

# **International Scientific and Practical Conference “Materials Science, Mechanical Engineering and Energy: Problems and Prospects for Development” (MSEE’2019)**

IOP Conference Series: Materials Science and Engineering  
Volume 665

Barnaul, Russia  
27 - 28 June 2019

**Editors:**

**Alexander A. Sitnikov**

ISBN: 978-1-5108-9853-0  
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 with permission by Curran Associates, Inc. (2020)

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 665

**International Scientific and Practical Conference "Materials Science,  
Mechanical Engineering and Energy: Problems and Prospects for Development"**

**27–28 June 2019, Polzunov Altai State Technical University, Russian Federation**

**Accepted papers received: 9 October 2019**

**Published online: 29 October 2019**

### **Preface**

[Preface](#)

[EDITOR](#)

[Peer review statement](#)

### **Papers**

[Methods for forming interfacial heat-mass exchange surface in flowing air contact with water](#)

A.G. Averkin, A.I. Eremkin and S.O. Kiselev.....1

[Studying microstructure of sintered magnets Co-25% Sm](#)

O A Chikova, K Yu Shmakova and I V Slinkin.....6

[Adhesion and mechanical properties of polyanionic cellulose-Al-Zr protective coatings](#)

N M Antonova.....11

[Realisation and Approbation of Conditionally Constant Coefficients Method for Loss Counter Measuring Tools](#)

S.S. Kostinskiy, D.V. Shaykhutdinov, E.V. Kirievskiy, Y.M. Manatskov and N.D. Narakidze.....17

[Peculiarities of the fracture upon tensile deformation of hypoeutectic silumin samples after irradiation with an intensive pulse electron beam digital image correlation method](#)

Yu F Ivanov, A M Ustinov, A A Klopotov, D V Zagulyaev, E A Petrikova, Yu A. Abzaev, Yu A Vlasov and O M Loskutov.....23

[Monitoring of properties of epoxy molding compounds used in electronics for protection and hermetic sealing of microcircuits](#)

A N Kokatev, N M Iakovleva, K V Stepanova, N Yu Ershova and K V Belov.....30

[Decision making system for industrial companies](#)

A O Loyko and S A Gusev.....37

[Aluminate spinel-based SHS pigments for fire-resistant protective and decorative coatings](#)

N I Radishevskaya, A Yu Nazarova and N G Kasatsky.....42

[Use of Additive Technologies to Optimize Design of Classifying Devices](#)

A O Romashev.....48

[Simulation and analysis of the shaft strength of a centrifugal pump in an in-situ leaching method of uranium](#)

M P Sadykov.....54

[Analytical description of stress-strain dependence for segmented polyurethane ureas swollen in physically aggressive media](#)

V Yu Senichev, M A Makarova, E R Volkova, A V Savchuk and A I Slobodinyuk.....64

[Magnetocaloric effect in thin magnetic films  \$\gamma\$ -Fe<sub>2</sub>O<sub>3</sub>](#)

X O Urinov, X A Jumanov, Kh B Mirzokulov, A M Xidirov, M A Bolbekov, T A Jumaboyev and J O Urinov.....69

[Martensitic transformations in VO2 films](#)

X O Urinov, X A Jumanov, A K Amonov, A M Xidirov, J R Kilichov, J X Nurmurodov and T A Jumaboyev.....73

[Workstations Industry 4.0 for instrument engineering products](#)

D A Zakoldaev, A V Shukalov, I O Zharinov and O O Zharinov.....78

[Workstations Industry 4.0 for instrument manufacturing](#)

D A Zakoldaev, A G Korobeynikov, A V Shukalov and I O Zharinov.....82

[The life cycle of technical documentation in the smart factory of Industry 4.0](#)

D A Zakoldaev, A V Gurjanov, A V Shukalov and I O Zharinov.....87