

# Table of Contents

## Committees

## Preface

## I. Nanomaterials

### The Intrinsic Frictional Property of Carbon Nanotubes

L.C. Zhang, K. Mylvaganam and K.Q. Xiao 1

### Silver Nanoparticles, Cages and Flowers Growing on Carbon Nanosheets

X.S. Du, G.T. Wang, J. Ma, M.S. Mo and Y.W. Mai 5

### Thermal Properties and Fire Performance of Woven Glass Fibre Reinforced Nylon 6 Nano-Composites with Carbon Nanotubes

S.Z. Shen, S. Bateman, Q. Yuan, M. Dell'Olio, J. Gotama and D.Y. Wu 9

### Detonation Synthesis of TiO<sub>2</sub> Nanoparticles in Gas Phase

X.J. Li, X. Ouyang, H.H. Yan, G.L. Sun and F. Mo 13

### Manufacture, Wet and Dry Corrosion, and Plasma Nitridation of Novel Nanocrystalline Ni-Cr Nanoparticle Nanocomposites: A Brief Review

X. Peng 17

### Reduced Gravity Testing and Research Capabilities at Queensland University of Technology's New 2.0 Second Drop Tower

T. Steinberg 21

### Physical Phenomena of Thermoplastic Articles in the Vicinity of Their Glass Transition Temperatures

S. Kharchenko and J. Huang 25

### The Role of Al<sub>2</sub>O<sub>3</sub> Buffer Layer in the Growth of Aligned CNTs

M.K. Lai, N.M. Mohamed and K.M. Begam 29

### Improved Fabrication of PMMA/Ag Core-Shell Nanostructures with Two Steps

Z.H. Chen, Z. Wu, J.J. Bao, G.Q.M. Lu, Q.Q. Zhang, L.Z. Wang and X.F. Zhu 33

### Simulation on Optical Properties of Gold and Silver Coated Nano Coreshell

X.Y. Chen, Q. Li, Z. Wu and X.F. Zhu 39

### Effect of Iron Content on the Properties of FePt Nanoparticles in Water in Oil Microemulsions

K.M. Hyie and I.I. Yaacob 45

## II. Thin Films and Coatings

### Bovine Serum Albumin Adhesion Force Measurements Using an Atomic Force Microscopy

C.C. Lai, J.M. Bell and N. Motta 49

### Prediction of Defects in PZT Thin Film Using Ab-Initio Method

Z. Zhang, L. Lu, P. Wu and C. Shu 53

### Nonlinear Analysis of a Ball Grid Array Package under Thermal Cycles

R. Bai, H. Jiang and C. Yan 57

### Deposition and Properties Studies of Superfine TiN Films with Magnetic Filter

L. Chen, D.C. Zeng, W.Q. Qiu, X.W. Shi and Z.Y. Liu 61

### Environmental Response of Plasma Sprayed Nanostructured Coatings

Z. Ahmad and M. Ahsan 65

### Residual Thermal Stresses in a Fe<sub>3</sub>Al/Al<sub>2</sub>O<sub>3</sub> Gradient Coating System

J.T. Wang, P. Hodgson, J.D. Zhang and C.H. Yang 71

### Residual Stress Estimation of Tungsten Film by GIXRD

C.C.A. Chen, W.E. Fu and M.K. Chen 75

## III. Metals and Alloys

### Stress Corrosion Cracking of NiTi Orthodontic Wires in Sodium Fluoride Solution

X.J. Li, J.Q. Wang, E.H. Han and W. Ke 79

<b>Analytic Prediction of Structural Stress-Strain Relations of Microstructured Metal</b>	83
C.H. Yang, I. Sabirov, J. Mullins and P. Hodgson	
<b>Experimental Research on Grain Orientation Evolution of Extruded Mg Alloy AZ31B Sheet during Uniaxial Tensile Deformation</b>	87
S.H. Zhang and Z.G. Li	
<b>Bonding of Aluminum Alloy by Hot-Dipping Tin Coating</b>	93
H. Diao, C.Q. Wang and L. Wang	
<b>Micro Impact Testing of Lead Free Solder Joints</b>	99
R. Rajoo, E.H. Kisi and D.J. O'Connor	

