

# **17th IUMRS International Conference in Asia (IUMRS-ICA 2016)**

IOP Conference Series: Materials Science and Engineering  
Volume 182

Qingdao, China  
20 – 24 October 2016

**Editor:**

**Yafang Han**

ISBN: 978-1-5108-3770-6  
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 182

**17th IUMRS International Conference in Asia (IUMRS-ICA 2016)  
20–24 October 2016, Qingdao, China**

**Accepted papers received: 28 February 2017  
Published online: 10 March 2017**

### **Preface**

011001  
OPEN ACCESS  
[17th IUMRS International Conference in Asia \(IUMRS-ICA 2016\)](#)

011002  
OPEN ACCESS  
[Peer review statement](#)

### **Energy and Environmental Materials**

012001  
OPEN ACCESS  
[Effect of fluorine doped TiO<sub>2</sub> on the property of perovskite solar cell](#)

X Q Zhang, Y P Wu, Y Huang, Z H Zhou and S Shen.....1

012002  
OPEN ACCESS  
[Preparation of silicon target material by adding Al-B master alloy in directional solidification](#)

Pengting Li, Kai Wang, Shiqiang Ren, Dachuan Jiang and Yi Tan.....5

012003

OPEN ACCESS

[Effect of Co and Pr doping on the properties of solar-reflective ZnFe<sub>2</sub>O<sub>4</sub> dark pigment](#)

M Suwan, N Sangwong and S Supothina.....11

012004

OPEN ACCESS

[Improved electric energy production of solar cell using small silver nanoparticles](#)

X Y Wang, H F Li, S Shi and J L Wang.....18

012005

OPEN ACCESS

[The microstructure, mechanical and electrical properties of Niobium pentoxide-doped Titanium oxide ceramic targets](#)

Qi Ling, TingTing Xu, LianZi Wu, Wei Peng, ZuoXiang Zhu, ShengHui Xie, HaiPeng Yang, JiHua Gao, Ling Gao and HaiTao Yang.....24

012006

OPEN ACCESS

[Dealloying-driven synthesis and characterization of AgCl/Ag/TiO<sub>2</sub> nanocomposites with enhanced photocatalytic properties](#)

Tongyang Wang, Yan Wang, Zhengfeng Zhao, Lanxiang Zhang and Shifeng Huang.....31

012007

OPEN ACCESS

[Enhanced solar photocurrent of LaTaON<sub>2</sub> photoanodes via electrochemical treatment](#)

Huiting Huang and Zhaosheng Li.....42

012008

OPEN ACCESS

[New Sn-Cu/C composite anode materials with high cyclic stability for Lithium ion battery](#)

Zhaowen Huang, Wenping Xiao, Benqin Tang, Shejun Hu and Qiang Ru.....51

012009

OPEN ACCESS

[Thermal performance enhancement of erythritol/carbon foam composites via surface modification of carbon foam](#)

Junfeng Li, Wu Lu, Zhengping Luo and Yibing Zeng.....58

012010

OPEN ACCESS

[Preparation and thermal characterization of oxalic acid dihydrate/bentonite composite as shape-stabilized phase change materials for thermal energy storage](#)

Lipeng Han, Shaolei Xie, Jinhe Sun and Yongzhong Jia.....64

012011

OPEN ACCESS

[Aluminum alloy anode materials for Li-ion batteries](#)

Z H Sun, Z F Chen, Q W Fu and X Y Jiang.....71

012012

OPEN ACCESS

[Superstructure and physical properties of skutterudite-related phase  \$\text{CoGe}\_{1.5}\text{Se}\_{1.5}\$](#)

Y Liang, B Fang, X M Zhu and M M Liang.....76

012013

OPEN ACCESS

[Activated porous carbon wrapped sulfur sub-microparticles as cathode materials for lithium sulfur batteries](#)

Y Wang, Y L Yan, B Ren, R Yang, W Zhang and Y H Xu.....83

012014

OPEN ACCESS

[Plasma assisted fabrication of multi-layer graphene/nickel hybrid film as enhanced micro-supercapacitor electrodes](#)

Q Ding, W L Li, W L Zhao, J Y Wang, Y P Xing, X Li, T Xue, W Qi, K L Zhang, Z C Yang and J S Zhao.....90

012015

OPEN ACCESS

[Microencapsulation of phase change materials with carbon nanotubes reinforced shell for enhancement of thermal conductivity](#)

Weiwei Cui, Yongpeng Xia, Huanzhi Zhang, Fen Xu, Yongjin Zou, Cuili Xiang, Hailiang Chu, Shujun Qiu and Lixian Sun.....99

012016

OPEN ACCESS

[A damage mechanics based method for fatigue life prediction of the metal graded materials](#)

