DMITRY YAKHVAROV

Institute of Organic and Physical Chemistry - Subdivision of the Federal State Budgetary Institution of Science "Kazan Scientific Center of the Russian Academy of Sciences"
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Date of birth: April 3, 1974

GENERAL SUMMARY

- **Professor Doctor of Chemical Science**

- Over 27 years of laboratory and research experience in Inorganic, Organic and Physical chemistry as well as Catalysis, Electrochemistry, Electrosynthesis, Electrocatalysis, Organometallic and Organoelement chemistry. More than 100 publications, *h-index* = 16(Scopus), 17 (Web of Science).

- **Scientific interests:** chemistry of element and low-coordinated phosphorus, highly reactive organometallic and phosphorus intermediates, phosphinidenes, homogeneous catalysis, problems of electrolysis, electrochemical phenomena, red-ox processes, electroanalytical methods, coupling reactions, ecological problems, chemistry of fullerenes, etc**.**

PROFESSIONAL EXPERIENCE

INSTITUTE OF ORGANIC AND PHYSICAL CHEMISTRY - SUBDIVISION OF THE FEDERAL STATE BUDGETARY INSTITUTION OF SCIENCE "KAZAN SCIENTIFIC CENTER OF THE RUSSIAN ACADEMY OF SCIENCES"

CHIEF RESEARCH OFFICER — **06.2017 – PRESENT**
Russian Academy of Sciences — *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry
Laboratory of Organometallic and Coordination compounds

DEPUTY DIRECTOR FOR SCIENCE — **06.2017 – 31.12.2018**
Russian Academy of Sciences — *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry

LEADING RESEARCH OFFICER — **09.2013 – 05.2017**
Russian Academy of Sciences — *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry
Laboratory of Organometallic and Coordination compounds

SENIOR RESEARCH OFFICER **07.2008 – 08.2013**
Russian Academy of Sciences *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry
Laboratory of Organometallic and Coordination compounds
(vice-head of the Laboratory)

SENIOR RESEARCH OFFICER **11.2002 – 06.2008**
Russian Academy of Sciences *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry
Laboratory of Organometallic Synthesis

RESEARCH OFFICER **03.2000 – 10.2002**
Russian Academy of Sciences *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry
Laboratory of Organometallic Synthesis

JUNIOR RESEARCH OFFICER **09.1995 – 02.2000**
Russian Academy of Sciences *Kazan, Russia*
A.E.Arbuzov Institute of Organic and Physical Chemistry
Laboratory of Electrochemistry

KAZAN FEDERAL UNIVERSITY
A.M.BUTLEROV INSTITUTE OF CHEMISTRY

CHIEF RESEARCH OFFICER **02.2017 – PRESENT**
Kazan Federal University *Kazan, Russia*
A.M.Butlerov Institute of Chemistry
Laboratory of Industrial Catalysis

LEADING RESEARCH OFFICER **10.2013 – 09.2016**
Kazan Federal University *Kazan, Russia*
A.M.Butlerov Institute of Chemistry
Laboratory New Catalysts for Petrol Chemistry

EDUCATION

Habilitation in CHEMISTRY (Doctor of Chemical Sciences) **May 2012**
A.E.Arbuzov Institute of Organic and Physical Chemistry of RAS *Kazan, Russia*

Thesis titled: "Electrochemical reactions with participation of elemental (white) phosphorus and organometallic sigma-complexes"

PhD in CHEMISTRY (Candidate of Chemical Sciences) **February 2000**
Kazan State Technological University *Kazan, Russia*

Thesis titled: "Electrochemically induced catalytic processes with participation of organic halides and elemental phosphorus"

M. Sc. in PHYSICAL CHEMISTRY **June 1996**
Kazan State University *Kazan, Russia*
The "red"-diploma (with distinction)

Thesis titled: "Electrochemical arylation and alkylation of white phosphorus and phosphorus chlorides under the action of electrochemically generated Ni(0) complexes"

