

Program
III International Conference on
Nonisothermal Phenomena and Processes:
From Thermal Explosion Theory to Structural Macrokinetics
Devoted to the 85th Anniversary of Academician A.G. Merzhanov



November 28–30, 2016
Chernogolovka, Moscow Region, Russia

TECHNICAL PROGRAM

MONDAY, NOVEMBER 28

8:30–10:00

Registration

10:00–10:55

Opening ceremony

Introduction

Prof. Vladimir Fortov, President Russian Academy of Sciences,

Welcome remarks

Prof. Sergei Aldoshin, Vice-President Russian Academy of Sciences

Prof. Zulfair Mansurov

Prof. Evgenii Levashov

Plenary session

Chairman A.L. Buchachenko

10:55–11:15

Powder metallurgy methods for production of advanced materials

M.I. Alymov

Chernogolovka, Russia

11:15–11:45

Infiltration-mediated combustion of Group 13–14 elements (B, Al, Si) in reactive gases: Some features of product patterning

I.P. Borovinskaya

Chernogolovka, Russia

11:45–12:05

Nanoparticles formation by combustion synthesis and related processes

A.V. Gubarevich, H. Wada, and O. Odawara

Tokyo, Japan

12:05–12:25

Similarities of intermediate zones formed in detonation welding and detonation spraying

T. Babul, J. Jeleńkowski

Warsaw, Poland

12:25–12:40

Mechanoactivated combustion synthesis of Ti_3Al in conditions of induction heating

V.Yu. Filimonov, M.V. Loginova, V.I. Yakovlev, A.A. Sitnikov

Barnaul, Russia

12:40–12:55

Structural macrokinetics of Al combustion in CO_2

I.G. Assovskii

Moscow, Russia

12:55–14:25

Lunch

Plenary session

Chairman A.I. Kirdyashkin

14:25–14:55

Solid–flame synthesis of nanomaterials (IL)

Z.A. Mansurov

Almaty, Republic of Kazakhstan

14:55–15:25

Combustion and structure formation routes in multicomponent SHS systems with participation of multicomponent chemical reactions (IL)

E.A. Levashov

Moscow, Russia

15:25–15:45

Toward new approaches in study of the initiatory reactivity of nitramines

S. Zeman, N. Liu, M. Jungová

Pardubice, Czech Republic

Xi'an, China

15:45–16:05

An application of metallothermic reduction: Metallic antimony production

O. Yücel, S.P. Başağ, A. Turan

Istanbul, Turkey

16:05–16:20

Coffee break

16:20–16:40

Diffusion during annealing Al coatings on Ti substrate

S.P. Kiselev, N.S. Ryashin, A.A. Polukhin

Novosibirsk, Russia

16:40–16:55

Boride–zirconium silicide high–temperature ceramics

Ju.S. Pogozhev, I.V. Yatsyk, A.Ju. Potanin, E.A. Levashov,

N.A. Kochetov, D.Ju. Kovalev

Moscow, Chernogolovka, Russia

16:55–17:15

SHS extrusion: New task objectives and prospects

A.M. Stolin

Chernogolovka, Russia

17:15–17:30

Non–equilibrium emission phenomena in SHS processes

A.I. Kirdyashkin, V.G. Salamatov, R.M. Gabbasov, Ju.M. Maksimov

Tomsk, Russia

17:30–17:45

SHS of mineral-like ceramics for immobilization of high-level nuclear wastes

T.V. Barinova, I.P. Borovinskaya

Chernogolovka, Russia

17:45–18:00

Multilayer coatings SHS-produced on a Ti surface

O.K. Kamynina, S.G. Vadchenko, A.S. Shchukin, I.D. Kovalev

Chernogolovka, Russia

18:00–18:30

Poster session

18:30–19:20

Welcome party

TUESDAY, NOVEMBER 29

Plenary session

Chairman E.A. Levashov

9:00–9:30

Development of Merzhanov's ideas in the ignition theory for condensed systems (IL)

V.E. Zarko, A.G. Knyazeva

Novosibirsk, Tomsk, Russia

9:30–10:00

Azide SHS of nitride nanopowders (IL)

