide	142
Q. Li, Y.J. Zheng, J.F. Xia, D.Y. Jiang, H. Wu and C.L. Wang	
Study on Surface Characterization and Properties of Three Dimensional Nano-Porous Titanium Film	146
Y.M. Ge, C.Y. Ning, G.X. Tan, H.D. Zheng and D. Li	
Preparation of Si-C-N-O Amorphous Films from a Polysilazane by Heat Treatment at High-Temperatures	151
G.L. Hou, Z.J. Peng, Z.Q. Fu, W. Yue and C.B. Wang	
Synergistic Effect of Cr-Doped DLC Coatings and Lubricant Additives	155
J. Sun, W. Zhang, Z.Q. Fu, C.B. Wang, W. Yue, Z.J. Peng, X. Yu, S.S. Lin and M.J. Dai	
Preparation and Characterization of Nano-Films Materials	160
C.X. Li, Q. Lv, J. Song, D.Y. Jiang and Q. Li	
Estimate of Thermodynamic Indirect Measurement on the Electrocaloric Effect	164
K. Ding, Y. Bai, X. Han, W.J. Zhang and L.J. Qiao	
Anisotropic Permittivity Measurement of Layered Inorganic Compounds	168
H.Y. Wu and J. Zhou	
Laboratory Testing of Piezoelectric Bridge Transducers for Asphalt Pavement Energy Harvesting	172
L. Yao, H.D. Zhao, Z.Y. Dong, Y.F. Sun and Y.F. Gao	
Representation Methods for Microwave Absorption Ceramics	176
Z.Y. Zeng, H. Liu and M. Lu	
Test Method and Equipment for Electrically Conducting Property of Ceramic/Carbon Composites	180
K.Q. Liu, S.Z. Wang, Y. Ding and Y.F. Liu	
Assessment on the Electrical Conductivity of Additive Fillers into Carbon Fiber-Cement Based Composites	185
J.J. Qin, W. Yao, J.Q. Zuo and H.Y. Cao	
Preparation and Characterization of Lead-Free Piezoelectric Ceramics	189
Q. Chen, J.X. Li, L.H. Zhang, Y. Bai, Y.J. Su, L.J. Qiao and A.A. Volinsky	
Dielectric and Piezoelectric Properties of Lead Free (1-x-y)Na_{1/2}Bi_{1/2}TiO₃-xBaTiO₃-yBiFeO₃ Piezoelectric Ceramics	194
Y.F. Wang, X.J. Yi, W. Pan, G.Z. Zang and J. Du	
Preparation and Characterization of Lead-Free Na_{0.54}K_{0.42}Li_{0.04}NbO₃ Nano-Powders by Sol-Gel Method	198
G.Z. Gao, Y.G. Liu, Z.H. Huang and M.H. Fang	

Preparation and Characterization of BiFeO₃ Film via Sol-Gel Spin-Coating Process	202
X.W. Qi, X.Y. Zhang, X. Wang, H.B. Sun and J.Q. Qi	
Electrical Characteristics and Microstructures of Dy₂O₃-Doped Bi₄Ti₃O₁₂ Thin Films	206
M. Chen, X.A. Mei, A.H. Cai, J. Liu and C.Q. Huang	
Electrical Characteristics and Microstructures of Eu₂O₃-Doped Bi₄Ti₃O₁₂ Ceramics	210
M. Chen, X.A. Mei, J.G. Liu, J. Liu and C.Q. Huang	
Ferroelectric Properties of Bi_{3.25}Gd_{0.75}Ti_{2.97}V_{0.03}O₁₂	214
C.Q. Huang, M. Chen, X.A. Mei, Y.H. Sun and J. Liu	
Preparation and Characterization of Textured CaBi_{4-x}La_xTi₄O₁₅ Ceramics	218
G.X. Jin, X.B. Wu, L.D. Chen, Y.X. Tang, B.X. Jiang, Y.B. Pan and D.Z. Sun	
Electrical Characterization and Microstructures of Ce-Doped Bi₄Ti₃O₁₂ Thin Films	222
J. Liu, M. Chen, X.A. Mei, Y.H. Sun and C.Q. Huang	
Ferroelectric Properties and Microstructures of Dy₂O₃-Doped Bi₄Ti₃O₁₂ Ceramics	226
J. Liu, M. Chen, X.A. Mei, Y.H. Sun and C.Q. Huang	
Ferroelectric Properties of Bismuth Titanate Ceramics by Eu³⁺/V⁵⁺ Substitution	230
X.A. Mei, M. Chen, R.F. Liu, Y.H. Sun and J. Liu	
