

## CURICULUM VITAE

NAME Sytshev Alexander Eugen'evich DATE OF BIRTH 03.09.1960	POSITION TITLE Materials Science Laboratory, Head
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### Education/Training

INSTITUTION(S) AND LOCATION	DEGREE(S)	YEAR(S)	FIELD(S) OF STUDY
Moscow Physical-Engineering Institute, Moscow, Russia	Master of Sci.	1983	Chemical Engineering
Merzhanov Institute of Structural Macrokinetics and Materials Science, Russian Academy of Sciences, Chernogolovka, Moscow Region, Russia	Ph.D	1991	Chemical Physics

### Employments

- Junior Researcher, Institute of Chemical Physics, Russian Academy of Sciences, Chernogolovka, Moscow region, 1983-1989;
- Researcher, Institute of Structural Macrokinetics, Russian Academy of Sciences, Chernogolovka, Moscow region, 1989-1993;
- Senior Researcher, Institute of Structural Macrokinetics and Materials Science, Russian Academy of Sciences, Chernogolovka, Moscow region, 1993-1999;
- Deputy Director, Merzhanov Institute of Structural Macrokinetics and Materials Science, Russian Academy of Sciences, Chernogolovka, 1999-2018;
- Materials Science Laboratory, Head, Merzhanov Institute of Structural Macrokinetics and Materials Science, Russian Academy of Sciences, Chernogolovka, 2009-present.

### Research Areas

- Combustion of Heterogeneous Systems
- Self-propagating High-Temperature Synthesis (SHS) of Advanced Materials
- Structure and Phase Formation
- SHS under microgravity
- SHS of Intermetallic
- SHS Joining
- MAX-phases
- Nanolaminate materials, multilayered graphite

### Memberships

- Scientific Council of the Institute of Structural Macrokinetics and Materials Science (ISMAN), Member, 1999-present;
- International Journal of SHS, Executive Secretary, 1992 – present
- Coordinator-International Symposia on SHS (Moscow Russia, Aug. 1999; Haifa, Israel, Oct. 2001; Cracow, Poland, Jul. 2003; Cagliari, Italy, Jun. 2005; Dijon, France, Jun. 2007; Anavyssos, Greece, Sept. 2011; South Padre Island, TX, USA Oct. 2013)
- Coordinator-French-Russian Workshops on SHS, Chernogolovka, Russia, Oct. 2003; Vilantanesse, France, Aug. 2006

- Member of the Program Committee of the International Conference " Synthesis and Consolidation of Powder Materials (SCPM-2018)", October 23 – 26, 2018, Chernogolovka, Russia
- Member of the Organizing Committee of the International Symposium on the Explosion of New Materials: Science, Technology, Business and Innovation (EPNM-2018), May 14-18, 2018, St. Petersburg, Russia
- Chairman of the Local Organizing Committee of the International Conference "SHS-50", dedicated to the 50th anniversary of the scientific discovery " The phenomenon of wave localization of self-braking solid-phase reactions...", November 20-21, 2017, Chernogolovka, Russia
- Chairman of the Local Organizing Committee of the International Conference "Non-Isothermal Phenomena and Processes: from the theory of thermal explosion to Structural Macrokinetics", November 28 – 30, 2016, Chernogolovka, Russia
- Member of the Organizing Committee of the International Symposium on the Explosion of New Materials: Science, Technology, Business and Innovation (EPNM-2016), 20 – 24 June, 2016, Coimbra, Portugal
- Member of the Organizing Committee of the Japanese-Russian Workshop on SHS, Karlovy Vary, 1998; 1 st First Sino-Russian Workshop on SHS, Sep. 20-23, 2000 Beijing.
- Member of the Program Committee of the Third International Conference on Combustion and Detonation " Zel'dovich Memorial", dedicated to the 100th anniversary of the birth of Academician Ya. B. Zel'dovich, 27-31 October 2014, Moscow, Russia
- Member of the Organizing Committee of the XII International Symposium on Explosive New Materials: Science, Technology, Business and Innovation (EPNM-2014), 25 – 30 May, 2014, Krakow, Poland
- Member of the Organizing Committee of the Italian-Russian Seminar "New achievements and problems in the field of self-propagating high-temperature synthesis", April 16-17, 2012, Cagliari, Italy
- Chairman of the Local Organizing Committee of the International Conference "Non-Isothermal Phenomena and Processes: from the theory of thermal explosion to structural Macrokinetics", November 27-30, 2011, Chernogolovka, Russia
- Chairman of the Coordination Subcommittee International Meeting "Obtaining new materials using combustion and explosion ", May 2-8, 2011, Svetlogorsk, Kaliningrad region, Russia
- Coordinator of the IX International Symposium "Using Explosion Energy to produce Materials with New Properties: Science, Technology, Business and Innovation" (EPNM-2008), 6-9 May 2008, Lisse, the Netherlands
- Coordinator of the International Conference "Non-Isothermal Phenomena and Processes", dedicated to the 75th anniversary of Academician of the Russian Academy of Sciences and foreign member of the National Academy of Sciences of the Republic of Armenia A. G. Merzhanov, November 27 – December 1, 2006, Yerevan, Republic of Armenia
- Member of the Local Organizing Committee of the "International Symposium on Explosive Production of New Materials: Science, Technology, Business and Innovations (EPNM-2006)", September 11 – 14, 2006, Moscow, Russia
- Member, Council on space of the Russian Academy of Sciences, Expert section "Fundamental problems of physics in microgravity", 2016-present
- etc.

