

# **VII Conference on Low Temperature Plasma in the Processes of Functional Coating Preparation 2015**

Journal of Physics: Conference Series Volume 669

Kazan, Russia  
4 - 7 November 2015

ISBN: 978-1-5108-1960-3  
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.**

Copyright© (2015) 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. (2016)

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: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# Table of contents

## Volume 669

VII Conference on Low temperature Plasma in the Processes of Functional Coating Preparation  
4–7 November 2015, Kazan, Russia

**Accepted papers received: 20 November 2015**

**Published online: 14 January 2016**

## Preface

011001

[VII Conference on Low Temperature Plasma in the Processes of Functional Coating Preparation](#) OPEN ACCESS K Nail

011002

[Peer review statement](#) OPEN ACCESS

## Papers

012001

[Way of stability increase of the glow discharge](#) OPEN ACCESS T Ya Asadullin, I G Galejev and B A Timerkayev pg. 1

012002

[Low pressure glow discharge in a system with hollow electrode at floating potential](#) OPEN ACCESS N A Babinov pg. 4

012003

[Hydrogen trapping in graphite materials in various conditions](#) OPEN ACCESS L B Begrambekov, A A Ayrapetov, Ya A Sadovskiy and P A Shigin pg. 8

012004

[Additive manufactured Ti6Al4V scaffolds with the RF- magnetron sputter deposited hydroxyapatite coating](#) OPEN ACCESS E Chudinova, M Surmeneva, A Koptioug, P Scoglund and R Surmenev pg. 12

012005

[Characteristics of the electric arch and stream of plasma in the channel with porous cooling](#) OPEN ACCESS G. Yu Dautov, R. R. Khairtdinova and I. G. Dautov pg. 18

012006

[Evaluation of the effectiveness of the use of arc plasma generator with distributed parameters for the deposition of functional coatings at low pressures.](#) OPEN ACCESS N. F. Kashapov, G. Yu. Dautov, I. G. Dautov and G. R. Zakirova pg. 21

012007

[The influence of ripple current on characteristics of electric arc, stable in a cylindrical plasmatron channel.](#) OPEN ACCESS G Y Dautov, N F Kashapov, G R Zakirova and I G Dautov pg. 24

012008

[Equations of spatial hydrodynamic interaction of weakly nonspherical gas bubbles in liquid in an acoustic field](#) OPEN ACCESS A I Davletshin and T F Khalitova pg. 27

012009

[Features of hydrogen trapping and desorption during deposition of yttrium coating on zirconium in a gas discharge](#) OPEN ACCESS A E Evsin, L B Begrambekov and S S Dovganyuk pg. 31

012010

[Transverse acoustic oscillations in cylindrical chambers with the radial temperature gradient](#) OPEN ACCESS S A Fadeev, A I Saifutdinov and N F Kashapov pg. 35

012011

[About the equilibrium speed of sound in a liquid with gas-vapor bubbles](#) OPEN ACCESS D A Gubaidullin, D D Gubaidullina and Yu V Fedorov pg. 40

012012

[Deposition of polymer powder particles on the product surface at jet spraying](#) OPEN ACCESS V L Fedyayev, E R Galimov, I R Gimranov, M S Takhaviev, I V Morenko and A R Siraev pg. 44

012013

[Heat transfer of gas suspension jet flow on the product surface when applying polymer powder coatings](#) OPEN ACCESS V L Fedyayev, E R Galimov, I R Gimranov, M S Takhaviev, I V Morenko and L R Fazlyev pg. 49

012014

[Improving the efficiency of plasma heat treatment of metals](#) OPEN ACCESS Az T Gabdrakhmanov, I H Israphilov, A T Galiakbarov, A D Samigullin and Al T Gabdrakhmanov pg. 55

012015

[Enhancing of the glow discharge stability in chamber with cathode sections coated by a discontinuous dielectric coating](#) OPEN ACCESS I G Galeev and T Ya Asadullin pg. 59

012016

[Obtaining fullerene-containing soot during combustion of gaseous hydrocarbons in an external electric field](#) OPEN ACCESS I G Galeev and T Ya Asadullin pg. 62

012017

[Study of the petroleum schedules thermal cleaning process from asphalt, ressin and paraffin deposits using low- temperature plasma](#) OPEN ACCESS A D Samigullin, A T Galiakbarov and R T Galiakbarov pg. 65

012018

[The effects of bubbles on the structure of upward gas-liquid flow](#) OPEN ACCESS D A Gubaidulin and B A Snigerev pg. 68

012019

[Weak waves in multifractional liquids with bubbles](#) OPEN ACCESS D A Gubaidullin, A A Nikiforov and R N Gafiyatov pg. 72

