

# **12th International Scientific Conference on Functional Materials and Nanotechnologies (FM&NT 2018)**

IOP Conference Series: Materials Science and Engineering  
Volume 503

Riga, Latvia  
2 – 5 October 2018

ISBN: 978-1-5108-8487-8  
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 503

**Functional Materials and Nanotechnologies (FM&NT 2018)**  
**2–5 October 2018, Riga, Latvia**

**Accepted papers received: 28 February 2019**  
**Published online: 25 March 2019**

### **Preface**

[Functional Materials and Nanotechnologies \(FM&NT 2018\)](#)

[Functional Materials and Nanotechnologies \(FM&NT 2018\)](#)

[Peer review statement](#)

### **Papers**

[Negative thermal expansion of ScF<sub>3</sub>: first principles vs empirical molecular dynamics](#)

Dmitry Bocharov, Yuri Rafalskij, Matthias Krack, Mara Putnina and Alexei Kuzmin.....1

[First principles evaluation on photocatalytic suitability of 2H structured and \[0001\] oriented WS<sub>2</sub> nanosheets and nanotubes](#)

Y F Zhukovskii, S Piskunov and R A Evarestov.....5

[Role of impurities in the formation of point defects in Ti-Al alloys](#)

A V Bakulin, A A Fuks and S E Kulkova.....12

[Influence of fluorine and oxygen atom adsorption on electronic structure of InSb\(111\) surface](#)

A A Fuks, A V Bakulin and S E Kulkova.....16

[Impedance spectroscopy of water splitting reactions on nanostructured metal-based catalysts](#)

G A Niklasson, Z Qiu, I Bayrak Pehlivan and T Edvinsson.....20

[TiO<sub>2</sub> thin films by ultrasonic spray pyrolysis](#)

Z Chen, I Dündar, I Oja Acik and A Mere.....26

[Deuterium concentration's in austenitic stainless steel by deuterium irradiation. Effects temperature irradiation](#)

Oleksandr Morozov, Volodymyr Zhurba, Oleksandr Mats, Viktoria Progoiaeva, Viktoriia Seliukova and Nikolay Kochnev.....33

[Preparation of ZnO modified TiO<sub>2</sub> nanoporous coatings and their photocatalytic properties](#)

R Drunka, J Grabis, A Letlena, Dz Jankovica, A Krumina and I Steins.....37

[Electro-catalytic and photo-catalytic reformation of CO<sub>2</sub>—reactions and efficiencies processes \(Review\)](#)

A Knoks, P Lesnicenoks, J Kleperis, L Grinberga, J Hodakovska, J Klavins, G Cikvaidze and I Lukosevics.....42

[Carbon nanotubes vs graphene nanoplatelets for 3D-printable composites](#)

G. Gorokhov, D. Bychanok, D. Meisak, I. Shlyk, A. Liubimau, P. Angelova, C. Menseidov, E. Ivanov, R. Kotsilkova, M. Casa, P. Ciambelli and P. Kuzhir.....52

[Wood-based nitrogen doped activated carbon for fuel cells](#)

A Plavniece, G Dobele, A Volperts, A Zhurinsh and I Kruusenbergs.....58

[Electric field induced permittivity increase of carbon particle aggregates/silicone oil suspension](#)

K Ozols, S Scegoleva and M Knite.....62

[Synthesis and studying of reduced few-layered graphene coatings in gas sensor applications](#)

Ingars Lukosevics, Peteris Lesnicenoks and Janis Kleperis.....66

[Specific features of magnetic domain structure in epitaxial magneto-optical ferrite-garnet films](#)

A I Ivanova, E M Semenova and M K Virchenko.....71

[Determination of the electron effective mass for \*n\*-type germanium by the low-frequency impedance dispersion](#)

O Malyshkina, E Barabanova, K Boitsova, V Klyuev and I Kaplunov.....75

[Optical properties of zinc-iridium oxide thin films](#)

V Skvortsova, M Zubkins, R Kalendarev, H Arslan and J Purans.....79

[Electronic processes in doped ZnO nanopowders](#)

Larisa Grigorjeva, Aleksejs Zolotarjovs, Ivita Bite, Jurgis Grube and Donats Millers.....83

[Pressure-induced structural changes in  \$\alpha\$ -MoO<sub>3</sub> probed by X-ray absorption spectroscopy](#)

Inga Jonane, Andris Anspoks, Lucie Nataf, Francois Baudalet, Tetsuo Irifune and Alexei Kuzmin.....87

[Nanoporous characterization of modified humidity-sensitive MgO-Al<sub>2</sub>O<sub>3</sub> ceramics by positron annihilation lifetime spectroscopy method](#)

H Klym, A Ingram, I Hadzaman, I Karbovnyk, I Vasylchyshyn and A I Popov.....91

[Structural investigation of crystallized Ge-Ga-Se chalcogenide glasses](#)

H Klym, O Shpotyuk, I Karbovnyk, L Calvez and A I Popov.....97

[Luminescence characteristics of magnesium aluminate spinel crystals of different stoichiometry](#)

G Prieditis, E Feldbach, I Kudryavtseva, A I Popov, E Shablonin and A Lushchik.....103

[Float zone single crystals for testing rods, pulled under electron beam heating](#)

Anatoly Kravtsov, Kirils Surovovs and Jānis Virbulis.....110

[Influences of sputtering process factors on wear resistance of TiN coated on a machine component](#)

Charnnarong Saikaew.....115

[Features of nanostructure and functional properties formation in Ti-Ni shape memory alloys subjected to quasi-continuous equal channel angular pressing](#)

I Yu Khmelevskaya, R D Karelin, S D Prokoshkin, M G Isaenkova, Yu A Perlovich, V A Fesenko, V S Komarov and M M Zaripova.....122

[Analysis of the conditions of deformation's formation in lead selenide nanolayers](#)

A M Pashaev, O I Davarashvili, M I Erukashvili, Z G Akhvlediani, L P Bychkova, R G Gulyaev, M A Dzagania and V P Zlomanov.....129

[Optimization of the enzyme power source for a nano drug delivery system fuelled by glucose in blood plasma](#)

S Naidoo, L Thage, Q Ying, S Vallie and G Vaivars.....136

[Mass recovery of carbonated fabrics of glass fibres after isothermal heating](#)

E Pentjuss, J Balodis, M Vdovicenko, J Gabrusenoks, G Bajars, L Petersone and J Kleperis.....142

[Characterization of thermoelectric and thermogravimetric properties of conductive PEDOT:PSS films blended with SWCNTs and PVA](#)

G Vugule, J Bitenieks, J Zicans, R Merijs-Meri, T Ivanova, D Erts and K Buks.....147

Model colloids to study surface – ligand interactions in nanosized Fe<sub>3</sub>O<sub>4</sub>

M M Maiorov, D Zablotsky, E Blums and A Krumina.....151

Different approaches in sulfonated poly (ether ether ketone) conductivity measurements

D Fedorenko and G Vaivars.....155

Nafion® and polyaniline composite modification with Li and Mg ions

Stanislavs Lozkins, Julija Hodakovska, Janis Kleperis and Remo Merijs-Meri.....160