

# **5th Global Conference on Materials Science and Engineering (CMSE 2016)**

IOP Conference Series: Materials Science and Engineering  
Volume 164

Taichung City, Taiwan  
8 – 11 November 2016

**Editor:**

**Anete Ashton**

ISBN: 978-1-5108-3562-7  
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.**

Copyright© (2016) by the Institute of Physics  
All rights reserved. The material featured in this book is subject to  
IOP copyright protection, unless otherwise indicated.

Printed by Curran Associates, Inc. (2017)

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 164

**5th Global Conference on Materials Science and Engineering  
8–11 November 2016, Tunghai University, Taiwan**

**Accepted papers received: 15 December 2016  
Published online: 23 January 2017**

### **Preface**

011001

OPEN ACCESS

[5th Global Conference on Materials Science and Engineering](#)

011002

OPEN ACCESS

[Peer review statement](#)

### **Papers**

012001

OPEN ACCESS

[Numerical simulation and experimental research of the integrated high-power LED radiator](#)

J H Xiang, C L Zhang, Z J Gan, C Zhou, C G Chen and S Chen.....1

012002

OPEN ACC

[Effects of groove type on airflow speed and pressure during rotor spinning process](#)

R H Yang, C Liu, Y Xue and W D Gao.....8

012003

OPEN ACCESS

[Experimental study on the influence of wire diameter on the internal flow behaviour of woven metal screens](#)

Y B Peng, G Q Xu, X Luo, H W Li and Y P Liu.....16

012004

OPEN ACCESS

[Advances in the numerical investigation of the immersion quenching process](#)

D S Zhang, R Kopun, N Kosir and W Edelbauer.....24

012005

OPEN ACCESS

[Influence of carbonation and freeze-thaw on macro-properties of concrete](#)

M J Rao, Y Dong, H Q Yang, M X Li and Z Yu.....37

012006

OPEN ACCESS

[A study of the conversion of ultrasonic energy and their transducers](#)

Q L Li and J Wu.....46

012007

OPEN ACCESS

[Mechanical properties of gutta-percha sulfide modified asphalt](#)

X Y Zou, X Y Gu and X W Wang.....51

012008

OPEN ACCESS

[Precision machining of advanced materials with waterjets](#)

H T Liu.....58

012009

OPEN ACCESS

[A numerical analysis on forming limits during spiral and concentric single point incremental forming](#)

M L Gipiela, V Amauri, C Nikhare and P V P Marcondes.....74

012010

OPEN ACCESS

[Determination of an acoustic reflection coefficient at the inlet of a model gas turbine combustor for power generation](#)

W J Song and D J Cha.....87

012011

OPEN ACCESS

[Research on fracture performance of epoxy asphalt concrete based on double-K fracture criterion](#)

M Zhang, Z D Qian and Y C Xue.....94

012012

OPEN ACCESS

[Research on steel bridge deck pavement mechanical response of Urumqi express way](#)

M Zhang, Z D Qian, Y C Xue and Q B Huang.....101

012013

OPEN ACCESS

[Synthesis of a stable magnetite \(magnetic fluid\) colloid solution](#)

S I Evdokimov and V S Evdokimov.....108

012014

OPEN ACCESS

[Research on construction technology for orthotropic steel deck pavement of Haihe River Chunyi Bridge](#)

Y C Xue, Z D Qian and M Zhang.....116

012015

OPEN ACCESS

[Numerical simulation of leakage rates of labyrinth seal in reciprocating compressor](#)

H N Tang, H Yao, S J Wang, X S Meng, H T Qiao and J H Qiao.....124

012016

OPEN ACCESS

[Gas metal arc welding in refurbishment of cobalt base superalloys](#)

M S Shahriary, Y Miladi Gorji and A M Kolagar.....132

012017

OPEN ACCESS

[An investigation on the behaviour and stiffness of reinforced concrete slabs subjected to torsion](#)

M C T Nguyen and P T Pham.....140

012018

OPEN ACCESS

[The characteristic analysis of the solar energy photovoltaic power generation system](#)

B Liu, K Li, D D Niu, Y A Jin and Y Liu.....148

012019

OPEN ACCESS

[Economic and safety analysis of unconventional peak regulation on power unit of peak shifting start-stop](#)

X Cao, J F Zhao, X Q Duan and Y A Jin.....154

012020

OPEN ACCESS

[Study on formation of JPC under large standoff distance condition](#)

Y J Wang, W B Li, X M Wang, W B Li and Y M Li.....158

012021

OPEN ACCESS

[Simulation study on combustion of biomass](#)

M L Zhao, X Liu, J W Cheng, Y Liu and Y A Jin.....165

012022

OPEN ACCESS

[Low temperature performance prediction model of GAC-20 modified asphalt mixture](#)

Z H Sun, H Y Cheng, G Q Zhu and J Ma.....171

012023

OPEN ACCESS

[3D printing technology as innovative tool for math and geometry teaching applications](#)

M Huleihil.....177

012024

OPEN ACCESS

[The influence of phase transformation hardening on continuous laser processing of notches for fracture splitting of a C70S6 connecting rod](#)

S Q Kou, Y Gao and Z Shi.....184

012025

OPEN ACCESS

[Measurement research for pitting potential of aluminium alloy with chromate passivation layers](#)

Z H Su, Y Dai, Q Y Ma, J N Wang and C Q Zheng.....192

012026

OPEN ACCESS

[A moderate method for preparation DMSA coated Fe<sub>3</sub>O<sub>4</sub> nanoparticles](#)

L N Song, N Gu and Y Zhang.....197

012027

OPEN ACCESS

[The toughening mechanism of rubber particles in polypropylene composite](#)

L Shi and J M Xiao.....203

012028

OPEN ACCESS

[Effect of different filtration materials on oil and water separation efficiency](#)

D Zhang, W X Wu and L Zhang.....211

012029

OPEN ACCESS

[Stripping of titanium from TBP-decanol phase](#)

X H Mao.....215