Negative Resistance Behavior of Ferroelectric Bismuth Titanate Ceramics at Low Field	234
X.A. Mei, M. Chen, R.F. Liu, Y.H. Sun and J. Liu	
Electrical Behaviors of Bi₂WTi₃O₁₂ Ceramics	238
C.Q. Huang, M. Chen, X.A. Mei, Y.H. Sun and J. Liu	
Measurements of Thermoelectric Behavior and Microstructure of Carbon Nanotubes/Carbon Fiber-Cement Based Composite	242
J.Q. Zuo, W. Yao, J.J. Qin and H.Y. Cao	
Synthesis of ZnO/MWCNT Heterostructure via the Self-Assemble Route and its Property	246
N. Zhang, C. Zhang, H.F. Xu, Y.L. Li and Q. Li	
Grain Growth in (Ga, Mn)-Codoped ZnO Ceramics	250
B. Shen, H. Wang, S. Li and J.H. Gong	
Synthesis, Structure and Properties of Super Fine Zn₂SnO₄	256
J. Song, C.X. Li, D.Y. Jiang, J.F. Xia and Q. Li	
Synthesis and Electromagnetic Properties of Hollow Ceramic Microspheres	260
B.C. Xu, J.J. Wang, R.X. Duan and X.J. Huo	
Preparation and Magnetic Properties of α-MnO₂ Nanoparticles	264
B.L. Zhu, Qiherima, L. Lv and X.J. Wang	
Experimental Study on Magnetic Fluids Viscous Damper	268
Z.L. Zhang, D.C. Li, L.M. Huang, Q. Han and D. Shi	
Analysis and Experimental Study on Magnetic Fluid Seal Mechanism	273
H.N. Zhang and D.C. Li	
Experimental Study of Surface Tension Coefficient for Magnetic Fluid	277
Q.L. Wang, D.C. Li and F. Wang	
Experimental Study of Large Gap Magnetic Fluid Static Sealing	283
F.F. Xing, D.C. Li and X.L. Yang	
Design and Calculation of Magnetic Liquid Seal with Rectangular Pole Teeth	287
X.L. Yang, D.C. Li, W.M. Yang and F.F. Xing	
Characteristics of TiO₂ Nanotube Arrays on Titanium Prepared by Anodization	291
D. Li, C.Y. Ning, G.X. Tan, H.D. Zheng and Y.M. Ge	
Hydrogen Sensing Properties of Dye-Sensitized TiO₂ Nanotube Array	296
L. Huang, Y.H. Ling, Y.Q. Zhuo and F.J. Ren	
Low-Temperature Synthesis and Gas Sensing Properties of Anatase TiO₂ Thin Films	300
F.J. Ren, Y. Sun, L. Huang, Y.H. Ling and J.Y. Feng	
Discharge Relaxation of TiO₂-WO₃ Composite Nanotube Arrays	304
Y.Q. Zhuo, Y.H. Ling and L. Huang	
Effect of Au Doped WO₃ Gas Sensors for NO₂ Detection	308
W.B. Gao, C. Dong, X. Liu, Y.H. Ling and J.L. Sun	
Characterizing and Sintering of BaZrO₃ Doped with TiO₂	312
C. Zhang, N. Zhang, D.Y. Jiang and L.C. Fan	

Fabrication and Photoelectrochemical Properties of CuO/TiO₂ Heterojunction Nanotubes Array Film	316
S.L. Chen, Y.H. Ling and H.J. Fang	
Luminescence Properties of Eu²⁺ Doped β-SiAlON Phosphor	320
L. Li, C. Zhang, D.Y. Jiang, N. Zhang, C.X. Li and Q. Li	
Solvothermal Synthesis and Characterization of Two Iron Complexes	324
Y.W. Hu and Y.M. Ma	
Evaluation of Thermal Performance for Vacuum Glazing by Using Three-Dimensional Finite Element Model	328
Z.M. Han, Y.W. Bao, W.D. Wu, Z.Q. Liu, X.G. Liu and Y. Tian	
Evaluation of Thermal Shock Resistance of Alumina Ceramics	333
K. Li and L.C. Guo	
Thermal Decomposition of Dolomite Containing Phosphorus	337
H.W. Zhang, Q.F. Fang and Y. Guo	
Study of Natural and Synthetic Quartz by Raman Spectra	341
