

REPORT ON THE INTERNATIONAL CONFERENCE SPACE'2019

General Information



**Russian Ministry of Science and Education
RUSSIAN ACADEMY OF SCIENCES (RAS)
International Academy of Astronautics
Semenov Institute of Chemical Physics RAS
Keldysh Institute of Applied Mathematics
Russian Section of International Combustion Institute**

SPACE'2019

9th International conference

*"Space for Earth
and
Earth for Space"*

**"SPACE CHALLENGES IN XXI CENTURY.
Novel Technologies, Materials and Devices for
Space Development and Earth Applications"
Yaroslavl, Tereshkova Space Center, Russia
7-11 October 2019**

The aim of the conference is to support international cooperation of researchers in the field of Space development and application of advanced technologies, materials and devices for Space technology, and Space development as well as to advance and discuss joint scientific-technical projects.

The conference "SPACE'2019" is a part of the cycle "Space challenges in the 21st Century (SPACE'XXI)", which was launched in 2003 in Moscow by the conference devoted to the 100th anniversary of publication of the K. E. Tsiolkovsky's paper "Investigation of Outer Space by Rockets". The conference SPACE'2019 was held in Planetarium of the Cosmonaut Valentina Tereshkova cultural and educational Space Center in Yaroslavl, Chaikovskogo Str. 3, 150000, Russian Federation.

The main topics:

1. Structural, energetic, electronic and protective materials
2. Power and energy systems for space missions
3. Chemical Propulsion and Propulsion Chemistry
4. Miniaturization of spacecraft and rocket engines
5. Durability of materials and space devices
6. Safety of space stations and expeditions
7. Devices for space research
8. Space technologies applications for national economies
9. International cooperation for Space development, and future projects
10. Special session will be dedicated to the 50th anniversary of man's landing on the moon **The**

conference languages: English and Russian.

SELECTION of papers was carried out in accordance with the application and submitted extended abstracts (its volume is from 1 to 2 pages).

PUBLICATION: extended abstracts were published before the conference and distributed among participants. Full papers will be published after the conference in the journal Acta Astronautica (<http://iaaweb.org/content/view/232/359/>).

Address of the Organizing Committee: SPACE'2019, Semenov ICP RAS, Kosygin Str. 4, Moscow 119991 RF. Fax: 7(495) 651-2191, e-mail: space@chph.ras.ru ; phone: 7(495) 939-7267. <https://www.comb-inst-rus-section.com>

The conference SPACE'2019 was devoted to the 50th anniversary of the First man's appearance on the Moon. The main topics of the conference are international cooperation in the development and application of advanced materials, technologies and devices for space development, aerospace and earth applications, the

nomination and discussion of international scientific-technical projects. The involved international experts represent the scientific and industrial organizations of Russia, CIS, Europe, Brasilia and China.

THE CONFERENCE PROGRAM

07 OCTOBER

13-00 – 16-00 Arrangements and accommodation of participants.

18-00 Registration of participants and WELCOME PARTY

Cultural and educational center named after V.V.Tereshkova, foyer, Tchaikovsky st, 3

08 OCTOBER

Planetarium of V.V. Tereshkova cultural and educational Center,

10-00-10-30 Greetings for participants of SPACE'2019

PLENARY SESSION

Chairmen: Academician Berlin A.A., Acting Rector of YSTU Stepanova E.O. Director of the V.V. Tereshkova Center Trofileva I.N.

10-30 – 11-10 REACTIVE MOLECULAR DYNAMICS SIMULATIONS AND COMBUSTION PERFORMANCE EVALUATION OF PARAFFIN/GOX FOR

HYBRID ROCKET MOTORS Rene Francisco Gonçalves , Shirley Mota Pedreira , Leonardo Gouvea , Cristiane Martins, Marcela Galizia Domingues , Koshun Iha , José Atílio Fritz Fidel Rocco, Bruno Tschick Rocco , Leopoldo Rocco Jr. and Luiz Eduardo Nunes de Almeida, Instituto Tecnológico de Aeronáutica, São José dos Campos/SP, Brasil

11-10 – 11-50 INVESTIGATION OF FRICTION AND WEAR IN OPEN SPACE

Bronovets M.A. Ishlinsky Institute for Problems in Mechanics RAS, Moscow

11-50 – 12-30 “SIMEIZ-KATSIVELI” POLYGON: ASSESSMENT OF THE RADIATION SITUATION IN NEAR-EARTH SPACE Volvach A.E., Yakubovskaya