Yang Tong, Weiping Hu and Qingchun Meng.....109

012017

OPEN ACCESS

[Effect of citric acid dosage and sintered temperature on the composition, morphology and electrochemical properties of lithium vanadium oxide prepared by a sol-gel method](#)

C R Zhong, X J Su, G L Hou, Z H Liu, F S Yu, S Bi and H Li.....118

012018

OPEN ACCESS

[Influence of Mn contents in 0Cr18Ni10Ti thin wall stainless steel tube on TIG girth weld quality](#)

Bo Liu.....123

012019

OPEN ACCESS

[Microstructure and corrosion behavior of a Zr-Sn-Nb-Fe-Cu-O alloy fabricated by  \$\alpha+\beta\$  quenching processing](#)

Liangyu Chen, Lina Zhang, Linjiang Chai, Wenlong Yang, Liqiang Wang and Weijie lu.....129

012020

OPEN ACCESS

[Effect of microstructure and alloying elements distribution on welding quality of Zircaloy-4](#)

Pengbo Ji, Yanhua Du, Chunxia Chi and Hongbo Wang.....137

012021

OPEN ACCESS

[Influence of Mo content on the  \$\gamma\$ -phase stability and properties of U-Mo alloy](#)

Xuwei Zhang, Zhiyuan Yang, Ying Meng, Shidong Kang and Jinming He.....148

## **Functional Materials**

012022

OPEN ACCESS

[Welded-Ag-nanowires/FTO conducting film with high transmittance and its application in transparent supercapacitors](#)

Zhensong Qiao, Xiaopeng Yang, Feng Liu, Guangbin Duan and Bingqiang Cao.....157

012023

OPEN ACCESS

[Tribological performances of multilayer-MoS<sub>2</sub> nanoparticles in water-based lubricating fluid](#)

B M Zhang and J L Sun.....165

012024

OPEN ACCESS

[Size-dependent photoluminescent property of hybrid nanoparticles consisted with YVO<sub>4</sub>:Eu<sup>3+</sup> and gold](#)

W Zhang, Y L Yan, F Q Guo, L S Zhong, J Wang, Y Wang and Y H Xu.....173

012025

OPEN ACCESS

[Tribological properties and lubricating mechanism of SiO<sub>2</sub> nanoparticles in water-based fluid](#)

Y Y Bao, J L Sun and L H Kong.....179

012026

OPEN ACCESS

[Synthesis of core-shell structured magnetic nanoparticles with a carbide shell](#)

Shushan Hou, Yue Chi and Zhankui Zhao.....187

012027

OPEN ACCESS

[Getting graphite nano-sheets with different sizes by choosing parent graphite: ultrasonication assisted preparation](#)

Chunyu Wang, Haiping Liu, Chunlin Qin and Sifu Bi.....192

012028

OPEN ACCESS

[New practical method of homogeneous dispersion of multi-walled carbon nanotubes \(MWCNTs\) into Mg matrix composites](#)

Teng Zhang, Shuangming Du, Wanchang Sun, Jumei Zhang, Libin Niu and Xiaohu Hua.....198

012029

OPEN ACCESS

[Influence of chemical admixtures on the dispersion of carbon nanotubes in water and cement pastes](#)

Hui Liu, Suping Cui, Jiachen Wang and Jianfeng Wang.....205

012030

OPEN ACCESS

[Effect of oxygen plasma etching on graphene's mechanical and electrical properties](#)

Pengfei Jia, Fengming Pan and Tianhang Chen.....213

012031

OPEN ACCESS

[Study on voids of epoxy matrix composites sandwich structure parts](#)

Simin He, Youyi Wen, Wenjun Yu, Hong Liu, Cheng Yue and Jing Bao.....220



012032

OPEN ACCESS

[Synergy effects of Cu and Sn on pitting corrosion resistance of ultra-purified medium chromium ferritic stainless steel](#)

XiangJun Zhang and ZhenYu Liu.....228

012033

OPEN ACCESS

[Synthesis and performances of polycarboxylate superplasticizer with clay-inerting and high slump retention capability](#)

Shanshan Qian, Haidong Jiang, Bei Ding, Yi Wang, Chunyang Zheng and Zhaolai Guo.....233

012034

OPEN ACCESS

[Mechanism and preparation of liquid alkali-free liquid setting accelerator for shotcrete](#)

Ying Qiu, Bei Ding, Jiezhong Gan, Zhaolai Guo, Chunyang Zheng and Haidong Jiang.....245

012035

OPEN ACCESS

[Determination of dynamic mechanical properties of silica aerogel by resonance and non-resonance method](#)

