

# **4th International Conference on Manufacturing, Material and Metallurgical Engineering (ICMMME 2019)**

IOP Conference Series: Materials Science and Engineering  
Volume 538

Chengdu, China  
22 – 25 March 2019

ISBN: 978-1-5108-8812-8  
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 by Curran Associates, Inc. (2019)

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](mailto: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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# Table of contents

## Volume 538

**ICMMME 2019, The 4th International Conference on Manufacturing, Material and Metallurgical Engineering**

**22–25 March 2019, Chengdu, China**

**Accepted papers received: 17 April 2019**

### **Preface**

[ICMMME 2019, The 4th International Conference on Manufacturing, Material and Metallurgical Engineering](#)

[Committee List](#)

[Peer review statement](#)

### **Papers**

#### **Composite Preparation and Performance Testing**

[Graphene-polymer Composites for Enhancing the Mechanical Properties](#)

Xiao Zhang, Jian Zheng and Zilong Ma.....1

[Research Status and Control Measures of Transverse Cracks for Micro-alloyed Continuous Casting Billet](#)

Qi Li, Jian Wu, Li Bao and Yu Gu.....6

[Design and Finite Element Analysis of Ultrasonic Composite Abrasive Vibration Polishing Equipment](#)

Hongqiang Wan, Peiying Han, Quanli Han, Shuai Ge and Fancong Li.....11

[Effect of Crystal Orientation on Cyclic Plastic Behaviors of Partially Recrystallized Single Crystal Nickel-based Superalloy](#)

D H Wei, W J Zhang, H Y Huang, L P Zhang, R Y Chen, Y W Wu, H J Shi and X F Ma.....17

[Preparation of RGO / Conductive Polymer Nanostructures and Application of Their Supercapacitors](#)

Yu Gu and Qi Li.....25

[Crystal Plasticity Simulation of Hot Deformation Texture of Titanium Alloy Considering Alpha-beta Transformation](#)

D H Wei, W J Zhang, L P Zhang, H Y Huang, R Y Chen, Y W Wu, X F Ma and Z H Xiong.....30

[An Effective Methodology to Design Scale Model for Microwave Transmitting Composites](#)

Liming Yuan, Fei Dai, Yonggang Xu, Dandan Gu, Feiming Wei and Yuan Zhang.....36

[Photo-Electric Response of Polyaniline/ZnO Nanocomposites Based on Inorganic/Organic Heterojunctions](#)

Lei-lei Han, Chao-ying Meng and Shan Fan.....41

[Influence of Sintering Temperature on Microhardness and Tribological Properties of Equi-Atomic Ti-Al- Mo-Si-W Multicomponent Alloy](#)

L. Rudolf. Kanyane, A. Patricia Popoola and Nicholus Malatji.....47

[Polyvinyl fluoride \(PVF\); Its Properties, Applications, and Manufacturing Prospects](#)

M. H. Alaaeddin, S. M. Sapuan, M.Y.M Zuhri, E.S Zainudin and Faris M. AL-Oqla.....53

## **Industrial Materials and Manufacturing Technology**

### [EDM-drilling Characteristics with the Rotation Motion of SS304](#)

Quanli Han, Hongqiang Wan and Dongchen Han.....60

### [Fabrication of Micro-Hole Array on Glass Material by Abrasive Jet Machining](#)

Choung-Lii Chao, Wan-Hsuan Wang, Tian-Ming Chao, Wen-Chen Chou and Kung-Jeng Ma.....66

### [Study of the Hardening in Middle Shaft During Cold Forging](#)

Yuan-Ping Luh, Huang-Li Wang, Jian-Rong Ciou and Jia-Fu Jhang.....74

### [Manufacturing Processes of Sensorial Materials: Sensors Placement and Experimental Validation](#)

S. Mekid and H. Daraghma.....86

### [Aluminium Lined, Carbon Composite Overwrapped Pressure Vessel](#)

Yunusa Mujaheed, Zu Lei, Chen Dan and Tapa Arnauld Robert.....94

### [Development of Hot Stamping Technology for High Strength Steel Parts with Tailored Properties](#)

Li Bao, Qidong Nie, Bo Wang and Xiaoping You.....104

### [Research on High Efficiency and Low Destructive Manufacture Process of Complex Structure Honeycomb Core](#)

Cao Xiang, Wang Yujie, Sun Chao and Shen Xin.....109

### [Corrosion failure analysis of Lightweight Tinplate in Protein Beverage](#)

Fei-fan Xu, Yun-guang Shi, Jan-wei Yang and Song-tao Yan.....116

[A Study on the Surface of RF Magnetron Sputtered CeO<sub>2</sub> Thin Films at Relatively Low Substrate Temperature](#)

Noormariah Muslim, Muhammad Nur Syafi'ie Md Idris, Ying Woan Soon and Nyuk Yoong Voo.....123

**Advanced Manufacturing Processes and Applications**

[The Residual Stress Distribution of Ti-6Al-4V Thin Wall in the Selective Laser Melting](#)