012020

[The movement of a particle at nonlinear oscillations of high amplitude in the closed tube](#)  
OPEN ACCESS D A Gubaidullin, L A Tkachenko and R G Zaripov pg. 76

012021

[Computation of shock waves in media with an interphase boundary by the CIP-CUP method on an adaptive grid](#) OPEN ACCESS T S Guseva pg. 81

012022

[Low temperature plasma RF capacitive discharge in helium at atmospheric pressure](#)  
OPEN ACCESS A Hakki, I Fayrushin and N Kashapov pg. 85

012023

[Frequencies of gas oscillations in a pipe with a concentrated heat source](#) OPEN ACCESS  
O V Iovleva, V M Larionov and E V Semenova pg. 91

012024

[Study of processes of steels surfaces modification with highly concentrated energy flows](#)  
OPEN ACCESS R M Khisamutdinov, V V Zvezdin, I H Israfilov, Ruz R Saubanov, A A Spirin and R R Rakhimov pg. 94

012025

[Investigation of crater form and dimensions evolution during laser treating of materials](#)  
OPEN ACCESS A Yu Ivanov, A V Kapytski, N V Zharkiy and N A Yerema pg. 98

012026

[Influence of electric field on crater formation during laser treating of metals](#) OPEN  
ACCESS A Yu Ivanov and S V Vasil'ev pg. 104

012027

[Hydrogen transport through stainless steel under plasma irradiation](#) OPEN ACCESS A A  
Airapetov, L B Begrambekov, A S Kaplevsky and Ya A Sadovskiy pg. 109

012028

[Changes of thermal balance in a plasma-electrolyte system according to the shape of the applied voltage](#) OPEN ACCESS L N Kashapov, N F Kashapov, R N Kashapov and V D Semushin pg. 114

012029

[Plasma electrolytic treatment of products after selective laser melting](#) OPEN ACCESS L N Kashapov, N F Kashapov, R N Kashapov and D G Denisov pg. 117

012030

[Study of thermal and electrical parameters of workpieces during spray coating by electrolytic plasma jet](#) OPEN ACCESS A A Khafizov, Yu I Shakirov, R A Valiev, R I Valiev and G M Khafizova pg. 122

012031

[Features of deformation of metal body surfaces under impact of a water jet](#) OPEN ACCESS A A Aganin and N A Khismatullina pg. 128

012032

[Generation of low-temperature plasma by low-pressure arcs for synthesis of nitride coatings](#) OPEN ACCESS O V Krysina, N N Koval, I V Lopatin, V V Shugurov and S S Kovalsky pg. 132

012033

[Hybrid plasma system for magnetron deposition of coatings with ion assistance](#) OPEN ACCESS K V Vavilin, E A Kralkina, P A Nekludova, A. K Petrov, A M Nikonov, V B Pavlov, A A Airapetov, V V Odinokov, G Ya Pavlov and V A Sologub pg. 142

012034

[In situ X-ray diffraction investigation of nitride coatings at high-temperature oxidation](#) OPEN ACCESS O V Krysina, N N Koval, A N Shmakov and Z S Vinokurov pg. 146

012035

[Radiative heat transfer in plasma of pulsed high pressure caesium discharge](#) OPEN ACCESS V F Lapshin pg. 153

012036

[Acoustic disturbances in a gas with an axial temperature gradient](#) OPEN ACCESS V M Larionov pg. 159

012037

[Optimization of hydrocarbon fuels combustion variable composition in thermal power plants](#) OPEN ACCESS E R Saifullin, V M Larionov, A V Busarov and V V Busarov pg. 162

012038

[External high-frequency control of combustion instability](#) OPEN ACCESS V M Larionov, G A Mitrofanov and A N Kozar pg. 165

012039

[Features of formation concentration profile in structured materials](#) OPEN ACCESS T S Pavlenko, A A Lisenkov and N A Babinov pg. 169

012040

[The distribution of excess charges in the diffusion flame of hydrocarbons](#) OPEN ACCESS S M Reshetnikov, I A Zyryanov, A P Pozolotin and A G Budin pg. 173

012041

[Mechanism of influence water vapor on combustion characteristics of propane-air mixture](#) OPEN ACCESS V M Larionov, G A Mitrofanov, A V Sachovskii and N K Kozar pg. 177

012042

[Interaction of electric and acoustic vibrations in combustion](#) OPEN ACCESS V M Larionov, K G Sadikov and G A Mitrofanov pg. 181

012043

[Thermal effect of hydrocarbon fuels combustion after a sudden change in the specific calorific value](#) OPEN ACCESS E R Saifullin, V M Larionov, A V Busarov and V V Busarov pg. 185

012044



[Modeling the dielectric barrier micro-discharge in argon at atmospheric pressure](#) OPEN ACCESS A I Saifutdinov, A A Saifutdinova and N F Kashapov pg. 188

