

4th International Conference on Competitive Materials and Technological Processes 2016 (IC-CMTP4)

IOP Conference Series: Materials Science and Engineering
Volume 175

Miskolc, Hungary
3 - 7 October 2016

ISBN: 978-1-5108-3677-8
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.

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

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

Volume 175

4th International Conference on Competitive Materials and Technology Processes (IC-CMTP4)

3 March to 7 October 2016, Miskolc, Hungary

Accepted papers received: 3 February 2017

Published online: 15 February 2017

Preface

011001

OPEN ACCESS

[4th International Conference on Competitive Materials and Technology Processes \(IC-CMTP4\)](#)

011002

OPEN ACCESS

[Peer review statement](#)

Plenary and Keynotes

012001

OPEN ACCESS

[Rheological principles of development hetero-modulus and hetero-viscous complex materials with extreme dynamic strength](#)

L A Gömze and L N Gömze.....1

012002

OPEN ACCESS

[Scientific basis for creation of construction materials based on titanium and alumina minerals](#)

O Kotova, A Shmakova and A Ponaryadov.....13

012003

OPEN ACCESS

[Engineering estimation of time-dependent deformation characteristics as bending moment relaxation and released unfolding motion of creased paperboard](#)

Sh Nagasawa.....19

012004

OPEN ACCESS

[Topological Insulators: Electronic Band Structure and Spectroscopy](#)

S Palaz, H Koc, A M Mamedov and E Ozbay.....28

012005

OPEN ACCESS

[Whole blood of mammalian species in the oscillating shear field: influence of erythrocyte aggregation](#)

U Windberger, Ch Pöschl, S Peters, J Huber and R van den Hoven.....35

Advanced Materials for Bio- and Medical Applications

012006

OPEN ACCESS

[Piezoresistive Carbon-based Hybrid Sensor for Body-Mounted Biomedical Applications](#)

M Melnykowycz, M Tschudin and F Clemens.....42

012007

OPEN ACCESS

[Analysis of structure and dynamics of superfine polyhydroxybutyrate fibers for targeted drug delivery](#)

A Olkhov, E Kucherenko, P Pantyukhov, A Zykova, S Karpova and A Iordanskii.....48

012008

OPEN ACCESS

[Fibrous materials on polyhydroxybutyrate and ferric iron \(III\)-based porphyrins basis: physical-chemical and antibacterial properties](#)

A Olkhov, A Lobanov, O Staroverova, P Tyubaeva, A Zykova, P Pantyukhov, A Popov and A Iordanskii.....52

012009

OPEN ACCESS

[Surface treatment and corrosion behaviour of austenitic stainless steel biomaterial](#)

M Oravcová, P Palček, V Zatkalíková, T Tański and M Król.....56

012010

OPEN ACCESS

[Development and application of nano-and monocrystalline materials for medical miniatures X-ray tubes](#)

A A Pavlov, M L Taubin, D A Chesnokov and A A Yaskolko.....62

012011

OPEN ACCESS

[Silver metal nanoparticles study for biomedical and green house applications](#)

E Rauwel, L Simón-Gracia, M Guha, P Rauwel, S Kuunal and D Wragg.....68

012012

OPEN ACCESS

[The facts that the physical-chemical properties of modern tablets distinguish them from natural food lumps](#)

A Urakov, N Urakova, A Reshetnikov, M Kopylov, A Kasatkin, D Baymurzin and R Gabdrafikov.....73

Advanced Materials for Extreme Applications

012013

OPEN ACCESS

[Development ceramic composites based on Al₂O₃, SiO₂ and IG-017 additive](#)

E Kurovics, A Shmakova, B Kanev and L A Gömze.....78

012014

OPEN ACCESS

[Band Structure and Optical Properties of Kesterite Type Compounds: first principle calculations](#)

S Palaz, H Unver, G Ugur, A M Mamedov and E Ozbay.....84

012015

OPEN ACCESS

[Crystal chemical characteristics and physical properties of ferrous minerals as the basis for the formation of functional materials](#)

A Shmakova, B Kanev, A L Gömze and O Kotova.....90

012016

OPEN ACCESS

[Change of fine gold properties for industrial application](#)

S Sitkevich, L A Gömze and T Mayorova.....94

012017

OPEN ACCESS

[Damascus steel ledeburite class](#)

D A Sukhanov, L B Arkhangelsky and N V Plotnikova.....98

012018

OPEN ACCESS

[On the synthesis atmosphere influence in the technology of complex composite materials in the wide temperature range](#)

A A Uspensky, S Yavshits, V Lipin, P Zhigalov and A Slobodov.....105

Advanced Nanomaterials with Predesigned Properties

012019

OPEN ACCESS

[The corrosion resistance of zinc coatings in the presence of boron-doped detonation nanodiamonds \(DND\)](#)

G K Burkat, G S Alexandrova, V Yu Dolmatov, E D Osmanova, V Myllymäki and A Vehanen.....112

012020

OPEN ACCESS

[Characterization of Ta-B-C nanostructured hard coatings](#)