### **Some Awards**

- Award of the William and Mary Greve Foundation, Inc., 1994
- Diploma of the President of Russian Academy of Sciences, 1999
- Diploma of the Federal Agency for Scientific Organizations (FASO Russia), 2017
- Gratitude of the Governor of the Moscow region, for many years of fruitful activity, 2020

## Current Research Projects

My research interests are in fundamental studies of mechanisms for rapid high temperature heterogeneous reaction and in developing of novel approaches for materials synthesis, self-propagating high-temperature synthesis (SHS), SHS of intermetallic, SHS joining (welding), MAX-phases, diffusion processes.

## Publication activity

WoS Researcher ID AAF-2871-2020

Scopus Author ID 6507794642

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## Selected publications

### 2021

1. Aborkin, A.V., Elkin, A.I., Reshetniak, V.V., Ob'edkov, A.M., Sytshev, A.E., Leontiev, V.G., Titov, D.D., Alymov, M.I.  
Thermal expansion of aluminum matrix composites reinforced by carbon nanotubes with in-situ and ex-situ designed interfaces ceramics layers  
(2021) Journal of Alloys and Compounds, 872, 159593.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85103429006&doi=10.1016%2Fj.jallcom.2021.159593&partnerID=40&md5=1de03f5f3caeb80cd1502814fed082cf>  
DOI: 10.1016/j.jallcom.2021.159593
2. Kochetov, N.A., Sytshev, A.E.  
Effects of magnesium on initial temperature and mechanical activation on combustion synthesis in Ti–Al–Mg system  
(2021) Materials Chemistry and Physics, 257, 123727.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85090713890&doi=10.1016%2Fj.matchemphys.2020.123727&partnerID=40&md5=c62d37888ecf674918b0c2515a973229>  
DOI: 10.1016/j.matchemphys.2020.123727
3. Busurina, M.L., Sytshev, A.E., Karpov, A.V., Sachkova, N.V., Kovalev, I.D.  
Synthesis of an Intermetallic Alloy Based on 2Cu–Ti–Al: Structure Analysis and Electrophysical Properties  
(2021) Russian Journal of Non-Ferrous Metals, 62 (1), pp. 82-88.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85102176347&doi=10.3103%2FS1067821221010053&partnerID=40&md5=ead3bf97f06fe560d389392065319694>  
DOI: 10.3103/S1067821221010053

### 2020

4. Busurina, M.L., Sytshev, A.E., Karpov, A.V., Sachkova, N.V., Kovalev, I.D.  
Peculiarities of the Structure and Phase Formation of the Fe<sub>2</sub>TiAl Heusler Alloy during Self-Propagating High-Temperature Synthesis (SHS)  
(2020) Russian Journal of Physical Chemistry B, 14 (6), pp. 999-1006.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85099930621&doi=10.1134%2FS1990793120060020&partnerID=40&md5=a1415f9152dbdfbfa14988bfea7eb336>  
DOI: 10.1134/S1990793120060020