A.P. Amosov, G.V. Bichurov, L.A. Kondratyeva, I.A. Kerson

Samara, Russia

Morning Section 1

Chairman V.E. Zarko

10:00–10:15

To the theory of relay–race combustion: Combustion of spirals

A.P. Aldushin

Chernogolovka, Russia

10:15–10:30

Cellular combustion of metal powders in convective gas flow

P.M. Krishenik, S.V. Kostin, K.G. Shkadinsky

Chernogolovka, Russia

10:30–10:45

Stability of filtration combustion front

V.M. Kislov, E.A. Salganskiy, S.V. Glazov, A.Yu. Zaychenko,

D.N. Podlesnyi, Yu.Yu. Kolesnikova, E.N. Pilipenko

Chernogolovka, Russia

10:45–11:00

Filtration combustion of bulk–density layer: Continuum and discrete models

O.S. Rabinovich, A.I. Malinovskii

Republic of Belarus, Minsk

11:00–11:15
Coffee break

11:15–11:30

Matrix combustion of methane–rich mixtures as a method
for preparation of syngas

V.S. Arutyunov, V.M. Shmelev, V.I. Savchenko, I.V. Sedov, A.V. Nikitin
Moscow, Chernogolovka, Russia

11:30–11:45

Low–temperature inflammation of binary mixtures of methane
with C₂–C₅ alkanes

A.V. Nikitin, K.Ya. Troshin, V.S. Arutyunov, A.A. Borisov
Moscow, Chernogolovka, Russia

11:45–12:00

Propagation of combustion front over coal–methane–air mixtures in closed
spherical volume

A.Yu. Krainov, K.M. Moiseeva
Tomsk, Russia

12:00–12:15

Inhibition of combustion and explosion in methane–air mixtures

V.V. Azatyan, V.M. Prokopenko, S.K. Abramov, V.A. Petukhov, Ju.N. Shebeko
Chernogolovka, Russia

12:15–12:30

Combustion of coal–methane–air mixtures in a burner:
Influence of coal dust parameters

A.Yu. Krainov, K.M. Moiseeva
Tomsk, Russia

12:30–12:45

Infiltration-mediated gasification of fine coal fuel

E.A. Salganskii, D.N. Podlesnyi, M.V. Salganskaya, A.Yu. Zaychenko
Chernogolovka, Russia

12:45–13:00

Mathematical modeling of high-speed impact of metal plates using different
equations of state

S.V. Fortova, V.V. Shepelev, P.S. Utkin
Moscow, Russia

13:00–14:30

Lunch

Afternoon Section 1

Chairman S.M. Frolov

14:30–14:45

Mathematical model of thermal ignition with account of material relaxation

V.A. Kudinov, A.V. Eremin, I.V. Kudinov

Samara, Russia

14:45–15:00

Critical conditions for thermal explosion in a platelet

V.A. Kudinov, A.V. Eremin, I.V. Kudinov, E.V. Stefanyuk

Samara, Russia

15:00–15:15

Inhibition of hydrogen oxidation by polyatomic gases: Theoretical model

O.V. Skrebkov

Chernogolovka, Russia

15:15–15:30

Filtration CS in forced oscillation mode

A.S. Maznoy, A.I. Kirdyashkin, R.M. Gabbasov

Tomsk, Russia

15:30–15:45

Electrode materials SHS-produced in the Ti–C–Co–Ca₃(PO₄)₂–Ag–Mg system for deposition of bioactive coatings

N.V. Litovchenko, A.Yu. Potanin, N.A. Kochetov, Yu.S. Pogozhev,

E.A. Levashov

Moscow, Chernogolovka, Russia

15:45–16:00

SHS-produced targets for deposition of heat-resistant Zr–B–(Si)–(N) coatings

I.V. Yatsyuk, F.V. Kiryukhantsev-Korneyev, M.V. Lemesheva,

E.A. Levashov, D.V. Shtanskii

Moscow, Russia

16:00–16:15

Coffee break

16:15–16:30

ZrB₂–CrB cutting ceramics
V.A. Shcherbakov, A.N. Gryadunov
Chernogolovka, Russia

16:30–16:45

Laser-assisted and electron-beam layerwise synthesis of materials from Ni–Al and Ni–Ti powder mixtures: Numerical analysis
A.G. Knyazeva
Tomsk, Russia