I.V., Radio Astronomy and Geodynamics Department, Crimean Astrophysical Observatory RAS, Yalta, Crimea

12-30 – 13-10 LASER-CHEMICAL HYBRID PROPULSION PRINCIPLE AND

PRACTICE Ruiqi Shen, Lizhi Wu, Haonan Zhang, Yinghua Ye, The Institute of Space Propulsion, School of Chemical Engineering, Nanjing University of Science and Technology, Nanjing 210094, China

ORAL SESSION

Assembly Hall "Panorama", Hotel "Ring Premier Hotel", St. Liberty 55

15-00 – 15-30 MICRO-EXPLOSION OF MULTICOMPONENT FUELS IN THE COMBUSTION CHAMBER AT DIFFERENT INITIAL TEMPERATURES Dmitrii V.

Antonov., Pavel A. Strizhak Tomsk Polytechnic University, Tomsk

15-30 – 16-00 PROSPECTS FOR EFFICIENCY ENHANCEMENT OF

PROPULSION SYSTEMS FOR DELIVERING PAY-LOADS INTO THE NEAR-EARTH ORBIT Litvinov A.V., Chashchikhin E.A., Porubov E.E., Poddyakova L.S.,

Gorbachev A.S., Karmanov N.M., JSC «Federal Research & Production Center «ALTAI», Russia, Biysk

16-00 – 16-30 COMPARATIVE ASSESSMENT OF THE TARASOV-LEVINE

NOZZLE EFFICIENCY Bulat P.V., Levikhin A.A., Kirshina A.A., BSTU "Voenmeh", St. Petersburg

16-30 – 17-00 ADDITIVE TECHNOLOGIES APPLICATION IN THE PREPARATION OF FUNCTIONAL NANOMATERIALS FOR AIRCRAFT AND SPACE ENGINEERING

Simonenko N.P., Mokrushin A.S., Gorobtsov Ph.Yu., Ivanova V.M., Nagornov I.A., Fisenko N.A., Vlasov I.S., Simonenko T.L., Simonenko E.P., Volkov I.A., Sevastyanov V.G., Kuznetsov N.T., Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences, Russia, Moscow

17-00 – 17-30 MECHANISM AND CHARACTERISTICS OF THE IGNITION OF GEL FUELS CONTAINING SOLID PARTICLES Glushkov D.O., National Research Tomsk Polytechnic University, Tomsk

17-30 – 18-00 CHEMILUMINESCENT RADIATION OF ELECTRON-EXCITED PARTICLES DURING SELF-IGNITION OF ACETYLENE AFTER REFLECTED SHOCK WAVES Tereza A.M., Institute of Chemical Physics RAS, Moscow

09 OCTOBER 2019

Conference Hall of the Center Tereshkova, 1st floor

PLENARY SESSION

Chairmen: José Atilio Fritz Fidel Rocco, Himenko L.L., Volvach A.E.

10-00 – 10-40 MATHEMATICAL MODELING OF THE INTRA-CHAMBER PROCESS DURING THE COMBUSTION OF A CHARGE IN BAR AND REACTIVE BALLISTIC ENGINES Mutafov M.N., Higher School of Transport "Todor Kableshkov" "Geo Milev" BULGARIA

10-40 – 11-20 PRODUCTION AND INVESTIGATION OF STRUCTURE AND PROPERTIES OF BIODEGRADABLE COMPOSITIONS POLYLACTIDE-POLYSACCHARIDES Rogovina S.Z., Berlin A.A., Semenov Institute of Chemical Physics RAS, Moscow, Russia

11-20 – 12-00 APPROACHES TO ULTRA-HIGH-TEMPERATURE CERAMIC MATERIALS MODIFICATION BY REFRACTORY CARBIDES Simonenko E.P., Simonenko N.P., Sevastyanov V.G., Kuznetsov N.T., Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences, Russia, Moscow

12-00 – 12-40 INFLUENCE OF CARBON NANOTUBES ON FROST RESISTANCE AND MECHANICAL CHARACTERISTICS OF FILLED POLYMER COMPOSITIONS Himenko L.L., Ilyin A.N., Golubev A.Y., Minchenko L.A., JSC "Scientific research institute of polymeric materials", Perm

12-40 – 13-20 THERMOPHASE TRANSITIONS OF FURAZANOTETRAZINE DIOXIDE DURING COMBUSTION ITS THERMO-REVERSIBLE COMPOSITIONS Kalmykov P.I., Sidorov K.A., Nikitin R.G., Vdovina N.P., FRPC "Altai", Biysk

13-00 – 14-00 Lunch

15-00 – 18-00 Excursion to the Yaroslavl radio factory

10 OCTOBER 2019

Conference Hall of the Tereshkova Center, 1st floor

PLENARY SESSION

Chairmen: Mutafov M.N., Simonenko E.P., Malinin V.I.