5. Shchukin, A.S., Konovalikhin, S.V., Kovalev, D.Y., Sytshev, A.E.  
Composition and Crystalline Structure of Ternary Phases in the Ta–Ni–Al System  
(2020) Russian Journal of Non-Ferrous Metals, 61 (3), pp. 303-308.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087462549&doi=10.3103%2fS1067821220030141&partnerID=40&md5=236f16c03a7f0f5a7bccfcff568d2abc>  
DOI: 10.3103/S1067821220030141
6. Aborkin, A.V., Elkin, A.I., Sytshev, A.E., Alymov, M.I.  
Wear under Conditions of Dry Friction of a Composite Material Based on an Aluminum Alloy Reinforced with Nanocrystalline Graphite  
(2020) Journal of Friction and Wear, 41 (3), pp. 236-241.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85086803334&doi=10.3103%2fS1068366620030022&partnerID=40&md5=f4023b7f9282fcacc32c66d92d87e4d5>  
DOI: 10.3103/S1068366620030022
7. Shchukin, A.S., Sytshev, A.E.  
SHS Joining of Ta with NiAl: Structure of Transition Zone  
(2020) International Journal of Self-Propagating High-Temperature Synthesis, 29 (2), pp. 131-132.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087314549&doi=10.3103%2fS1061386220020120&partnerID=40&md5=a9ddb218e9834fc808a7fc911b219b33>  
DOI: 10.3103/S1061386220020120
8. Kondakov, A.A., Karpov, A.V., Grachev, V.V., Sytshev, A.E.  
Temperature Dependence of Electrical Resistivity of the TiN/TiAl<sub>3</sub>/Ti<sub>2</sub>AlN Composite Material  
(2020) Russian Journal of Non-Ferrous Metals, 61 (2), pp. 216-220.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85084705923&doi=10.3103%2fS106782122002008X&partnerID=40&md5=5c1667daa6a29bef0c2d6fa98dbd8dd2>  
DOI: 10.3103/S106782122002008X
9. Shchukin, A.S., Kovalev, D.Y., Sytshev, A.E., Shcherbakov, A.V.  
Formation of New Intermetallic Phases in the Ta–Ni–Al System  
(2020) Inorganic Materials: Applied Research, 11 (2), pp. 271-276.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85083359660&doi=10.1134%2fS2075113320020355&partnerID=40&md5=295c5a3a3dbcb9915293c984fa3d7938>  
DOI: 10.1134/S2075113320020355
10. Aborkin, A.V., Saikov, I.V., Berbentsev, V.D., Ob"edkov, A.M., Sytshev, A.E., Alymov, M.I.  
The Use of Gas Extrusion for the Synthesis of a High-Strength Composite Based on a 5xxx Series Aluminum Alloy Strengthened with Carbon Nanostructures  
(2020) Technical Physics Letters, 46 (3), pp. 207-210.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85083998819&doi=10.1134%2fS1063785020030025&partnerID=40&md5=f79b0fa3c31b076162559a19b2afa532>

DOI: 10.1134/S1063785020030025

11. Sytshev, A.E., Kochetov, N.A., Shchukin, A.S., Busurina, M.L., Aborkin, A.V. Structure and Properties of SPS-produced Carbon-Containing NiAl (2020) International Journal of Self-Propagating High-Temperature Synthesis, 29 (1), pp. 58-60.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85083188922&doi=10.3103%2fS1061386220010124&partnerID=40&md5=f7d2161f99ea8ad4036ae239504154bf>  
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## 2019