E.D. Zu, S.Q. Li, Y. Zou, X.G. Zhao, Y.D. Sun, Y.F. Lin and H. Li	
Testing and Evaluating Method of Dispersion of Carbon Nanotubes	345
X.Y. Liu, L. Liu, F. Wei and D. Jin	
Measuring the Infinite Optical Thickness of Dentine Porcelain of the IPS E.max	349
L.Q. Shao, L.L. Wang, Q. Liu, B. Deng and N. Wen	
Contrast Ratios and Chromatic Value of IPS E.max LT Framework Materials	354
L.Q. Shao, T. Sun, S.Y. Zhou, B. Deng, Y.F. Yi and N. Wen	
Relative Translucency of IPS E.max LT Core Materials after Veneering and Glazing	358
T. Sun, L.Q. Shao, J. Ai, B. Deng and N. Wen	
Soak Colored Zirconia Ceramics and its Colorimetric Plate	362
L. Zhang, H.X. Lu, L.Q. Shao, Y.F. Yi, B. Deng, J. Liu and N. Wen	
The Correlation between Play-of-Color Effect and SiO₂ Cavities Size of Australian Blue Opal	366
Y. Guo, Z.X. Dai and H.J. Sun	
Influence of Fe²⁺ on the Color Appearance of Yellow-Green Peridot	370
W.X. Tang, Y. Guo and L.X. Ma	
Difference Analysis of Different Standard Illuminants on Yellow-Green to Green Jadeite-Jade	374
H. Wang, Y. Guo and Y. Zhang	
Influence of Light Source and Cathodoluminescence on the Color Parameters of Ruby Red	379
X. Li and Y. Guo	
Measurement and Research of the Transverse Mechanical Properties of High Performance Fibers	384
J.Z. Huang, Q.H. Li, Q. Yang, H.J. Li and W. Ye	
Study on Gemological and Mineralogy Features of Huanglong Jade	388
J. Zhao, E.D. Zu, D. Ye and N.Y. Shen	
Infrared and Visible Spectrum Study on Yellowish Green Peridot from Jinlin	392
L.X. Ma, Y. Guo and W.X. Tang	
Intercalated Modification of Suzhoutu	396
W.L. Zhang, X.F. Zeng, M. Zhang and S.R. Sun	
The Contribution of Co²⁺ to Blue Color of Synthetic Spinel	400
Y. Ma and Y. Guo	
A Study on Color Stones of Clay Minerals — Changhua Stone	404
Y.F. Chen and X.H. Yu	
Reliability Evaluation of Glass Curtain Wall via Vibration Detection	410
X.G. Liu and Y.W. Bao	
Phases Transformation of Boron Mud during Carbothermal Reduction Process	415
X.C. Li, Z.H. Huang, Y.G. Liu and M.H. Fang	
Application of Argon Ion Beam Cross Section Polishing in Material Microstructure Research	419
Y.Z. Wang, W. Wu, Z.W. Liu, Y. Zeng, M.J. Ding and C.G. Zhang	

Effects of Internal Standards and Peak Profile Functions on Quantitative XRD Phase Analysis of Cement and its Hydrates	424
Y.Q. Wei, W. Yao and W. Wang	
FT-IR Study on Early-Age Hydration of Alkali-Activated Slag Cement	429
Y.H. Fang, Z.L. Lu and Z.L. Wang	
Studying Blended Cement Paste with Nuclear Magnetic Resonance Relaxation Time	433
D. Jin, W. Yao and H.Z. Wang	
Evaluation of Water Evaporation in Cementitious Materials by Low Field NMR	437
A.M. She, W. Yao and W.C. Yuan	
Determination of Silicon Content in SiC Ceramics Precursor by Modified Titration	441
L.J. Yang, X. Cheng, Y. Zhang and J. Liu	
Determination of Main Component and Purity of Oxide by Mass Balance of Difference-Determination for ZrO_2+HfO_2	446
J. Zeng and J.P. Xu	
Assessment of Ultrasonic-Ethanol Extraction to Determine the pH Value of Hardened Cement Pastes	451