10-00 – 10-40 COMPUTATION OF COMBUSTION OF SINGLE ALUMINIUM PARTICLE IN OXYGEN-CONTAINING MEDIA ON THE BASIS OF NONEQUILIBRIUM THERMODYNAMICS Kriukov A.Yu., Malinin V.I., Perm national research polytechnic university (PLENARY)

10-40 – 11-00 ANALYSIS OF COMBUSTION PECULIARITIES OF SINGLE ALUMINIUM PARTICLE IN OXYGEN-CONTAINING MEDIA ON THE BASIS OF NONEQUILIBRIUM THERMODYNAMICS MODEL Kriukov A.Yu., Malinin V.I., Perm national research polytechnic university.

ORAL SESSION

11-00 – 11-30 ISS AS AN OBJECT AND TOOL OF SPACE RESEARCHES

Deshevaya E.A., Vasilyak L.M., Grebennikova T.V., Pecherkin V.Ya., Syroeshkin A.V., Tsygankov O.S., Shubralova E.V., Institute of Biomedical Problems of the Russian Academy of Sciences (IMBP), Russia, Moscow

11-30 – 12-00 MODELING OF THE FLOWING OF A DIRECT-FLOWING AIRREACTIVE ENGINE BY A SUPER SUNDARY FLOW: STUDYING THE STRUCTURE OF A COURSE IN A FLOW TRACT AND CALCULATION OF THERMO-GAS DYNAMIC PARAMETERS Skibina N.P., Faraponov V.V., Maslov E.A., Tomsk State University, Tomsk

12-00 – 12-30 SELF-HEALING LAYERED COMPOSITES BASED ON BOROSILOXANE COMPOUNDS Sitnikov N.N., Khabibullina I.A., Mashchenko V.I., Shelyakov A.V., Vysotina E.A., Mostovaya K.S., Kuznetsova O.V., National Science Center Keldysh Research Center, Moscow, Russia

12-30 – 13-00 OPTIMAL MANEUVER DESCENT FROM AN ORBIT OF A SPACEPLANE Elisov N.A., Ishkov S.A., Lomaka I.A., Khramov A.A., Samara National Research University

13-00 – 13-30 SOL-GEL SYNTHESIS OF THIN FILM NANOMATERIALS AS COMPONENTS OF ELECTROCHROMIC DEVICES IN AIRCRAFT AND SPACE ENGINEERING Gorobtsov Ph.Yu., Fisenko N.A., Ivanova V.M., Simonenko T.L., Simonenko N.P., Simonenko E.P., Sevastyanov V.G., Kuznetsov N.T., Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences, Russia, Moscow
13:30 – 15:00 Lunch

ORAL SESSION

Chairmen: Marcela Galicia Dominguez, Glushkov D.O., Yakovina V.V.

15-00 – 15-30 GENERATION OF THE DIRECTED FLOWS VIA NONSTATIONARY COMBUSTION OF GASEOUS MIXTURES IN A CHANNEL FOR THE IMPLANTATION OF MICROPARTICLES INTO A SUBSTRATE Yakovenko I.S., Kiverin A.D., Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Moscow, Russia

15-30 – 16-00 STAND FOR DETERMINING THE POSITION OF THE CENTER OF MASSES AND MOMENTS OF INERTIA OF NANOSEPTARIES Belokonov I.V., Ivliev A.V., Barinova E.V., Samara National Research University named after academician S.P. Korolev

16-00 – 16-30 INTENSIFICATION OF SURFACE COMBUSTION IN INFRARED BURNERS Vasilik Nikolai, Shmelev Vladimir Federal center of Chemical Physics, Russian Academy of Sciences, Moscow

16-30 – 17-00 TWO ENGINEERING SOLUTIONS OF PULSE DETONATING ENGINE CONSTRUCTION Migalin K.V., Ambrozevich A.B., Egorov A.G., Sidenko K.A. Rotor NPF, Togliatti