012045

[Dynamics contraction of DC glow discharge in argon](#) OPEN ACCESS A I Saifutdinov, A A Saifutdinova, N F Kashapov and S A Fadeev pg. 193

012046

[Addition agents effects on hydrocarbon fuels burning](#) OPEN ACCESS V M Larionov, G A Mitrofanov and A V Sakhovskii pg. 197

012047

[Self-excited gas oscillations in Helmholtz resonator type combustor](#) OPEN ACCESS V M Larionov, E R Saifullin and E V Semenova pg. 200

012048

[Experimental setup for plasma treatment of disperse materials in the arc plasma jet](#) OPEN ACCESS K Sadikov, I Fayrushin, A Shamsutdinov and N Kashapov pg. 203

012049

[Surface hardening of cutting elements agricultural machinery vibro arc plasma](#) OPEN ACCESS S N Sharifullin, N R Adigamov, N N Adigamov, R Y Solovev and K S Arakcheeva pg. 206

012050

[Plasma technology for increase of operating high pressure fuel pump diesel engines](#) OPEN ACCESS R Y Solovev, S N Sharifullin and N R Adigamov pg. 212

012051

[Opportunity some relationship tribo between plasma and service life of machines and mechanisms](#) OPEN ACCESS V B Lomuhin, S N Sharifullin and I V Lapteva pg. 217

012052

[Mathematical modeling of plasma deposition and hardening of coatings-switched electrical parameters](#) OPEN ACCESS A M Kadyrmetov, S N Sharifullin and AS Pustovalov pg. 222

012053

[Highly non-linear resonance fluctuations of gas in a closed pipe](#) OPEN ACCESS R G Zaripov, N F Kashapov, L A Tkachenko and L R Shaydullin pg. 227

012054

[The effects of low-temperature plasma treatment on the capillary properties of inorganic fibers](#) OPEN ACCESS A R Garifullin, I Sh Abdullin, E A Skidchenko, I V Krasina and M F Shaekhov pg. 233

012055

[Fractal structure of low-temperature plasma of arc discharge as a consequence of the interaction of current sheets](#) OPEN ACCESS N A Smolanov pg. 237

012056

[The features of high-current gas discharge in a narrow gap between the liquid electrolyte and solid electrode](#) OPEN ACCESS A Kh Tazmeev, R N Tazmeeva and F S Sarvarov pg. 242

012057

[The high-frequency current pulsations in the gas discharge with liquid electrode](#) OPEN ACCESS G Kh Tazmeev, B A Timerkaev and Kh K Tazmeev pg. 246

012058

[The influence of the method of cooling liquid electrolyte cathode on the energy balance in the gas discharge](#) OPEN ACCESS Kh K Tazmeev, I M Arslanov and G Kh Tazmeev pg. 250

012059

[The change in optical and electrical characteristics of tin oxide films under the action of argon ion beam](#) OPEN ACCESS O Asainov, S Umnov and V Temenkov pg. 254

012060

[Structure of the local environment of titanium atoms in multicomponent nitride coatings produced by plasma-ion techniques](#) OPEN ACCESS O V Krysina, N A Timchenko, N N Koval and Ya V Zubavichus pg. 258

012061

[Decomposition of heavy hydrocarbons in argon arc with the sunken electrodes](#) OPEN ACCESS B A Timerkaev and G R Ganieva pg. 265

012062

[Carbon nanotubes formation in the decomposition of heavy hydrocarbons creeping along the surface of the glow discharge](#) OPEN ACCESS B A Timerkaev, A O Sofronitskiy and A A Andreeva pg. 270

012063

[Heat Characteristics of Glow Discharge at Low Pressure with Supersonic Gas Flow](#) OPEN ACCESS B A Timerkaev, D R Amirzyanov and D I Israfilov pg. 274

012064

[Erosion of electrode metal in the electric discharge under the exposure of the electrolyte stream](#) OPEN ACCESS Yu I Shakirov, R I Valiev, A A Khafizov, R A Valiev and R G Khakimov pg. 278

012065

[Plasma technologies application for building materials surface modification](#) OPEN ACCESS G G Volokitin, N K Skripnikova, O G Volokitin, V V Shehovtsov, A G Luchkin and N F Kashapov pg. 282

012066

[Antifriction coatings based on a-C for biomedicine applications](#) OPEN ACCESS Y N Yurjev, D V Kiseleva, D A Zaitcev, D V Sidelev and O S Korneva pg. 289

012067

[Ion-plasma nitriding of machines and tools parts instrumental steels](#) OPEN ACCESS V V Zvezdin, A A Spirin, Ruz R Saubanov, N M Zvezdina and A R Fayruzova pg. 293