

8th Global Conference on Materials Science and Engineering (CMSE2019)

IOP Conference Series: Materials Science and Engineering
Volume 770

Sanya, China
12-15 November 2019

Editor:

Alexander Khotsianovsky

ISBN: 978-1-7138-4708-3
ISSN: 1757-8981

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Preface	
Peer review statement	
Improvement of ternary gypsum-based composite resistance to a humid environment.....	1
<i>D Dobias, P Pokorny, J Kolisko, M Dolezelova</i>	
Group composition analysis of the Shubarkol deposit coal-tar resin fraction	8
<i>N T Smagulova, Zh K Kairbekov, A C Maloletnev, A Zh Kairbekov, D Zhanabaev, A Kanatkyzy</i>	
Microstructure of B ₄ C/TiC/TiB ₂ reinforced surface titanium matrix composite produced by laser cladding	13
<i>C L Hu, R L Sun</i>	
Compressive behavior of rice straw-reinforced concrete for rigid pavements	20
<i>T Ahmed, M U Farooqi, M Ali</i>	
Analysis of rope zone of multi-point multi-layer winding lifting system in ultra-deep mine.....	27
<i>H L Wang, X S Gong, Y Deng, X R Cheng</i>	
Analyzing the contact resistance for the penetration brazing of Cu/Ni metal wires.....	38
<i>Y Z Gao, X F Liu, Z G Feng, P F Tian</i>	
Experimental study of flexural behavior and serviceability of hybrid concrete beams reinforced by steel and G/BFRP bars.....	46
<i>C H Lu, H Li, K Xu, G Y Xuan, W Abdullah</i>	
Crack growth life estimation for No. 17 coupler knuckle in China Datong-Qinhuangdao railway freight trains	54
<i>C Li, S G Sun</i>	
Influence of resin content on mechanical properties of composite laminates	62
<i>K Yang, Y M Yue, W P Zhao, Y Liang, L Mei, J J Xue</i>	
The application of a Morlet wavelets bandpass filter in the fault diagnosis of rolling bearings.....	69
<i>R Wei, T F Ming, W Xu, H Zhao</i>	
Investigation on the microstructural evolution and mechanical properties of semi-solid Al-5Zn-3Mg-2Cu alloy based on recrystallization and partial remelting.....	78
<i>J Q Tao, G Z Zhao, Z W Huang, M Li, Z H Xing</i>	
Experimental research on high-speed dry milling performance of large-area nodular cast iron	86
<i>P Yan, Y B Wang, K J Chen, B X Ma, Y L Xiao, X B Wang</i>	
Intermetallic formation and characterization of Sn-Cu-Mn-Ag lead-free soldering alloys.....	94
<i>D A Padmanaban, D A J Sunderraj, K A V Geethan</i>	
A study of the fracture behavior of ballistic gelatin based on wire-cutting tests.....	100
<i>L Liu, Y R Fan, Q Q Lu</i>	
Graphene-polymer nanocomposites for thermal conductive applications.....	107
<i>X Zhang, J Zheng, Y Q Du, Z W Wang, Y D Wu, G Luo</i>	

