# 20th International School on Condensed Matter Physics 2018

# Physics and Applications of Advanced and Multifunctional Materials

Journal of Physics: Conference Series Volume 1186

Varna, Bulgaria 3 – 6 September 2018

ISBN: 978-1-5108-8497-7

ISSN: 1742-6588

# 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 with permission 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

## 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 1186**

20th International School on Condensed Matter Physics

3-6 September 2018, Varna, Bulgaria

Accepted papers received: 8 February 2019

Published online: 3 April 2019

## **Preface**

20th International School on Condensed Matter Physics

20th International School on Condensed Matter Physics

Peer review statement

# **Papers**

**Invited Lectures** 

Theoretically choosing multifunctional materials

V Celebonovic and M G Nikolic....1

Ferrimagnetism in a system of two antiferromagnetically coupled Heisenberg models

H Chamati and D V Shopova.....11

## **Oral Presentations**

Surface photovoltage study of GalnNAs layers for photovoltaic applications

V Donchev, S Georgiev, A Aho and M Guina....22

<u>Inter-granular effects at high magnetic fields of cuprate and iron chalcogenide</u> superconducting materials

K Buchkov, M Valkovski, D Gajda, K Nenkov and E Nazarova.....28

Impact of substrate temperature on surface and grain boundary reflection in thin chromium nanofilms

L Udachan, L Shiva, N Ayachit, A Banagar, S Kolkundi and S Bhairamadagi.....35

A study on nucleation, growth and grain boundary reflection in thin tin nanofilms

L Shiva, N Ayachit, L Udachan, A Banagar, S Kolkundi and S Bhairamadagi.....43

<u>Langmuir-Blodgett Films from Fluorescently Labelled Phospholipids Deposited on Surface Acoustic Wave Devices</u>

George R Ivanov and Ivan Avramov.....54

On Measuring the Characteristic Length of the Cooperative Molecular Dynamics in the Glass-Forming Liquids

Hristo Solunov.....60

#### **Poster Presentations**

<u>Dose-dependent genotoxicity of ammonia-modified graphene oxide particles in lung</u> cancer cells

K Hristova-Panusheva, M Keremidarska-Markova, T Andreeva, G Speranza, D Wang, M Georgieva, G Miloshev and N Krasteva.....66

Model-independent X-ray reflectometry analysis of phospholipid thin films on liquid substrates

Yu Volkov, A Tikhonov, V Asadchikov, B Roshchin, V Honkimäki and M Blanco.....75

Calix[4]amin	e Langmuir-E	<b>Blodgett thin</b>	film	sensing	properties	against	volatile	organic
compounds					•			

S Şen, R Çapan, Z Özbek, M E Özel, G A Stanciu and F Davis.....80

Two interesting scaffolds derived from pyrazolo[3,4-b]quinolines: synthesis and applications

K S Danel, G Lewińska, Z Usatenko, T Lemek and A Wisła-Świder.....86

Electret and Dielectric Properties of Lyophilized Polymer Films

Ivan Bodurov, Asya Viraneva and Temenuzhka Yovcheva.....92

<u>Phase diagrams of Heisenberg chains with different cell spins: role of the tree-site exchange interactions</u>

Nedko Ivanov and Jürgen Schnack.....98

Entropy and specific heat of a critical quantum system with long-range interaction

Ekaterina S Pisanova.....103

Interaction of solitons with a qubit in an anisotropic Heisenberg spin chain

S K Varbey, R S Kamburova and M T Primatarowa.....109

Soliton-impurity interaction in two coupled ferromagnetic chains

R S Kamburova, M T Primatarowa and S K Varbev.....115

A different optical composition for a broadband linear polarization rotator

Hristina Hristova, Stefano Ognyanski, Andon Rangelov and Emiliya Dimova.....121

Comparative analysis of red wines on the base of optical and chemical characteristics by statistical methods

St Minkova, M Milev, Kr Nikolova, Ir Ivanova, N Hristova-Avakumuva, V Hadjimitova, M Kakalova and V Vladev.....126

Polymer (PEO)-liquid crystal (LC E8) composites: The effect from the LC inclusion

G B Hadjichristov, Y G Marinov, A G Petrov, H K Koduru and N Scaramuzza.....132

Energy spectra of a spin-1/2 XY spin molecule interacting with a single mode field cavity

H Tonchev, A A Donkov and H Chamati.....139

Investigation of resistive switching in SiO<sub>2</sub> layers with Si nanocrystals

E Manolov, J Paz-Delgadillo, V Dzhurkov, N Nedev, D Nesheva, M Curiel-Alvarez and B Valdez-Salas.....144

Room temperature sensitivity of ZnSe nanolayers to ethanol vapours

V Dzhurkov, Z Levi, D Nesheva and T Hristova-Vasileva.....150

Zeolites from fly ash embedded in a thin niobium oxide matrix for optical and sensing applications

K Lazarova, S Boycheva, M Vasileva, D Zgureva, B Georgieva and T Babeva.....156

Leakage currents in Al<sub>2</sub>O<sub>3</sub>/HfO<sub>2</sub> multilayer high-k stacks and their modification by postdeposition annealing steps

D Spassov, A Paskaleva, T A Krajewski, E Guziewicz and Tz Ivanov.....162

<u>In-depth evolution of tellurium films deposited by Frequency Assisted Thermal</u> Evaporation in Vacuum (FATEV)

T Hristova-Vasileva, I Bineva, R Todorov, A Dinescu and C Romanitan.....169

S	pin –	coating	of	SnO <sub>2</sub>	thin	films

M Ganchev, A Katerski, S Stankova, J S Eensalu, P Terziyska, R Gergova, G Popkirov and P Vitanov.....175

Experimental investigations on ultrashort laser ablation for micro and nanomachining of materials

Katarzyna Garasz, Marek Kocik and Todor Petrov.....182

Femtosecond-laser-assisted LIPSS generation on chitosan/hydroxyapatite thin layers for biomedical applications

I Bliznakova, A Daskalova, A Zhelyazkova, L Angelova, A Trifonov and I Buchvarov.....188

Crosslinked Chitosan/Casein Polyelectrolyte Multilayers for Drug Delivery

T Yovcheva, B Pilicheva, A Marinova, A Viraneva, I Bodurov, G Exner, S Sotirov, I Vlaeva, Y Uzunova and M Marudova.....194

Optical, electro-optical, electrical and dielectric characterization of nematic liquid crystal (E7) layers doped with graphene nanoparticles for electro-optics

Y G Marinov, G B Hadjichristov, P M Rafailov, S H Lin, V M Marinova and A G Petrov.....200

Impedance and dielectric spectroscopy study of graphene-doped liquid crystal E7

G B Hadjichristov, T E Vlakhov and Y G Marinov.....206

Development of low-cost technology to obtain carbon based supercapacitors

N Tyutyundziev, M Petrov, K Lovchinov, H Nichev, H Angelov and P Petrov.....212

Graphene/Polyaniline flexible supercapacitors using non-metalic electrodes

N Tyutyundzhiev, K Lovchinov, M Petrov and Hr Nichev.....216

<u>Carrier transport in methylammonium lead iodide perovskite single crystals studied by dark current, steady state and transient photocurrent measurements</u>

S Reynolds, A R Houghton and D J Keeble.....222