17-00 – 17-30 SYNTHESIS OF NEW FUNCTIONAL NANOMATERIALS AS COMPONENTS OF ALTERNATIVE ENERGY DEVICES, PERSPECTIVE FOR AIRCRAFT AND SPACE RELATED APPLICATION Simonenko T.L., Simonenko N.P., Vlasov I.S., Mokrushin A.S., Gorobtsov Ph.Yu., Ivanova V.M., Simonenko E.P., Volkov I.A., Sevastyanov V.G., Kuznetsov N.T., Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences, Russia, Moscow

19-00 - 22-00 OFFICIAL DINNER

11 OCTOBER 2019

Assembly Hall "Panorama", Hotel "Ring Premier Hotel"

PLENARY SESSION

Chairmen: Kalmykov P.I., Vasilik N.Ya., Kryukov A.Yu.

1210-00 – 10-40 SAFETY OF SPACE STATIONS AND EXPEDITIONS IN LOW EARTH ORBITS Smirnov N.N., Kiselev A.B., Zakharov P.P., M.V.Lomonosov Moscow State University, Moscow

10-40 – 11-20 ADDITIVE TECHNOLOGIES APPLICATION IN THE PREPARATION OF FUNCTIONAL NANOMATERIALS FOR AIRCRAFT AND SPACE ENGINEERING Simonenko N.P., Mokrushin A.S., Gorobtsov Ph.Yu., Ivanova V.M., Nagornov I.A., Fisenko N.A., Vlasov I.S., Simonenko T.L., Simonenko E.P., Volkov I.A., Sevastyanov V.G., Kuznetsov N.T., Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences, Russia, Moscow

11-20 – 12-00 INFLUENCE OF NON-EQUILIBRIUM REACTIONS ON THE

OPTIMAL TRAJECTORY OF THE ORBITAL PLANE ATMOSPHERIC ROTATION

Elisov N.A., Ishkov S.A., Shakhov V.G., Samara National Research University

12-00 – 12-40 WATER-FUEL COMPOSITIONS AS AN ALTERNATIVE TO HYDROGEN ENERGY Assovsky I.G., Baronin G.S., Kuznetsov G.P., Semenov Inst. Chem. Physics RAS, Moscow.

12-40 – 13-20 MECHANOACTION POWER COMPOSITES OF DIFFERENT PURPOSES Sadykov B.S., Mofa N.N., Bakkara A.E., Galfetti L., Mansurov Z.A., Kazakh National University Al-Farabi, Institute for Combustion Problems, Almaty, Republic of Kazakhstan

13-20 – 14-00 METAL POWDERS AS AN ALTERNATIVE CARBON-FREE FUEL Poletaev NI Khlebnikova M.E., Institute of Combustion and Alternative Technologies, Odessa National I.I. University Mechnikov, Odessa, Ukraine

12:00- 15:00 POSTERS SESSION

1. HETEROCYCLIC POLYAZOTIC COMPOUNDS AS COMPONENTS OF SPECIAL FUELS Pavlovets G.Ya., Meleshko V.Yu., Sizova AA, Kulikova TL, Federal Research Center for Chemical Physics named after NN Semenova RAS, Moscow
2. RESEARCH OF THE INFLUENCE OF ELECTRIC PULSE THERMAL TREATMENT IN A STRESSED CONDITION ON STRUCTURE FORMATION IN TINICU AMORPHIC ALLOYS Khabibullina IA, Shelyakov AV, Ashmarin AA Sitnikov FN, SSC FSUE “Center of Keldysh”
3. GASIFICATION OF SOLID FUEL IN THE COMBINED CHARGE OF A LOW-TEMPERATURE GAS GENERATOR OF AIRCRAFT Lutsenko NA, Salgansky EA, Yanovsky LS Institute of Chemical Physics Problems, Russian Academy of Sciences, Chernogolovka, Russia
4. CONDITION AND PROSPECTS OF INCREASING ENERGY EFFICIENCY OF HEAT ENGINES Pinchuk VA, Pinchuk AV, BSTU “VOENMEKh” named after DF Ustinov), St. Petersburg
5. CATALYTIC EFFECT OF ZIRCONIUM DIOXIDE ON BURNING ALUMINUM NANOPOWDER IN AIR Konovchuk TV, National Research Tomsk Polytechnic University
6. RESEARCH OF SPECTRAL FEATURES OF THE VERTICAL DECAY INDEX OF THE LIGHT OF THE TOP LAYER OF WATER OF THE NORTH PART OF THE BLACK SEA IN SEPTEMBER 2018 Suslin V.V., Latushkin A.A., Kudinov OB, Martynov O.V. Marine Hydrophysical Institute RAS, Sevastopol
7. APPROACHES TO THE MODIFICATION OF ULTRA-HIGH-TEMPERATURE CERAMIC MATERIALS BY REFLECTED CARBIDES Simonenko EP, Simonenko NP, Sevastyanov VG, Kuznetsov N.T., Institute of General and Inorganic Chemistry named after N.S. Kurnakova RAS, Moscow, Russia
8. PROSPECTS FOR INCREASING EFFICIENCY OF POWER UNITS FOR MEANS OF DELIVERY OF GOODS TO NEAR EARTH ORBIT Litvinov AV, Chyashchin EA, Porubov EE, Poddyakova LS, Gorbachev AS, Karmanov N.M. “Altai Federal Research and Production Center, Russia, Biysk
9. PROPERTIES OF SPHEROPLASTICS UNDER SHOCK COMPRESSION BY RESULTS OF INTERFEROMETRIC MEASUREMENTS Ziborov VS, Joint Institute for High Temperatures RAS (OIVT RAS), Moscow