16:45–17:00

Combustion of 5Ti + 3Si mixtures in conditions of quasi-static compression
V.Yu. Barinov, V.A. Shcherbakov
Chernogolovka, Russia

17:00–17:15

Combustion of highly caloric mixtures in centrifugal machine
K.G. Shkadinsky, N.I. Ozerkovskaya, P.M. Krishenik
Chernogolovka, Russia

17:15–17:30

Solid-state synthesis of carbon–carbon composite: Theoretical modeling
A.G. Knyazeva, K.A. Aligozhina
Tomsk, Russia

17:30–17:45

Multilayer composite for armor applications
A.E. Rozen, A.O. Krivenkov, D.B. Kryukov, S.N. Chugunov,
O.L. Pervukhina, M.S. Gus'kov
Penza, Chernogolovka, Russia

Morning Section 2
Chairman A.P. Amosov

10:05–10:25

SHS metallurgy of materials and alloys
V.I. Yukhvid
Chernogolovka, Russia

10:25–10:45

Reduction of $\text{Mg}_4\text{Ta}_2\text{O}_9$ with Mg in an SHS mode

M.V. Kryzhanov, V.M. Orlov

Apatity, Russia

10:45–11:00

Synthesis of supported catalysts for deep oxidation of CO and hydrocarbons by low-temperature combustion

V.N. Borsch, I.M. Dement'eva

Chernogolovka, Russia

11:00–11:15

Coffee break

11:15–11:30

Common task objectives of micro and filtration combustion of gases in porous media

S.S. Minayev, F.V. Sirotkin, R.V. Fursenko, A.I. Kirdyashkin, K. Maruta

Vladivostok, Russia; Sendai, Japan

11:30–11:45

SHS of novel IR burners

A.S. Maznoy, A.I. Kirdyashkin, A.N. Gushchin

Tomsk, Russia

11:45–12:00

Combustion in low-temperature gas generator: Effect of solid fuel dispersity

L.S. Yanovskii, I.S. Aver'kov, A.V. Baikov, S.O. Dorofeenko,

A.F. Zholudev, M.B. Kislov, V.A. Strunin, E.V. Surikov, P.D. Toktaliev,

A.V. Shikhovtsev

Moscow, Chernogolovka, Russia

12:00–12:15

Combustion of $(\text{Zr} + \text{CuO} + \text{LiF})-(\text{LiF})-(\text{Zr} + \text{BaCrO}_4 + \text{LiF})$ sandwiches

V.Yu. Barinov, S.G. Vadchenko, A.S. Shchukin, V.V. Prosyanyuk,

I.S. Suvorov, S.V. Gilbert

Chernogolovka, Sergiyev Posad, Russia

12:15–12:30

SHS materials for metallurgy: Expertize of industrial-scale production

M.Kh. Ziatdinov

Tomsk, Russia

12:30–12:45

Synthesis of magnesium diboride by thermal explosion:
Product patterning and effect of alloying agents

A.Yu. Potanin, D.Yu. Kovalev, E.A. Levashov

Moscow, Chernogolovka, Russia

12:45–13:00

Dispersion-hardening SHS-produced TiC-based materials with a metal binder

O.S. Manakova, E.A. Levashov, V.V. Kurbatkina

Moscow, Russia

13:00–14:30

Lunch

Afternoon Section 2

Chairman V.I. Yukhvid

14:30–14:50

Analysis of combustion wave propagation in solid composite fuel
with different geometrical structure

V.V. Gubernov, R.V. Fursenko, S.S. Minaev, V.N. Kurdyumov

Moscow, Vladivostok, Novosibirsk, Russia

Madrid, Spain

14:50–15:05

Mo–Si–B electrodes for electrospark deposition of coatings onto a Ni alloy

D.N. Lebedev, A.E. Kudryashov, A.Yu. Potanin, E.A. Levashov

Moscow, Russia

15:05–15:20

Conditions for formation of MAX-phase Cr₂AlC in electrospark coatings
on Ti substrates