Metallurgical modeling of intergranular HAZ liquation cracking during laser welding newly developed crystallography-dependent aerospace materials. Part I: Spontaneous microcrack repair of microstructure development	114
<i>Z G Gao</i>	
Metallurgical modeling of intergranular HAZ liquation cracking during laser welding newly developed crystallography-dependent aerospace materials. Part II: Grain boundary alloying segregation of microstructure modification.....	132
<i>Z G Gao</i>	
Characteristics of Ni/Au/Ni/Au ohmic contact in a p-AlGaN/GaN semiconductor	141
<i>Z F Hu, X Y Li, Y Zhang</i>	
Steric hindrance effects of phenoxyimine nickel catalysts in ethylene/propylene polymerization.....	150
<i>D Xu, L Dai, F Y Li, J X Zhu, J K Chai, Y W Zhang</i>	
Investigating the influence of flowing fluid on the resistance of materials to sulfide stress cracking.....	156
<i>R Rihan, B Al-Wakaa, N Tanoli</i>	
Effect of prestrain on storage life for HTPB coating in solid rocket motor.....	162
<i>Y Q Du, J Zheng, Y Yang, T C Yang, X Tu</i>	
The application of broken expanded polystyrene particles in thermal insulation coating material	168
<i>Y Zhang, S Y Li</i>	
Acceptability analysis for determining the average grain size by ASTM E112 standard.....	178
<i>Geping Bi, Yong Guan, Xiaoyu Chen, Wenhua Tan, Wenniu Huang, Yuqing Gao, Meimei Wang</i>	
Influence of additives on polycarbonate/acrylonitrile-butadiene -styrene blending for fused deposition modeling	187
<i>Y W Chen, Y Yin, L Feng, X Ling, J K He, W W Lai, Y Wang</i>	
The fracture resistance of bi-axially orientated PMMA	195
<i>J Y Zhao, B Blackman, Y Patel, Y Yan</i>	
The effect of cement mortar composition on the pH value	204
<i>P Shafiqh, S Yousuf, J C Lee, Z Ibrahim</i>	
Synthesis and testing of defected g-C ₃ N ₄ with improved photocatalytic activity.....	210
<i>Y Zheng, C H Li, Y Y Cai</i>	
Application of GeTe phase-change films in the directly heated two-port switch design	219
<i>S Qu, J H Zhang, L B Gao, H W Chen, X Li, J M Wang</i>	
Formulation of EPDM heat-resistant V-ribbed belt	226
<i>X Ling, Y L Hu, W W Lai, Y Wang</i>	
Mitigation of uncommon peel-off defects in galvanized steel sheets.....	235
<i>F Fang, W H Zhang, Y M Chen, W Q Zhou</i>	
Cyclic deformation behavior of gradient structured austenitic stainless steels.....	241
<i>W L Zhou, K K Liu, Y Li, H S Ho</i>	
Numerical simulation of force characteristics and contact loss of high-speed railway subgrade.....	247
<i>Y H Wang, H Xiao, Y X Lv, S Lv</i>	

Interfacial reactions and structural properties of explosively welded titanium/copper plates	255
<i>H Paul, R Chulist, M M Miszczyk, G Cios, A Galka, W Skuza, P Petrzak, I Mania</i>	
Preparation of polyimide hollow fiber membrane.....	262
<i>B L Li, Y Zhai, Y Liu, Y B Jiu</i>	
Analysis of factors influencing the steel sheet surface waviness in cold rolling process	269
<i>J Guo, Q G Meng, H X Zuo</i>	
Analysis and mitigation of defective circular structures in HPCVD-grown MgB ₂ thin films.....	277
<i>Y L Li, X D Kong, L Han</i>	
The Taguchi orthogonal analysis of Ti6Al4V titanium alloy chip morphology in micro-milling.....	284
<i>X Zhang, X D Pan, G L Wang</i>	
A raster polishing path-planning method based on the untethered magnetic manipulation polishing.....	291
<i>X Q Zhou, H C Wang, B Q Sun, Y F Wang, X Y Wu</i>	
Design and simulation analysis of an aerospace damper.....	298
<i>Q L Wang, Q X Wang, H J Jiang, Y H Lin, X H Zhou</i>	
Study on pervious recycled aggregate fiber-reinforced concrete for airfield pavement.....	305
<i>J Novak, A Kohoutkova, R Chylik, T Trtik</i>	
The compatibilizer content effect on tensile and flexural properties of PC/ABS blends	312
<i>Z F Zhu, B Chen, J Wen, Q Zhang, S Yuan, L Yin</i>	
Microstructural evolution of Super304H stainless steel during high-temperature creep rupture	319
<i>X Tian, B X Yang, L L Ding, H Xu, Y M Li</i>	
Low-frequency band gaps in Y-type phononic crystals	330
<i>X F Ma, J W Xiang</i>	
Band gaps of a fan-like solid-fluid phononic crystal.....	335
<i>H F Zhai, J W Xiang</i>	
Electrochemical analysis of the inhibition performance of glucobiogen on low-carbon steel in neutral chloride solution	340
<i>R T Loto, M Fajobi, L Oluwole, C A Loto</i>	
Inhibition effect of rosemary oil on mild steel corrosion in a water-based petrochemical drilling fluid	346
<i>R T Loto, A Busari</i>	
Effects of active adsorption on thermodynamic equilibrium of solid-liquid interface	351
<i>L X Cheng, B H Yan, Y Liu</i>	
Design and experimental study of magnetically controlled shape-memory alloy sensor	358
<i>J Lu, Z Y Guo</i>	
Microstructure and mechanical properties of 25MnB and 25CrMnB steels: a comparative study for track shoe applications	366
<i>K Feng, Y S Zhu, X J Ma, G Xu</i>	
Analysis of nuclear radiation damage effect on typical materials	371
<i>S H Sun, X Xie, F Wu</i>	