10. INFLUENCE OF THE DUST FLAME IONIZATION OF ALUMINUM PARTICLES ON THE DISTRIBUTION BY THE SIZES OF Al_2O_3 NANOPARTICLES Khlebnikova ME, Poletaev NI Institute of Combustion and Alternative Technologies, Odessa National University named after I.I. Mechnikov, Odessa, Ukraine
11. COMPARISON OF MEASUREMENTS OF SPECTRAL IRRADIATION OF THE UPPER LAYER OF WATER ON O. BAIKAL WITH SATELLITE DATA Suslin VV, Latushkin AA, Martynov OV, Marine Hydrophysical Institute of the Russian Academy of Sciences, Sevastopol
12. ORGANIZATION OF PULSED BURNING MODE IN AERO PURPOSE FLOW Egorov AG, Migalin KV, Gagloev DM, Sidenko KA, Togliatti State University
13. COMPLEX OF MANAGEMENT, NAVIGATION AND COMMUNICATION OF SPACE VEHICLE OF NANOCCLASS Belokonov IV, Kramlikh AV, Lomaka IA, Melnik ME, Shafran SV, Samara National Research University named after academician S.P. Korolev.

15:00 THE CONFERENCE CLOSING CEREMONY

The Abstracts Book is on:

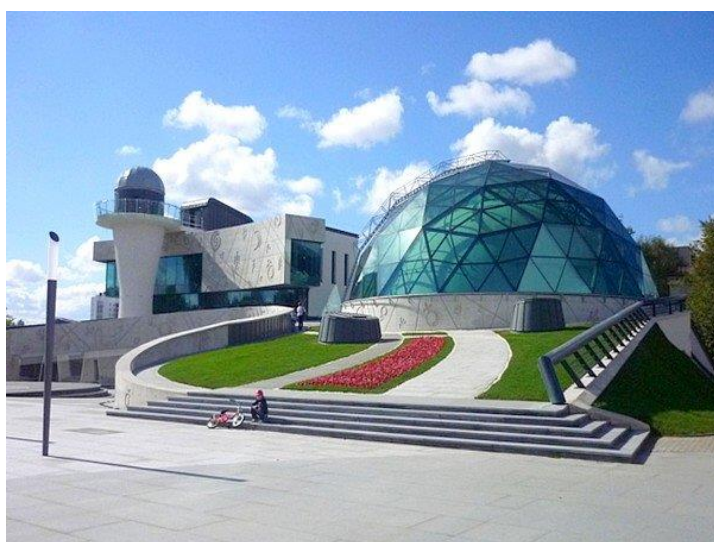
https://www.researchgate.net/publication/337335219_Abstracts_SPACE'2019

PHOTO GALLERY FROM SPACE'2019

Yaroslavl and Tereshkova Center



1 Yaroslavl



2. Tereshkova Center



3. Cosmonaut V.V. Tereshkova

4. International Organizing Committee



5. Some Participants



6. Cosmonaut-researcher Dmitry A Petelin



7. Some participants



9. Participant Prof. A. Tereza before presentation



10. Participant Ivan Yakovenko

11. Welcome party



12. Welcome party



13. Some listeners and lecturers



14. Some listeners



15. Some listeners



16. Lecturer



17. Discussions



18. Dicussion



19. Dicussions



20. Discussions



Fotos 21-30 are taken from the Official dinner