Changpeng Chen, Haihong Zhu, Zhongxu Xiao, Shiwen Liu, Jie Yin and Xiaoyan Zeng.....128

[Effect of Nanosecond Laser Treatment Parameters on Surface Wettability Behaviour of Pure Aluminium](#)

Jian Guo, Xiaolei Ma, Xuekang Si, Zeng Yang and Jingnan Zhao.....134

[Characteristics of RF Magnetron Sputtered VO<sub>2</sub> Thin Films for Potential Applications of Solar Control Coatings](#)

Noormariah Muslim, Ying Woan Soon and Nyuk Yoong Voo.....140

[The Effect of Annealing on Microstructure and Mechanical Properties of Selective Laser Melting AlSi10Mg](#)

Changchun Zhang, Haihong Zhu, Yang Qi and Xiaoyan Zeng.....145

[The Influence of Laser Parameters on the Coloring Effect and Microstructure of Stainless Steel Surface](#)

Xiaolei Ma, Jian Guo, Xuekang Si and Jingnan Zhao.....150

[Very High Cycle Fatigue Behaviour of the 316L Weldment Fabricated By Laser Butt-Welding](#)

Z H Xiong, X F Ma and X Y Qi.....155

[Different Methods of Introduction Gold NPs into Perovskite Solar Cells with Their Efficiencies](#)

Mouna Mohamed Abdoul-latif, Jia Xu, Jianxi Yao, Songyuan Dai and Mohamed Osman Awaleh.....163

[Numerical Simulation Analysis of Surfacing Temperature Field of Pulling-straightening Roller](#)

Jie Luyang, Chen Hua and Wang Liyan.....169

**Industrial Modeling and Simulation Research**

[Study on Aerodynamic Characteristics of Super High Speed Elevator](#)

Zhe Yang, Qing Zhang and Ruijun Zhang.....174

[The Development of Mode for Solubility of Oxygen in High Pressure Condition](#)

Yaqin Guo, Duoqiang Liang and Yong Deng.....181

[Sensitivity Analysis of Piston Wind in Hoistway of Super High-Speed Elevator](#)

Shuai Qiao, Ruijun Zhang and Luzhong Zhang.....186

[Cutting Simulation Analysis of the Cutter Head of the Shield Machine](#)

Jingnan Zhao, Xuekang Si, Jian Guo, Xiaolei Ma, Yuzhao Chen, Zichao Li and Yinghuai Dong.....193

[Robust Control of High-Speed Elevator Transverse Vibration Based on LMI Optimization](#)

Shunxin Cao, Qin He and Ruijun Zhang.....198

[Modeling Automation of Space Payload Experimental Cabinet Based on Secondary Development of Hypermesh](#)

Sinian Huang and Anping Wang.....206

[Study on Transverse Vibration Characteristics of High-Speed Elevator under Gas-Solid Coupling](#)

Jie Liu, Ruijun Zhang and Qing Zhang.....214

**Intelligent Industrial Design and Application**

[Simulation and Optimization of Temperature Field in Large-Sized MOCVD Reactor by Resistance Heating](#)

Lili Zhao, Zhiming Li, Runqiu Guo, Lansheng Feng, Ligen Lu and Xiaoqian Fu.....221

[Modeling and Analysis of Transverse Vibration of Traction Rope of High Speed Traction Elevator](#)

Xiujuan Qi, Ruijun Zhang and Qin He.....226

[The Finite Element Analysis of the Boom of 20-ton Backhoe Hydraulic Excavator Based on ANSYS](#)

Chao-ying Meng, Shan Fan and Lei-lei Han.....233

[Study on Atomization Characteristics of Nozzles in Wet Electrostatic Precipitator](#)

Lichun Xiao, Xin Wang, Yongpeng Wei, Meng Zhang and Yuchuan Wang.....239

[Measurement of Gas Temperature and Concentration Based on TDLAS](#)

Zijun Chang, Qingming Liu and Yang Shen.....245



[Optimization Techniques and Multi-Objective Analysis in Hybrid Solar-Wind Power Systems for Grid-Connected Supply](#)

M. H. Alaaeddin, A. Zakaria, J.M. Jani and N. Seyajah.....253

[Correlation Based Parametric Design Method of Lifting Device in Nylon Coated Conveyor Line](#)

Ma Ning, Yang Bo and Shang Junzhi.....259

[Development of a Robotic Structural Steel Cutting System](#)

Xijun Zhao and Yunchan Chung.....265

[Design, Modeling and Analysis of a XY Nanopositioning Stage for High Speed Scanning](#)

Shenglong Lin, Xianmin Zhang and Benliang Zhu.....271

[Design of the Curtain Wall Cleaning Robot](#)

Shan Fan, Lei-lei Han and Chao-ying Meng.....280

[Design and Analysis of A Multifunctional Wheelchair](#)

Jin Rui and Qiang Gao.....286

[Unitized Association Design Based on Structural Feature Analysis](#)

Shang Junzhi, Yang Bo and Ma Ning.....291

[Effect of Antioxidant on Storage Performance and Life Prediction of HTPB Propellant](#)