Z P Qu and M P Sheng.....255

012036

OPEN ACCESS

[Synthesis, characterization and mechanism of polycarboxylate superplasticizer with slump retention capability](#)

Mengting Li, Yi Wang, Haidong Jiang, Chunyang Zheng and Zhaolai Guo.....260

012037

OPEN ACCESS

[Laboratory test method for dirt pickup resistance and stain removal](#)

Shiwei Ren, Xueying Zheng, Yi Liu and Quan Jiang.....268

012038

OPEN ACCESS

[Synthesis of geopolymer composites from a mixture of ferronickel slag and fly ash](#)

Yun Liu, Kang Zhang, Enjuan Feng, Hongyi Zhao and Futian Liu.....276

012039

OPEN ACCESS

[Preparation and characterization of nano bismuth titanate powders with high reflectivity in near-infrared waveband](#)

Y H Jia, Y B Wu, Y Huang, Z H Zhou and S Shen.....282

012040

OPEN ACCESS

[Effects of glass fiber modified with calcium silicate hydrate \(C-S-H\(I\)\) reinforced cement](#)

M Xin, L Zhang, S Ge and X Cheng.....287

012041

OPEN ACCESS

[Ice melting properties of steel slag asphalt concrete with microwave heating](#)

Bin Li, Yihan Sun, Quantao Liu, Hao Fang, Shaopeng Wu, Jin Tang and Qunshan Ye.....292

012042

OPEN ACCESS

[Ice melting properties of steel fiber modified asphalt mixtures with induction heating](#)

Hao Fang, Yihan Sun, Quantao Liu, Bin Li, Shaopeng Wu and Jin Tang.....299

012043

OPEN ACCESS

[Influence of silica-based hybrid material on the gas permeability of hardened cement paste](#)

R Li, P Hou, N Xie, Z Zhou and X Cheng.....305

012044

OPEN ACCESS

[Freezing resistance of high iron phosphoaluminate cement](#)

S X Zhang, L C Lu, S D Wang, P Q Zhao and C C Gong.....309

012045

OPEN ACCESS

[A novel kind of concrete superplasticizer based on aryl isocyanate polycondensates](#)

Bei Ding, Shanshan Qian, Ying Qiu, Yi Wang, Chunyang Zheng and Gaoming Wang.....314

012046

OPEN ACCESS

[Effects of TEA, HCl hardening accelerator on the workability of cement-based materials](#)

Wenhao Pan, Zhaoyang Ding and Yanwen Chen.....320

## **Biological Materials**

012047

OPEN ACCESS

[Luminescent properties of tetracyanoethylene combined with triphenylphosphine oxide](#)

Lv Yuguang, Song Shanshan, Guo Qiang, Yu Liansheng, Yang Libin, Song Di, Qin Yushan and Wang Bo.....326

012048

OPEN ACCESS

[Effect of Mn on microstructure and corrosion properties of extruded Mg-1%Zn alloy](#)

Z M Zhang, Y Ma, Z Z Xi, C J Xu and Z L Lv.....331

012049

OPEN ACCESS

[Mechanical and corrosion properties of biodegradable Mg-1.5Mn-1Ca-xSr alloys](#)

X Sun, S Y Sun, Y H Ning and Y T Ning.....340

012050

OPEN ACCESS

[Characteristics of MAO coating obtained on ZK60 Mg alloy under two and three steps voltage-increasing modes in dual electrolyte](#)

Jun Yang, Ze-Xin Wang, Sheng Lu, Wei-gang Lv, Xi-zhi Jiang and Lei Sun.....351

012051

OPEN ACCESS

[Microstructure evolution and mechanical properties of biomedical Mg-Zn-Gd alloy wires](#)

Gan Chunlei, Li Xiaohui, Nong Deng, Zhang Xiang, Zheng Kaihong and Huang Zhenghua.....359

012052

OPEN ACCESS

[Effects of crystallinity and surface modification of calcium phosphate nanoparticles on the loading and release of tetracycline hydro-chloride](#)

Huaizhi Zhang, Dong Yan, Sriyani Menike Korale Gedara, Sajith Sudeepa Fernando Dingiri Marakkalage, Jothirathna Gamage Kasun Methlal, YingChao Han and HongLian Dai.....365

012053

OPEN ACCESS

[Microstructure and mechanical properties of the as-cast Mg-Zn-Mn-Ca alloys](#)

Junjian Fu, Ke Liu, Wenbo Du, Zhaohui Wang, Shubo Li and Xian Du.....373

012054

OPEN ACCESS

[Influence of solid-solution treatment on microstructure, mechanical property and corrosion behavior of biodegradable Mg-Zn-Ca alloy](#)

Xuan Nam Ly, S Yang and Y Qin.....378