E.I. Zamulaeva, E.A. Levashov, F.V. Kiryukhantsev-Korneev

Moscow, Russia

15:20–15:35

Local non-equilibrium phenomena in combustion waves and their analogs

S.L. Sobolev

Chernogolovka, Russia

15:35–15:50

Thermal regimes in half-periodic reactors

*N.G. Samoilenko, V.A. Bostandzhiyan, L.V. Kustova, Yu.N. Finaeva,
B.L. Korsunskii, A.V. Il'ichev*

Moscow, Chernogolovka, Balashikha, Russia

15:50–16:05

SHS-produced ceramic composites in the Al–SiO₂ system:

Features of interphase interactions

A.V. Karpov, S.G. Vadchenko, A.S. Shchukin, A.E. Sytshev

Chernogolovka, Russia

16:05–16:20

Coffee break

16:20–16:40

Solution-combustion synthesis of nanosized Co-Ni catalysts immobilized
on glass fiber

Z.R. Ismagilov, N.V. Shikina, S.A. Yashnik, Z.A. Mansurov

Novosibirsk, Kemerovo, Russia

Almaty, Republic of Kazakhstan

16:40–16:55

Spray solution combustion synthesis of metal and metal oxide microspheres

G.V. Trusov, A.B. Tarasov, S.I. Roslyakov, A.S. Rogachev, A.S. Mukasyan

Moscow, Chernogolovka, Russia

Notre Dame, USA

16:55–17:10

Combustion synthesis of NiAl: Influence of NaCl additive on combustion
and product patterning

V.V. Kurbatkina, E.I. Patsera, A.Zh. Rakhimova, A.G. Bodyan,

E.A. Levashov, A.I. Logacheva, D.Yu. Kovalev

Moscow, Korolev, Chernogolovka, Russia

17:10–17:25

Industrial-scale implementation of SHS-produced materials and electrospark
alloying in mechanical engineering and metallurgy

A.E. Kudryashov, Yu.S. Pogozhev, E.I. Zamulaeva, E.A. Levashov

Moscow, Russia

17:25–17:40

High-temperature phase transition in SHS-produced boron carbide

S.V. Konovalikhin, V.I. Ponomarev, D.Yu. Kovalev

Chernogolovka, Russia

17:40–17:55

Combustion of Ti + 0.5C mixtures at reduced ambient pressure: Influence of mechanoactivation and thermal treatment in vacuum

N.A. Kochetov, B.S. Seplyarskii

Chernogolovka, Russia

17:55–18:40

Poster session

WEDNESDAY, NOVEMBER 30

Plenary session

Chairman **Z.A. Mansurov**

10:00–10:20

Chain branching thermal explosion

V.V. Azatyan

Chernogolovka, Russia

10:20–10:40

SHS-produced cast refractory Ni and Ti aluminides and Nb compounds for reprocessing into micro granules used in 3D additive technologies

V.N. Sanin, V.I. Yukhvid, D.E. Andreev, D.M. Ikornikov, E.A. Levashov,

Yu.S. Pogozhev, M.I. Karpov

Moscow, Chernogolovka, Russia

10:40–10:55

Visualization of wave propagation by differential ns chronoscopy

P.Yu. Gulyaev

Khanty-Mansiysk, Russia

10:55–11:10

Low-temperature oxidation and combustion of drops in microgravity

S.M. Frolov, V.Ya. Basevich, S.N. Medvedev, F.S. Frolov

Moscow, Russia

11:10–11:25

Effect of granulation on burning velocity and mode of SHS reactions

B.S. Seplyarskij, R.A. Kochetkov

Chernogolovka, Russia

11:25–11:40

Self-propagating thermal waves in metallic glasses

A.S. Rogachev, S.G. Vadchenko, A.A. Aronin, A.S. Mukasyan

Chernogolovka, Russia

Notre Dame, USA

11:40–11:55

Synthesis of superhard (Ta, Hf)C carbide from the elements

E.I. Patsera, V.V. Kurbatkina, E.A. Levashov, N.A. Kochetov

Moscow, Russia

11:55–12:10

Reactive nanocomposites: Surface contact area and activation energy of Ni–Al

C.E. Shuck and A.S. Mukasyan

Notre Dame, USA

12:10–12:25

Passivation of pyrophoric powders in an unsteady mode:

Theoretical analysis

B.S. Seplyarskii, T.P. Ivleva, M.I. Alymov

Chernogolovka, Russia

12:25–12:40

Innovation, combined nanotechnology ERI/ SHS and the system ER–2S

M. Poladashvili, G. Tavadze, G. Oniashvili, A. Khvadagiani,

Z. Aslamazashvili, G. Zakharov

Tbilisi, Georgia

12:40–13:10

Closing ceremony

13:10–14:30

Lunch

14:30–18:00

Sightseeing

19:00

Farewell party

POSTER PRESENTATIONS

Characteristics of shock-compressed gas in explosion welding

M.I. Alymov, I.S. Gordopolova, A.A. Deribas

Chernogolovka, Russia

Cast low-density high entropy alloys by combined centrifugal casting–SHS process

D.M. Ikornikov, V.N. Sanin, D.E. Andreev, N.V. Sachkova, V.I. Yukhvid

Chernogolovka, Russia

Cast protective Mo₂NiB₂-based coatings by centrifugal SHS

D.M. Ikornikov, V.N. Sanin, D.E. Andreev, V.I. Yukhvid, B. Derin, O. Yucel

Chernogolovka, Russia

Istanbul, Turkey

Random close packing of combustion reactions

V.V. Klyucharev, S.V. Klyuchareva

Chernogolovka, Russia

Contribution of SHS to metallic powders production for 3D additive technology

E.A. Levashov, A.A. Zaitsev, Zh.A. Sentyurina, Yu.S. Pogozhev,

V.V. Kurbatkina, V.N. Sanin, V.I. Yukhvid, D.E. Andreev, A.I. Logacheva,

A.N. Timofeev

Moscow, Korolev, Chernogolovka, Russia

Centrifugal metallothermic SHS of cast Co–Cr–Mo–alloy and formation of ultrafine grain structure by plastic deformation

V.N. Sanin, D.N. Ikornikov, V.I. Yukhvid, S.A. Bozhko, E.V. Golosov,

Yu.R. Kolobov

Belgorod, Chernogolovka, Russia

Structural investigation of Co- and Ni-based cast alloys obtained by combined use of SHS and remelting

V.V. Sanin, Yu.A. Anikin, V.I. Yukhvid, M.R. Filonov

Moscow, Chernogolovka, Russia

Highly porous metallic materials obtained from nickel hollow microspheres by spark plasma sintering

G.V. Trusov, A.B. Tarasov, D.O. Moskovskih, A.S. Rogachev, A.S. Mukasyan

Chernogolovka, Moscow, Russia

Notre Dame, USA

Glass formation and crystallization of Cu–Ti alloy
during high-energy ball milling

*N.F. Shkodich, A.S. Rogachev, S.G. Vadchenko, I.D. Kovalev,
A.A. Nepapushev*
Chernogolovka, Moscow, Russia

Solution-combustion synthesis of powders for optical ceramics

*M.I. Alymov, A.V. Galakhov, V.A. Zelenskii, L.V. Kovalenko,
I.V. Tregubova*
Moscow, Chernogolovka, Russia

Shock compaction of W–Teflon powder mixtures

M.I. Alymov, S.G. Vadchenko, I.V. Saikov, I.D. Kovalev
Chernogolovka, Russia

Optical emission during combustion synthesis of ZnS

V.Yu. Barinov, A.A. Markov, L.M. Umarov, I.A. Filimonov
Chernogolovka, Moscow, Russia

Generation of voltage during combustion of Ti–B mixtures:

Effect of B content

V.Yu. Barinov, V.A. Scherbakov
Chernogolovka, Russia

SHS of silicon nitride fibers

*T.V. Barinova, I.P. Borovinskaya, T.I. Ignat'eva, Yu.N. Barinov,
I.D. Kovalev, A.S. Shchukin*
Chernogolovka, Russia

SHS of solid solution $(Al_n)_x(SiC)_{1-x}$: Some features of product patterning

I.P. Borovinskaya, T.G. Akopdzhanyan, E.A. Chemagina, N.V. Sachkova
Chernogolovka, Russia