Du Yongqiang, Zheng Jian, Zhi Jianzhuang and Tu Xin.....297

## **Aerospace Dynamics and Safety Engineering**

### [Aerodynamic Performance of Dragonfly Forewing–Hindwing Interaction in Gliding Flight](#)

Yun Luo, Guoyi He, Huixiang Liu, Qi Wang and Hang Song.....303

### [Reliability Analysis of Certain Rocket Engine Based on Fault Tree](#)

Wensheng Wang, Liying Jin, Xi Sun and Jing Liu.....310

### [Correlation Analysis between Gross Parameters and Performance Parameters of the Light Aircraft](#)

Fujia Liu, Qunfang Li and Hao Geng.....316

### [Numerical Simulation of Deflagration to Detonation Transition in High-Energy Propellant](#)

Zhuo-qun Wang, Li-qiong Wang and Fei Zhen.....326

### [Numerical Study on Tone Noise of Different Thickness Airfoils](#)

Feng Huanhuan, Liu Yong, Wang Qi and Zou Sen.....334

### [Reduction of Trailing-Edge Noise by Means of Brush-Serrated Coupling Bionic Structure](#)

Yong Wang, Yu Zhao, Hao Tian, Kun Zhao and Yu-Bao Song.....343

### [Research on Vulnerability and Damage Assessment of Tactical Ballistic Missile](#)

Hongping Gu, Chun Cheng, Aixi Sun, Xiaoyun Lei, Yijian Shi and Fenghua Huang.....349

### [Self-breathing Technology for Spacecraft Packaging Container Gas Drying Method](#)

Yahong Zhu, Xiaohuan Li, Shaohua Meng and Chengli Zhang.....356

[CFD Simulation of Cavitation Bubble Collapse near a Rectangular Groove Wall](#)

Yan Yu, Changguo Sun, Yazhe Liu, Yang Liu and Dongsheng Xia.....361

[Particle Concentration Distribution Control Based on Shear Rate Gradient and Marangoni Convection in Microchannel](#)

Jinxin Shen, Xiangjun Zhang, Hao Zhong, Wenjun Cheng and Yong li.....368

[Using Regularized Softmax Regression in the GNSS/INS Integrated Navigation System with Nonholonomic Constraints](#)

Linlin Zhao and Haiyang Quan.....373

**Aerospace Planning and Design**

[Study on Assessment Method of Satellite Damaged by Space Debris](#)

Hongping Gu, Yijian Shi, Chun Cheng, Quan Wang, Jie Fu, Hongxia Sui and Tongkun Xu.....382

[Base on PBN's General Aviation Airspace Planning Research](#)

Jing Mu.....388

[Joint Optimization of Level of Repair Analysis and Civil Aircraft Inventory System Based on PSO Algorithm](#)

Yuchang Liu, Yunwen Feng, Xiaofeng Xue and Cheng Lu.....392

[Fatigue Analysis of Suspension Control Arm Based on Road Spectrum](#)

Kang Yuan-chun.....404

[Optimization of A Novel Retractable Suspension Structure](#)

Kun Yin, Zhongkai Chen, Ye Sun, Xiaodong Liang and Erkang Li.....410

[The Design of A Motorcycle Featuring Fully Independent Adjustability for Front Suspension and Steering Geometry](#)

Marco Gadola, Daniel Chindamo, Federico Vitale and Emanuele Bonera.....418

**Vehicle Structure and Control Engineering**

[Thermal Analysis and Simulation of Cryopump Based on CFD Method](#)

Yueshuai Zhao, Lichen Sun, Wei Sun and Rongping Shao.....433

[Double Fuzzy Logical Control in Hybrid Power Supply Electric Vehicle](#)

Meng-Qiang Wu, Hao Guo, Zi-Qiang Xu, Yun-Long Yang, Zhi-Mei Yuan, Chao-Qun Xiao and Jian Liu.....441

[Sliding Mode Control Algorithm for Regenerative Braking of an Electric Bus with a Pneumatic Anti-lock Braking System](#)

Yiming Zhao, Junzhi Zhang, Chao Li and Chengkun He.....447

[Method for Determining Accurate Initial Air Pressure Range of Air Suspension Airbag Based on Vehicle Ride Comfort Simulation Analysis](#)

Quan Zhou, Puguang Yuan, Tim Tudor, Xudong Wang, Zhangwei Guo, Yihui Huang, Jingfeng Sun and Boyun Wang.....457

[A Road-Holding Index Based on Ride Dynamics for High-Downforce Racing Cars](#)

Felipe Marchesin, Roberto Spinola Barbosa, Marco Gadola and Daniel Chindamo.....474

[Effects of Riblet Shape of Non-smooth Surface on Aerodynamic Characteristics of Vehicle](#)

Liu Rong and Wu Yiwan.....490

[Dynamic Characteristics Analysis of Cutterhead System with Uncertain Loads](#)

Bao Youneng, Huo Junzhou and Xu zhaohui.....496