J Buršík, V Buršíková, P Souček, L Zábranský and P Vašina.....119

012021

OPEN ACCESS

[Relief, magnetic structure and microwave properties of composite films](#)

L N Kotov, V S Vlasov, V A Ustyugov, V K Turkov, M Yu Dianov, Yu E Kalinin, A V Sitnikov and E A Golubev.....123

012022

OPEN ACCESS

[Pulsed Nd:YAG deposition of nanostructured FeS_{1-x} containing meta-stable phases](#)

T Křenek, S Karatodorov, R Medlín, V Mihailov and J Savková.....130

012023

OPEN ACCESS

[A hybrid surface modification method on copper wire braids for enhancing thermal performance of ultra-thin heat pipes](#)

W K Sheng, H T Lin, C H Wu, L S Kuo and P H Chen.....134

012024

OPEN ACCESS

[Thermodynamic physico-chemical modelling and calculation for the synthesis process of modern functional materials](#)

A B Uspensky, R Ralys, D Kremnev, M Radin and A Slobodov.....139

Biomaterials Derived Ceramics and Composites

012025

OPEN ACCESS

[Porous Ceramic Composite ZrO₂\(MgO\)-MgO for Osteoimplantology](#)

A S Buyakov and S N Kulkov.....145

012026

OPEN ACCESS

[Annealing and structural properties of composite films](#)

L N Kotov, V A Ustyugov, V S Vlasov, V K Turkov, M Yu Dianov, I V Antonets, Yu E Kalinin, A V Sitnikov and E A Golubev.....149

Hetero-Modulus and Hybrid Materials

012027

OPEN ACCESS

[Interesting behavior of polymers containing multiwall carbon nanotubes](#)

A Adamne Major.....155

012028

OPEN ACCESS

[Combined Mechanical and Electrical Study of Polymers of Biological Origin](#)

G Zsoldos, K Szoda and K Marossy.....161

Materials with Extreme Dynamic Strength

012029

OPEN ACCESS

[Numerical simulation of mechanical behaviour and prediction of effective properties of metal matrix composites with consideration for structural evolution under shock wave loading](#)

V V Karakulov, I Yu Smolin and S N Kulkov.....168

012030

OPEN ACCESS

[Thermodynamic parameters of mixtures with allowance for phase transition components under shock-wave loading](#)

S A Kinelovskii and K K Maevskii.....172

Membranes and Catalysts

012031

OPEN ACCESS

[Effect of composition and calcination temperature of ceria-zirconia-alumina mixed oxides on catalytic performances of ethanol conversion](#)

S G Chuklina, S A Maslenkova, A I Pylinina, L I Podzorova and A A Ilyicheva.....178

012032

OPEN ACCESS

[High capacity MnO_x:ZrO₂ sorbent for elementary mercury capture: preparation, characterization and comparison to other sorbents](#)

J Lakatos and C E Snape.....182

Minerals for Environmental and Medical Application

012033

OPEN ACCESS

[Influence of mechanical activation on the properties of natural zeolites from Tokaj Mountain](#)

A Y Buzimov, S N Kulkov, E Kurovics, W Eckl and S Pappert.....189

Nanomaterials for Environment and Health

012034

OPEN ACCESS

[Synthesis and crystallization of titanium dioxide in supercritical carbon dioxide \(scCO₂\)](#)

A Kaleva, S Heinonen, J-P Nikkanen and E Levänen.....194

Novel Synthesis and Processing Technology

012035

OPEN ACCESS

[Influence of binding composition on the structure and properties of steel work-pieces obtained by injection moulding](#)

E A Darenskaia, O Yu Vaulina, Yu V Myachin and S N Kulkov.....200

012036

OPEN ACCESS

[The composite reinforcement production in digital manufacturing: experimental validation of the heat transfer and cure modeling results](#)

I Kazakov, A Krasnovskii and A Kutin.....204

012037

OPEN ACCESS

[Research of products of high temperature synthesis flowing in the rotation conditions](#)

G Ksandopulo, A Baideldinova, Y Riabikin, L Mukhina, E Ponomareva and N Vasilieva.....210

012038

OPEN ACCESS

[Influence of mechanical activation of steel powder on its properties](#)

O Yu Vaulina, E A Darenskaia, Y V Myachin, I E Vasilyeva and S N Kulkov.....215

Phase Diagram as a Tool of Materials Science

012039

OPEN ACCESS

[Transport Properties of Aliovalent Substitution Solid Solutions of the System \$\(1-x\)\text{PbF}_{2-x}\text{YF}_3\text{-SnF}_2\$](#)

Y V Pogorenko, R M Pshenychnyi, V I Lutsyk and A O Omel'chuk.....219

Processing, Properties and Applications of Ceramics

012040

OPEN ACCESS

[Micro-mechanical modelling of mechanical and electrical properties in homogeneous piezoelectric ceramic by using boundary integral formulations](#)

M Biglar, F Stachowicz, T Trzepiecinski and M Gromada.....225

012041

OPEN ACCESS

[Evolution of AC conductivity of wet illitic clay during drying](#)