Shock-assisted synthesis

S.N. Buravova
Chernogolovka, Russia

Discreteness and ergodicity of SHS in chronographic representation of
thermal imaging data

A.V. Dolmatov, P.Yu. Gulyaev, I.V. Milyukova, V.A. Mokrushin
Khanty-Mansiysk, Russia

On the possibility of gasless detonation in condensed matter

S.A. Zelepugin, O.V. Ivanova

Tomsk, Russia

Non-isothermal decomposition of 1-[2,2-bis(methoxy-*n*NO-azoxy)ethyl]-4-nitropyrazole

V.V. Zakharov, I.N. Zyuzin, B.L. Korsunskii, D.B. Lempert,

N.V. Chukanov, Shu Yuantsze

Chernogolovka, Russia

Xi'an, Shanxi, China

Solution-combustion synthesis of Mn–La and Mn–Ce catalysts for oxidation of hydrocarbons

Z.R. Ismagilov, N.V. Shikina, A.A. Gavrilova

Novosibirsk, Kemerovo, Russia

Autowave processes in condensed organic systems: Organic SHS

E.G. Klimchuk

Chernogolovka, Russia

Organic SHS: Mechanism, kinetics, and mathematical modeling

E.G. Klimchuk, A.G. Tarasov

Chernogolovka, Russia

Organic SHS: Acoustic effects, combustion macrokinetics, and product structure

E.G. Klimchuk, A.L. Parakhonskii

Chernogolovka, Russia

Combustion of Ti₂AlN in nitrogen

A.A. Kondakov, I.A. Studenikin, A.V. Linde, V.V. Grachev

Chernogolovka, Russia

SHS reaction in Ti–Al–C powder mixtures as initiated by electron beam

O.K. Lepakova, G.V. Potemkin, N.N. Golobokov, A.E. Ligachyov,

M.V. Zhidkov, Yu.R. Kolobov, Yu.M. Maksimov, N.N. Koval',

A.D. Teresov

Moscow, Belgorod, Tomsk, Chernogolovka, Russia

Combustion of Al-doped gun powder

V.A. Poryazov, A.Yu. Krainov

Tomsk, Russia

Quantization of nob-equilibrium surface layer

M.B. Saikhanov

Grosny, Russia

Combustion of powdered and granulated Ti–C mixtures:

Influence of inert additive

B.S. Seplyarskii, R.A. Kochetkov

Chernogolovka, Russia

SHS of TiC composite with a Ni binder from powdered and granulated green mixtures

B.S. Seplyarskii, R.A. Kochetkov

Chernogolovka, Russia

Thermal explosion in the Ni–Al–Nb system: Some features of product patterning

A.E. Sytshev, D. Vrel, O.D. Boyarchenko, D.C. Khrenov, N.V. Sachkova, I.D. Kovalev

Chernogolovka, Russia

Villetaneuse, France

Intermetallic-based carbon-containing composited by SHS method

A.E. Sytshev, V.E. Vaganov, A.S. Shchukin, S.G. Vadchenko,

O.D. Boyarchenko, I.D. Kovalev, D.S. Khrenov

Chernogolovka, Russia

A method for fabrication of aluminum nitride and oxynitride powders

S.A. Tikhomirov, M.I. Alymov, A.A. Alekseev, O.D. Tarasov,

I.O. Pahilo-Daryal

Moscow, Chernogolovka, Russia

SHS-produced porous catalysts with adjustable properties

V.I. Uvarov, V.E. Loryan, S.V. Uvarov, I.P. Borovinskaya

Chernogolovka, Russia

Non-isothermal synthesis of catalytic systems for decomposition of organic compounds

L.N. Chuhlomina, Yu.M. Maksimov

Tomsk, Russia

Layered media and some aspects of their SHS fabrication

K.G. Shkadinsky, S.A. Rogachev, P.M. Krishenik

Chernogolovka, Russia

Kinetics of heat release during electrothermal explosion in the Ta–C system

V.A. Shcherbakov, A.V. Shcherbakov

Chernogolovka, Russia

Kinetics of heat release during electrothermal explosion in the Ta–C system

V.A. Shcherbakov, A.V. Shcherbakov, S.A. Bostandzhiyan

Chernogolovka, Russia