Investigation of processing factors affecting flexible heating wire by coating polyester yarns with carbon nanotubes	380
<i>Y Xiao, L R Zhang, L X Li</i>	
Influence of lap sequence on the Al/Steel FSKSW weld quality	388
<i>Y H Zhang, Z K Zhang, J H Zheng, Z L Zhao</i>	
Antifungal activity and theoretical study of synthesized pyrazole-imidazole hybrids	395
<i>Dhafer S. Zinad, Ahmed Mahal, Omar A. Shareef</i>	
Application of confocal 3D-MXRF technology to the 3D elemental analysis and surface topography imaging of samples.....	403
<i>Z J Xiang, Z Y Meng, Z G Liu, K Pan, W G Zhao, P Zhou, Y Li</i>	
Study of confocal 3D micro X-ray fluorescence analysis technique based on polycapillary X-ray lens	410
<i>Z Y Meng, Z J Xiang, Z G Liu, Y A Hao, K Pan, P Zhou, X Y Lin</i>	
Effect of Ni and Mo contents on microstructure, magnetic and mechanical properties of Ti(C, N)-based cermets	416
<i>X Y Xu, Y Zheng, G T Zhang, Z K Yang, Z Ke, H Wu, W Zhou</i>	
Preparation and performance of binder jetting porous alumina ceramic	424
<i>S J Huang, C S Ye</i>	
Effect of Mo content on microstructure and mechanical properties of WCoB-TiC based cermets.....	430
<i>Z Ke, Y Zheng, F Sun, G T Zhang, J J Zhang, X Y Xu, H Wu, Z W Dong, W Zhou</i>	
Preparation of biodegradable PLA/PCL composite filaments: effect of PLA content on strength.....	436
<i>H M Qiu, K W Hou, J P Zhou, W J Liu, J B Wen, Q F Gu</i>	
Synthesis and fluorescence properties of ofloxacin rare-earth nanocomplexes.....	442
<i>C F Jin, H X Ren, J Du, Y X Zhao, Y Q Cheng, C G Wang, Z R Zhou, P Lin, C Zhao, Y G Lv</i>	
Stability analysis and numerical simulation of a composite laminated piezoelectric rectangular plate system.....	448
<i>S P Chen</i>	
Synthesis of waterborne polyurethane acrylate-modified epoxy resin	454
<i>Hongbo Liu, Xiaowu Xue, Wuying Zhang, Feng Lin</i>	
Effect of SnO ₂ content on properties and microstructure of Ag/SnO ₂ electric contact materials.....	460
<i>J B Wang, H H Qiu, F Si, Y B You, S T Liu, N H Matsumoto</i>	
Failure analysis of low-carbon steel pipe clamp of pressure pipe	467
<i>L Y Huang, F Zhang, F P Zhong, M Yuan</i>	
Hardening and precipitation of a commercial 6061 Al alloy during natural and artificial ageing.....	474
<i>Y Chen, B Q Lu, H A Zhang</i>	
The effect of graphite type on the growth of dense SiC ceramics prepared by the HTPVT method.....	481
<i>B B Liu, W J Jing, J F Yang</i>	
Ultra-low temperature effect on electron beam welding process	488
<i>Q S Xiao, X Han, Y F Pei</i>	