X.M. Xing and W. Yao	
Accelerated Carbonation Test Equipment of Concrete	455
W. Yang, J. Wang and X.X. Ji	
Data Acquisition and Control System of Hip Joint Simulator Based on LabVIEW and DSP	459
H.Z. Xiang, L. Chen, Y.W. Bao and Y.N. Chang	
Study on the Glassy Phase Composition of 95 Al_2O_3 Ceramics	463
Y.J. Chen, Q. Li and D.Y. Jiang	
Phase Composition, Microstructure and Mechanical Properties of Aluminous Cements Containing Magnesium Aluminate Spinel	467
J.H. Li, L.X. Tong and W.C. Zhou	
Phase Behavior of Silica Brick Used in Carbothermal Reduction	472
Z.H. Pan, Z.H. Huang, W.J. Li, Y.G. Liu and M.H. Fang	
Influence of Temperature on Phase Composition of Nitridation Products from Rutile and Fly Ash	476
H.P. Ji, K. Chen, Z.H. Huang, Y.G. Liu and M.H. Fang	
Effect of Temperature on the Phase Behaviors of Zircon by Carbothermal Reduction-Nitridation	480
L. Yin, Z.H. Huang, Y.G. Xu, Y.T. Li, Y.G. Liu and M.H. Fang	
Microstructure, Mineral Phases and Strength of the Foam Concrete	484
X.G. Yu, S.S. Luo, Y.N. Gao, H. Xiao, D.J. Li, H.C. Xu and F. Li	
True Density Measurement of Refractory by AccyPyc1330 Pycnometer	489
H. Qing and J.J. Zhu	
Purification of Carbon Nanotubes Synthesized by Pyrolysis Flame	493
Z.Y. Ding, B.M. Sun, J.S. Bi and X.L. Ding	
Effects of Feed Shoe Wheel Speed on Tablet Weight Variability	497
L. Chen, L.Z. Chen, X.J. Yang and Y.P. Yu	
Permeability Characteristics of Human Dentin and a Porous Ceramic	501
X.Y. Zhao, Y.P. Li and S.B. Li	
Biological Safety Assessment of a Colored Zirconia Ceramic: Hemolysis and Short-Term Systemic Toxicity Tests	505
H.X. Lu, B. Deng, L.Q. Shao, Y.F. Yi, J. Liu, W.W. Zhang and N. Wen	
Biological Safety Assessment of a Colored Zirconia Ceramic: Cell Toxicity and Skin Sensitivity Tests	509
H.X. Lu, B. Deng, L.Q. Shao, Y.F. Yi, J. Liu, W.W. Zhang and N. Wen	
Minocycline Modification of Gelatin-Hydroxylapatite Composite by Co-Precipitation Method	513
X.P. Zhu, T.Y. Ning, X.H. Xu, W. Liu and Q.L. Li	
The Anti-Erosion Properties of Pyrochlore Simulated Waste Forms	517
P.P. Wu, C. Zhang, H.F. Xu, D.X. Huang, B. Xu and D.Y. Jiang	
Effect of Atomic Oxygen Exposure on Polyhedral Oligomeric Silsesquioxane/Polyimide Hybrid Materials in Low Earth Orbit Environment	521
S.W. Duo, M.M. Song, T.Z. Liu, C.Y. Hu and M.S. Li	

Preparation and Performance Test of Epoxy Modified Silicone Resins	
Z. Wu, L.Y. Shen and L. Zhou	525
Establishment of Energy Efficiency Evaluation System for New Suspension Preheater Cement Enterprise in China	
X.X. Yuan	529
The Analysis of the Function and Principle on Air Cooling PV Double-Glass Window	
W.H. Li and C. Li	539
The Prospective Analysis of Listed Ceramic Companies in China	
R.H. Hua, B. Shen and Y.L. Liu	543
Stress-Sensitive Property of Carbon Fiber Reinforced Cement under Cyclic Load	
X.Y. Liu, X.R. Wang, A.H. Liu, J.Q. Zuo and W. Feng	548
One Monitoring Device for Concrete Early Age Shrinkage	
X.Y. Liu, K.Q. Liu and A.H. Liu	552