Š Csáki, I Štubňa, V Trnovcová, J Ondruška, L Vozár and P Dobroň.....229

012042

OPEN ACCESS

[Structured ZnO films: Effect of copper nitrate addition to precursor solution on topography, band gap energy and photocatalytic activity](#)

S Heinonen, J-P Nikkanen, A Kaleva, L Hyvärinen and E Levänen.....236

012043

OPEN ACCESS

[Preparation for Spherical particles of Praseodymium doped Perovskite Red Phosphor by Hydrothermal Reaction](#)

T Kosaka, A Matsuda, M Mizunuma and Y Tanaka.....241

012044

OPEN ACCESS

[Ceramic-like open-celled geopolymer foam as a porous substrate for water treatment catalyst](#)

T Kovářík, T Křenek, M Pola, D Rieger, J Kadlec and P Franče.....245

012045

OPEN ACCESS

[Properties of oxide-hydroxide sintered ceramics](#)

R V Levkov and S N Kulkov.....249

012046

OPEN ACCESS

[Optimization of activator solution and heat treatment of ground lignite type fly ash geopolymers](#)

Z Molnár, R Szabó, Á Rácz, J Lakatos, Á Debreczeni and G Mucsi.....253

Testing and Characterization of Materials - Methods, Equipment and Errors

012047

OPEN ACCESS

[Investigation of thermal properties of raw materials of asphalt mixtures](#)

R Géber, A Simon and I Kocserha.....261

012048

OPEN ACCESS

[Plastic deformation effect of the corrosion resistance in case of austenitic stainless steel](#)

F Haraszti and T Kovacs.....268

012049

OPEN ACCESS

[Researches of mechanical behaviour of the bone micro volumes and porous ceramics under uniaxial compression](#)

T V Kolmakova, S P Buyakova and S N Kulkov.....272

012050

OPEN ACCESS

[Alloying of steel and graphite by hydrogen in nuclear reactor](#)

E Krasikov.....277

Mechanical Properties and Processing Technology of Advanced Materials

012051

OPEN ACCESS

[Connection between diffusion coefficient and thermal conductivity of a metal matrix composite](#)

M A Anisimova, A G Knyazeva and I Sevostianov.....281

012052

OPEN ACCESS

[The influence of metakaolin substitution by slag in alkali-activated inorganic binders for civil engineering](#)

J Kadlec, D Rieger, T Kovářik, P Novotný, P Franče and M Pola.....285

012053

OPEN ACCESS

[The Influence of Surface Roughness on Biocompatibility and Fatigue Life of Titanium Based Alloys](#)

S Major, P Cyrus and M Hubálovská.....289

012054

OPEN ACCESS

[Mechanical properties of non-woven glass fiber geopolymer composites](#)

D Rieger, J Kadlec, M Pola, T Kovářik and P Franče.....293

012055

OPEN ACCESS

[Influence of Sintering Time on the Structure Formation of Al-ZrW₂O₈ Pseudo Alloys](#)

V S Shadrin and S N Kulkov.....298

012056

OPEN ACCESS

[Polycarbonate melt shear viscosity in wide range shear rate](#)

G Toth, A Bata and K Belina.....302

The 1st International Symposium on Intelligent and Smart Materials

012057

OPEN ACCESS

[Micromagnetic investigation of low-symmetry 3D particles](#)

T Blachowicz and A Ehrmann.....308

012058

OPEN ACCESS

[Development and characterization of textile batteries](#)

M Normann, T Grethe, A Schwarz-Pfeiffer and A Ehrmann.....313

012059

OPEN ACCESS

[Metamaterial Absorber Based Multifunctional Sensor Application](#)

Z Ozer, A M Mamedov and E Ozbay.....317

The 2nd International Symposium on Innovative Construction Materials

012060

OPEN ACCESS

[Evaluation of the shrinkage and creep of medium strength self compacting concrete](#)

C J De La Cruz, G Ramos and W A Hurtado.....321

012061

OPEN ACCESS

[Development of spraying agent for reducing drying shrinkage of mortar](#)

Hiromi Fujiwara, Masanori Maruoka and Lingling Liu.....332

012062

OPEN ACCESS

[Numerical methods for estimating \$J\$ integral in models with regular rectangular meshes](#)

B Kozłowiec.....338

012063

OPEN ACCESS

[Application of carbon FRP for fatigue strengthening of old steel structures](#)

J Vůjtěch, P Ryjáček and M Vovesný.....345

The 2nd International Symposium on Innovative Carbon and Carbon Based Materials

012064

OPEN ACCESS

[Investigations on new carbon-based nanohybrids combining carbon nanotubes, HfO₂ and ZnO nanoparticles](#)

P Rauwel, A Galeckas, M Salumaa, A Aasna, F Ducroquet and E Rauwel.....351

012065

OPEN ACCESS

[Preparation of SiC–MgAl₂O₄–Y₃Al₅O₁₂-MWCNTs nanocomposites by spark plasma sintering](#)

E V Zharikov, V V Kapustin, P P Faikov, N A Popova, A A Barmin, A V Ivanov and R N Rizakhanov.....356