12. Sytshev, A.E., Kochetov, N.A., Vadchenko, S.G., Kovalev, D.Y., Shchukin, A.S. Processing of Ni–Al intermetallic with 2D carbon components (2019) Materials Chemistry and Physics, 238, 121898, .  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85069628519&doi=10.1016%2fj.matchemphys.2019.121898&partnerID=40&md5=64386ddf7ebe0281ba20f66f030008f9>  
DOI: 10.1016/j.matchemphys.2019.121898
13. Aborkin, A.V., Khorkov, K.S., Kremlev, K.V., Ob'Edkov, A.M., Sytshev, A.E. The influence of hybrid nanostructures TiC/MWCNT concentration on the properties of bulk composites based on aluminum alloy (2019) Journal of Physics: Conference Series, 1331 (1), 012001, .  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85077823153&doi=10.1088%2f1742-6596%2f1331%2f1%2f012001&partnerID=40&md5=ae1db209a6f0b8c95b68d013765100e0>  
DOI: 10.1088/1742-6596/1331/1/012001
14. Shchukin, A.S., Sytshev, A.E. Peculiarities of a NiAl/Mo Transition Zone Formed during Self-Propagating High-Temperature Synthesis (2019) Physics of Metals and Metallography, 120 (9), pp. 848-852.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073212929&doi=10.1134%2fS0031918X19090138&partnerID=40&md5=bf8e2bbbf8ac8a042654bbf84d2e0c1a>  
DOI: 10.1134/S0031918X19090138
15. Gorshkov, V.A., Miloserdov, P.A., Karpov, A.V., Shchukin, A.S., Sytshev, A.E. Investigation of the Composition and Properties of a Cr<sub>2</sub>AlC MAX Phase-Based Material Prepared by Metallothermic SHS (2019) Physics of Metals and Metallography, 120 (5), pp. 471-475.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85067378309&doi=10.1134%2fS0031918X19050041&partnerID=40&md5=28d2cfedeb13db1543f741974b07f196>  
DOI: 10.1134/S0031918X19050041
16. Busurina, M.L., Belousova, O.V., Kovalev, I.D., Sytshev, A.E. d<sub>0</sub>-ferromagnetism in SHS titanium nitride treated by ball milling (2019) Eurasian Chemico-Technological Journal, 21 (4), pp. 347-352.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85077701025&doi=10.18321%2fectj892&partnerID=40&md5=3112ccfd88e437241271c3d62b85ee8e>

DOI: 10.18321/ectj892

17. Aborkin, A.V., Elkin, A.I., Evdokimov, I.A., Sachkova, N.V., Sytshev, A.E.  
Effect of type of ceramic particles on efficiency of gas dynamic spraying and hardness of hybrid coatings AlMg6/C60  
(2019) IOP Conference Series: Materials Science and Engineering, 525 (1), 012001.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85067811882&doi=10.1088%2f1757-899X%2f525%2f1%2f012001&partnerID=40&md5=99e19e791f9d3885a17c92cfc4f89199>  
DOI: 10.1088/1757-899X/525/1/012001

## 2018

18. Karpov, A.V., Konovalikhin, S.V., Borovinskaya, I.P., Sachkova, N.V., Kovalev, D.Y., Sytshev, A.E.  
Conductive TiB<sub>2</sub>-AlN-BN-Based Composite SHS Ceramics  
(2018) Russian Journal of Non-Ferrous Metals, 59 (6), pp. 658-663.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85060858771&doi=10.3103%2fS1067821218060081&partnerID=40&md5=6ec21c2c819858627fac743fcd0be662>  
DOI: 10.3103/S1067821218060081
19. Shchukin, A.S., Vadchenko, S.G., Sytshev, A.E.  
Features of Microstructure Formation in the Ni-Al-W System during SHS  
(2018) Russian Journal of Non-Ferrous Metals, 59 (5), pp. 583-588.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85055432468&doi=10.3103%2fS1067821218050164&partnerID=40&md5=2cde3a246d4650e9f81121ebbb93d5a3>  
DOI: 10.3103/S1067821218050164
20. Shchukin, A.S., Vrel, D., Sytshev, A.E.  
Interaction of NiAl Intermetallic During SHS Synthesis with Ta Substrate  
(2018) Advanced Engineering Materials, 20 (8), 1701077, .  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85041803543&doi=10.1002%2fadem.201701077&partnerID=40&md5=044f9c364b1c09eba819257a0794ee62>  
DOI: 10.1002/adem.201701077
21. Shchukin, A.S., Scherbakov, A.V., Sytshev, A.E., Shcherbakov, V.A.  
Synthesis of composite based on W-Ni-Al system by the electro-thermal explosion under pressure  
(2018) Letters on Materials, 8 (3), pp. 274-277.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85053622117&doi=10.22226%2f2410-3535-2018-3-274-277&partnerID=40&md5=672295cfb0e1179c5a607fe1adbf809b>  
DOI: 10.22226/2410-3535-2018-3-274-277
22. Xanthopoulou, G., Thoda, O., Roslyakov, S., Steinman, A., Kovalev, D., Levashov, E., Vekinis, G., Sytshev, A., Chroneos, A.