State-of-the-art applied research on conductive composites	496
<i>C Q Hu, Y M Huang, J S Yang, Q Yu, M Sun</i>	
Pressureless sintering of cordierite ceramics with optimized strength and thermal expansion	503
<i>J W Cao, X M Shi, Y F Jiao, C Zhang, Z P Li, Y Zheng, Y Y Cheng, L H Ren</i>	
Construction and application of a micro-area polarized energy dispersive X-ray fluorescence spectrometer with polycapillary X-ray lens in a conventional laboratory	509
<i>M Zhou, Y D Li, X Y Wang, J Y Duan, H Luo, L Ye, X Y Lin</i>	
Welding residual stress reduction assessment in steel rings via the spectral harmonic vibration aging test	516
<i>X D Liang, G L Shi, G Z Wang, X Z Zhou, B S Shang</i>	
Effect of stress triaxiality on the damage of polyethylene.....	522
<i>L M Han, S F Xue, Y Zhang</i>	
A method of constitutive experiment for accurate description of tube performance under rotary-draw bending	530
<i>Y X Zhu, R Chen, Y Wang, W B Tu, Y L Liu</i>	
The analysis of Fe-B-P valence electron structures by the empirical electron theory	539
<i>Z Q Li, Y Gu, Y H Zhang</i>	
Friction and wear behavior of WC-Ni coatings HVOF sprayed on duplex stainless steel	543
<i>H S Xu, Q Dong</i>	
The quantitative analysis of several metal elements in a solution by the confocal X-ray fluorescence thin-sample approach.....	550
<i>X P Sun, X Y Zhang, Y B Wang, Y F Li, S K Shao, S Q Peng, H Q Li, Z G Liu, T X Sun</i>	
Review of the test methods of the interface characterization of natural fiber-reinforced polymer composites.....	558
<i>Z H Zhu, Y Zhang, N Zhang, M Y Hao, H W Wu</i>	
Corrosion evolution of electric power equipment metal materials under industrial pollution environment with high heat and high humidity.....	563
<i>X Ren, Y Zhong, J Hao, G L Wu, Q Wang</i>	
Ultrathin exfoliated WS ₂ nanosheets in low-boiling-point solvents for high-efficiency hydrogen evolution reaction.....	571
<i>Y Q Qin, Y Q Peng, W F Yang, Y Wang, J W Cui, Y Zhang</i>	
Effect of process temperature on mechanical properties of Ti6Al4V titanium alloy with warm laser shock peening.....	578
<i>X L Pan, L C Zhou, W F He, X S Shi, R K Li, X T Feng, X D Wang</i>	
Wear behavior of TC4 titanium alloy and 2205 stainless steel friction pair in different media	587
<i>C P Wang, X B Wu, Y X Xiao, D W Song, H Z Wang, S H Wang</i>	
Study on microstructure and texture of high-strength plastic cold-rolled dual-phase DP980 steel	592
<i>W W Wang, L Liu, G Y Li</i>	
Erosion behavior and damage evolution of Ti-6Al-4V aero-engine titanium alloy	599
<i>Y Q Li, X D Wang, C B Long, Z P Sun, X L Wei, L C Zhou</i>	

A simulation model and experimental study of X-ray transmission through a polycapillary focusing X-ray lens	607
<i>X Y Wang, H Luo, M Zhou, J Y Duan, Y D Li, X Y Lin</i>	
Tribological behavior of TiAlN-coated TA19 alloy at elevated temperatures	615
<i>Z Ding, Q Miao, W P Liang, Z G Yang, J W Yi, H Lin</i>	
Geometric accuracy of rapid prototyping technologies using laser scanner and coordinate measurement machine	623
<i>A Dardzinska, K Fiedorczuk</i>	
Acoustic emission-based real-time monitoring of fatigue damage evolution of T800 carbon fiber/bismaleimide composites	633
<i>X F Qi, Y Yang, W P Kang, Q Wang, G Zhao</i>	
The microstructure of rapidly quenched TiNiCu ribbons crystallized by isothermal and electropulse treatments	641
<i>N N Sinikov, A V Shelyakov, I A Khabibullina, E A Visotina</i>	
Gold nanoparticle-enhanced amplified spontaneous emission of laser dye molecules in diode-pumped organic solid-state lasers	648
<i>W J Lin, Y L Li, W X Lan, K P Liu, B Wei</i>	
Experimental study and statistical analysis on corroded steel bars	654
<i>Y Chang, L F Zhang, P W Gao, Y L Tian</i>	
Multidisciplinary design optimization analysis of pin fins based on the Monte Carlo simulation	662
<i>Z Y Zhao, W B Hu, J B Wang</i>	
Application of Mount Pinatubo lahar sand as fine aggregate in controlled low-strength materials	671
<i>A R Alzona, K M Matriano, A J Galarosa, A J Malabanan, M S Mortel, R J Somera, M A Taguba, M S Delos Santos, C M Vahdanipour, F D Santos</i>	
Study on microstructure and mechanical properties of as-cast Mg-Zn-Sn-xCu(x=0,0.5,1.0,1.5wt.%) alloys	678
<i>Y H Liu, M L Ma, K Zhang, X G Li, Y J Li, G L Shi, J W Yuan</i>	
Study of dynamical mechanical properties and dislocation dynamics of copper single crystals by discrete dislocation dynamics simulation	684
<i>S L He, W T Jiang, J S Bai, M Y Zhang, H D Fan</i>	
Effect of carbon source on the synthesis of ZrB ₂ -SiC composite powders.....	689
<i>X Q Lian, X H Hua, X G Wang, L R Deng, L Zhang</i>	
Classification algorithms in the material science and engineering data mining techniques	694
<i>A Dardzinska, M Zdrodowska</i>	
Hot deformation behavior and processing map of Mg-12Gd-1MM-0.6Zr magnesium alloy.....	701
<i>B B Li, G L Shi, K Zhang, K K Wang, X G Li, Y J Li, M L Ma, J W Yuan</i>	
Comparative oxidation study of aviation lubrication oil	709
<i>J Ma, Y B Sun, X F Jiang, Y W Fei, S J Ruan, L B Li</i>	
Synchrotron radiation imaging and characterization of creep cracks in 2219 aluminum alloy	714
<i>F M Xu, Q Guo, Y X Xu, W Dong, T T Li, Y N Fu</i>	