## IV. Composite Materials

<b>Evaluating Multi-Delamination of Composite Laminates Using an Active Sensor Network</b>	103
Z.Q. Su, L. Cheng, X.M. Wang, L. Ye and Z.P. Chen	
<b>Optical and Piezoelectric Properties of ZnO Nanowires and Functional Polymer-Based Nanocomposites</b>	107
R. Pyrz	
<b>Tough Hypereutectic High Chromium White Iron – A Double <i>In Situ</i> Fibrous Composite</b>	111
G.L.F. Powell, I.H. Brown and G.D. Nelson	
<b>Microstructural Analysis on Ti-6Al-4V and 10 Vol.% (TiB+TiC)/Ti-6Al-4V Metal Matrix Composites</b>	115
J. Mak, R. Wuhrer, G. Heness, J. Qin, W. Lu, D. Zhang and W.Y. Yeung	
<b>Laminated Plate Elements Based on Higher-Order Shear Deformation Theories</b>	119
Y.X. Zhang and C.H. Yang	
<b>Shape Control in Composite Laminates Using Piezoelectric Actuators considering Thermal Deformation</b>	125
R. Bai, H.R. Chen, Q. Wang and C. Yan	
<b>Effect of Processing Method on Conductivity and Mechanical Properties of Glass Fibre Reinforced Carbon Black Filled Polyethylene</b>	131
Q. Yuan, D.Y. Wu, S. Bateman, S.Z. Shen, C. Gloria-Esparza and K. Xia	
<b>Simulations of Delamination Propagation in Composite Laminates under Static and Low-Velocity Impact Transverse Loads Using a New Cohesive Model</b>	137
N. Hu, Y. Zemba and H. Fukunaga	
<b>Manufacturing and Testing of High Performance Sheet Moulding Compound</b>	141
M. Hou and L. Ye	
<b>Effect of Vibrations on Void Content in Composite Materials</b>	145
J. Muric-Nesic, Z. Stachurski, P. Compston and N. Noble	
<b>High Performance Composites Using Nanotechnology</b>	149
M. Bauer, O. Kahle, S. Landeck, C. Uhlig and R. Wurzel	

## V. Materials Processing and Characterization

<b>A Knowledge-Based System for Temperature Prediction in Hot Strip Mills</b>	153
H.B. Xie, Z.Y. Jiang, D.B. Wei, X. Liu and G.D. Wang	
<b>Surface Roughness and Wear of Work Roll Containing Ti in Cold Strip Rolling</b>	157
H.C. Li, Z.Y. Jiang, A.K. Tie, W.H. Sun, H.J. Li and D.B. Wei	
<b>Rheology of Magnetorheological Shear Thickening Fluids</b>	161
W.H. Li and X.Z. Zhang	
<b>Investigation of Bimodal Particles Based Magnetorheological Elastomers</b>	165
X.Z. Zhang and W.H. Li	
<b>Analysis of Casting Roll Temperature Field during Twin-Roll Thin Strip Casting</b>	169
X.M. Zhang, Z.Y. Jiang, H.J. Li, Z. Fan, X. Liu and G.D. Wang	
<b>The Development of a New Image Acquisition &amp; Analysis System for 3D Surface Measurements Using Confocal Laser Scanning Microscopy</b>	173
Z.X. Peng and S. Tomovich	
<b>Gate Location and its Effects on Product Quality in Injection Moulding</b>	181
H. Haddad, S.H. Masood and A.B.M. Saifullah	
<b>Effect of Surface Texture on Deformation Behavior of Asperity in Cold Metal Forming</b>	185
D.B. Wei, Z.Y. Jiang, C. Lu, Y.D. Tang and A.K. Tie	