- Solution combustion synthesis of nano-catalysts with a hierarchical structure  
(2018) Journal of Catalysis, 364, pp. 112-124.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85047756141&doi=10.1016%2fj.jcat.2018.04.003&partnerID=40&md5=5b0f74be86c001febdb367b1a87cdc5f>  
DOI: 10.1016/j.jcat.2018.04.003
23. Shchukin, A.S., Sytshev, A.E.  
Effect of a NiO Additive on Interaction in a Ni–Al–W System in Self-Propagating High-Temperature Synthesis  
(2018) Combustion, Explosion and Shock Waves, 54 (4), pp. 433-441.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85052223063&doi=10.1134%2fS001050821804007X&partnerID=40&md5=15470d4c361154a583f3512fef451700>  
DOI: 10.1134/S001050821804007X
24. Karpov, A.V., Kovalev, D.Y., Borovinskaya, I.P., Sytshev, A.E.  
Electrically Conducting Ceramics Based on Al–AlN–TiB<sub>2</sub>  
(2018) High Temperature, 56 (4), pp. 527-531.  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85053464233&doi=10.1134%2fS0018151X18040089&partnerID=40&md5=0a58ff472c801d0ec09ea7c3eac8792c>  
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- Aborkin, A.V., Sobol'Kov, A.V., Kireev, A.V., Volochko, A.T., Izobello, A.Y., Sachkova, N.V., Sytshev, A.E.  
Morphology, granulometric and structural phase composition of mechanically synthesized composite powder Al-Mg+Al/MWCNTs  
(2018) Journal of Physics: Conference Series, 951 (1), 012008, .  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85042349338&doi=10.1088%2f1742-6596%2f951%2f1%2f012008&partnerID=40&md5=18d026bf4bec15702af75edd28e5412b>  
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25. Sytshev, A.E., Vadchenko, S.G., Boyarchenko, O.D., Shchukin, A.S.  
Ni<sub>3</sub>Al/C Composites by Thermal Explosion  
(2018) International Journal of Self-Propagating High-Temperature Synthesis, 27 (1), pp. 64-65.  
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## 2017

26. Shchukin, A.S., Sytshev, A.E.  
Fine structure of transition layer formed between NiAl melt and W substrate during self-propagating high-temperature synthesis  
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27. Kovalev, D.Y., Luginina, M.A., Sytshev, A.E.  
Reaction synthesis of the Ti<sub>2</sub>AlN MAX-phase  
(2017) Russian Journal of Non-Ferrous Metals, 58 (3), pp. 303-307.  
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28. Sytshev, A.E., Vrel, D., Boyarchenko, O.D., Roshchupkin, D.V., Sachkova, N.V.  
Combustion synthesis in bi-layered (Ti–Al)/(Ni–Al) system  
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Combustion synthesis in the Ni–Al–Nb ternary system: A Time-Resolved X-ray  
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30. Karpov, A.V., Vadchenko, S.G., Shchukin, A.S., Sychev, A.E.  
Particularities of interphase interaction in composite ceramic based on the system Al–SiO<sub>2</sub> in the process of self-propagating high-temperature synthesis (SHS)  
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DOI: 10.1007/s10717-017-9882-7
31. Boyarchenko, O.D., Sychev, A.E., Umarov, L.M., Shchukin, A.S., Kovalev, I.D., Sichinava, M.A.  
Structure and properties of a composite material obtained by thermal explosion in a mixture of Ni + Al + Cr<sub>2</sub>O<sub>3</sub>  
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32. Sytshev, A.E., Vrel, D., Boyarchenko, O.D., Khrenov, D.S., Sachkova, N.V., Kovalev, I.D.  
SHS joining by thermal explosion in (Ni + Al)/Nb/(Ni + Al + Nb) sandwiches:  
Microstructure of transition zone



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Synthesis of a new MAX phase in the Ti–Zr–Al–C system

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## 2016

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