Effect of Al content on the microstructure and mechanical properties of Mg-5wt%Sn-xAl as-cast alloys	719
<i>Z Q Sun, Y J Li, K Zhang, X G Li, M L Ma, G L Shi, J W Yuan</i>	
Effect of heat treatment on the electrical conductivity of ZM51 magnesium alloy.....	725
<i>J W Yuan, T Mu, K Zhang, X G Li, K Zhang, Y J Li, M L Ma, G L Shi</i>	
Study on in-situ modification of poly-dopamine on glass fibers and its effect on shrinkage performance of cement materials	733
<i>W G Zhong, M L Xin, D Wang, C C Jiang, L N Zhang, X Cheng</i>	
Determination of focal spot size of high-energy microfocal X-ray source based on HfO ₂ -coated single-bounce ellipsoidal glass monocapillary X-ray condenser	739
<i>Y B Wang, S K Shao, X Y Zhang, Y F Li, X P Sun, Z G Liu, T X Sun</i>	
Process parameters and mechanical properties of SAPH440 steel in pulse arc welding with different heat inputs.....	746
<i>S F Liang, L X Chi, X Z Gao, B L Yan</i>	
Shot peening effect on fatigue life of EN GJS 600-3 grade ductile iron wheel hubs	752
<i>W Arshad, H A Bilal, Z G Sun, W Shi, A Godfrey</i>	
An explicit high-efficiency algorithm for simulating high-cycle fatigue behavior of metals.....	760
<i>S Y Wang, L Zhan, Z H Xu, H F Xi, H Xiao</i>	
An explicit simulation of arbitrarily-shaped pseudo-elastic hysteresis loops in shape-memory alloys.....	765
<i>S Y Wang, L Zhan, Z H Xu, H F Xi, H Xiao</i>	
Explicit and accurate characterization of hardening- softening behavior of metals up to failure.....	771
<i>Z H Xu, S Y Wang, L Zhan, H F Xi, H Xiao</i>	
A unified simulation of low-to-high cycle fatigue failure effects for metals with efficient algorithm	776
<i>L Zhan, S Wang, Z H Xu, H F Xi, H Xiao</i>	
A unified and explicit approach for accurately characterizing the hardening-softening behavior of metals with a tension-compression strength asymmetry	781
<i>H F Xi, L Zhan, S Y Wang, Z H Xu, H Xiao</i>	
The heat treatment effect on the surface characteristics of 9310 steel gear.....	786
<i>S Y Ren, C Q Wang, W Zhang, Y Li</i>	
Simulation analysis of gas-solid separation system for hazardous materials' collection truck	793
<i>S W Zhou, S Yang</i>	
Experimental study on rotary draw bending of magnesium alloy extruded tubes.....	800
<i>P J Zhao, S W Bai, G Fang</i>	

Author Index