## **VI. Biomaterials and Biomechanics**

<b>Effect of Fully Porous-Coated (FPC) Technique on Osseointegration of Dental Implants</b>	189
C. Rungsiyakull, Q. Li, W. Li, R. Appleyard and M. Swain	
<b>Finite Element Analysis of a New Custom Made Orthotropic Post Material for Dental Applications</b>	193
M. Khanal, Y. Zheng and Z.T. Chen	
<b>Finite Element Analysis of Plant Cell Wall Materials</b>	197
H. Kha, S. Tuble, S. Kalyanasundaram and R.E. Williamson	
<b>Numerical Prediction of Influence of Diamond Burs on Subsurface Damage in Intraoral Adjustments of Porcelain Prostheses</b>	203
X.F. Song and L. Yin	
<b>Magnesium and Magnesium Alloys as Degradable Metallic Biomaterials</b>	207
H. Wang, Z.M. Shi and K. Yang	
<b>Modification of Porous Alumina Ceramics with Bioinert and Bioactive Glass Coatings</b>	211
X. Miao	
<b>Novel Synthetic Bio-Mimic Polymers for Cell Delivery</b>	215
Y. Xiao, H. Peng, X. Mao, A.K. Whittaker and R. Crawford	
<b>In Search of a Parameter to Distinguish Viable from Non-Viable Articular Cartilage – Indentation and Ultrasound Studies</b>	223
C.P. Brown, R. Crawford and A. Oloyede	
<b>Evaluation of Dentinal Viscoelastic Properties Based on its Microstructural Characters</b>	229
X. Wang, Y.X. Zhang and Y.H. Cui	
<b>Endothelialisation and Cell Retention on Gelatin Chitosan-Coated Electrospun Polyurethane, Poly (Lactide-Co-Glycolide) and Collagen-Coated Pericardium</b>	233
S. Patel, C. Wong, Y.S. Morsi, X.M. Mo and C. Rui	

## **VII. Computational Materials Science and Simulation**

<b>Simulation of Three-Point Bending Test of Titanium Foam for Biomedical Applications</b>	237
S. Kashef, S.A. Asgari, P. Hodgson and W.Y. Yan	
<b>A Multiscale Deformation Analysis for Mono-Crystalline Copper under Dynamic Uniaxial Tension</b>	241
Y.T. Gu and P.K.D.V. Yarlagadda	
<b>The Design of Functional Gradient Materials with Inverse Homogenization Method</b>	245
S.W. Zhou and Q. Li	
<b>Crystal Plasticity Finite Element Modelling of BCC Deformation Texture in Cold Rolling</b>	251
H.J. Li, J.T. Han, Z.Y. Jiang, H.C. Pi, D.B. Wei and A.K. Tieu	
<b>A Study on the Uniaxial Tension of FCC Metals at Nano Level Using MD</b>	255
B. Mortazavi and A.A. Khatibi	
<b>A Study on the Nanoindentation Behaviour of Single Crystal Silicon Using Hybrid MD-FE Method</b>	259
A.A. Khatibi and B. Mortazavi	
<b>Crack Analysis Using an Improved Meshless Technique with Irregular Nodes</b>	263
W.L. Wang, Y.T. Gu and L.C. Zhang	
<b>A Data-Constrained 3D Model for Material Compositional Microstructures</b>	267
S. Yang, S. Furman and A. Tulloh	
<b>Solidification Microstructure Modelling Using Cellular Automaton Method</b>	271
H. Wang and Q. Li	
<b>Characterization of Virtual Nano-Structures through the Use of Monte Carlo Integration</b>	275
L.F. Herrera, D.D. Do and G.R. Birkett	
<b>Design of Periodic Microstructural Materials by Using Evolutionary Structural Optimization Method</b>	279
S. Patil, S.W. Zhou and Q. Li	
<b>Multiscale Particle-In-Cell Modelling for Advanced High Strength Steels</b>	285
S.A. Asgari, P. Hodgson, V. Lemiale, C. Yang and B.F. Rolfe	
<b>Guided Wave Propagation and Interaction with Damage in Tubular Structures</b>	289
Y. Lu, L. Ye, D. Wang and G. Meng	