LANGUAGE ABILITIES

- Russian – mother tongue
- English - fluent

- German – good
- Italian - basic knowledge

EXPERTISE

- Physical Chemistry
- Electrochemistry
- Electrosynthesis
- Electroanalytical Chemistry
- Inorganic Chemistry
- Coordination Chemistry
- Organic Chemistry
- Organoelement Chemistry
- Organometallic Chemistry
- Chemistry of Fullerenes
- Catalysis
- Analytical Chemistry
- Low Temperature and High Pressure NMR
- Spectroscopy

AWARDS, HONOURS, FELLOWSHIPS

- **Medal of the Russian Academy of Science** for prominent Young Scientists in nomination "General and Technical Chemistry" for the best scientific work: *"Electrochemical processes of the chemical bond formation and cleavage at phosphorus and carbon atoms with participation of transition metal complexes".* (2005)

- **Arbuzov award** for prominent young scientist for outstanding researches in the field of organic and organoelement chemistry for the best scientific work *"Transition metal complexes in the processes of the chemical bond formation and cleavage and phosphorus and carbon atoms".* (2006)

- **State Stipend of the Russian Academy of Science** to a prominent Young Scientist. (2002)

- **Personal grants** of the Joint Program between U.S. Civilian Research & Development Foundation **(CRDF)** and Ministry of Education of the Russian Federation "Basic Researches and Higher Education" (BRHE - REC 007)
(2001, 2003)

- **Stipend of the Ernst-Moritz-Arndt-Universität Greifswald** (Germany). The topic of research is "Electrochemically induced polymerization of ethylene by generation of nickel catalyst in the presence of tertiary o-phosphinophenols or their derivatives".
(October-November, 2001)

- **Award of the competition "The best fifty innovative ideas for Republic of Tatarstan"** in the category "Start 1" for the "The newest technology for preparation of organonickel catalysts for ethylene oligomerization process". (2007)

- **Diploma of honor and breastplate of the Ministry of Education and Science of the Republic of Tatarstan** and the Republican Council of the Society of Inventors and Rationalizers of the Republic of Tatarstan in the contest "Best Invention of the Year". (2013)

- **American Chemical Society (ACS) Award** for Actively Reviewing ACS Journal Articles. (2018)

- **Academician M.I. Kabachnik Award**. (2018)

- **L.A. Chugaev Award** for outstanding work in the field of chemistry of complex compounds. (2019)

Russian Scientific Foundation (RSF):

18-13-00442 "The new highly efficient and environmentally safe processes for the production of phosphorus-containing compounds based on the elemental phosphorus and phosphine oxide H_3PO" (2018-2021) - *Leader*

14-13-01122 "Chemistry of phosphine oxide H_3PO - from molecule to functional materials" (2014-2016) - *Leader*

Russian Foundation for Basic Research (RFBR):

01-03-33210 "Development of strategy for electrosynthesis of organophosphorus compounds with P-C bonds starting from white phosphorus under conditions of catalysis by metal complexes" (2001-2003) - *Executor*

02-03-32932 "Synthesis of new fulleroides and their heteroanalogues with electron withdrawing phosphorus, sulphur, nitrogen containing substitutes - as an approach to the creation of fullerene molecules, possessing the electron affinity large than that of parent C60" (2002-2004) – *Executor*

03-03-04012-DFG "Cyclopentaphosphanid-anion as ligand in organometallic compo unds - synthesis and chemical behaviors" (2003-2005) - *Executor*

03-03-06090 The program of the support of the young scientists for RFBR project 01-03-33210 (2003) - *Leader*

04-03-32830 "Electrochemical generation of high-reactive phosphorus and germanium compounds, their stabilization methods and using for organic carbon-element bond formation" (2004-2006) - *Executor*

05-03-08039 "Development of the strategy and bases of technology of electrosynthesis for electrosynthesis of organophosphorus compounds starting from white phosphorus" (2005-2007) - *Executor*

05-03-32418 "Synthesis of the individual bis(azohomo)fullerene regioisomeres - the new type of the organoelement electron acceptors" (2005-2007) – *Executor*

06-03-32247 "The development and creation of new methods of the chemical bond formation and cleavage at phosphorus and carbon atoms with participation of transition metal complexes" (2006-2008) – *Holder*

09-03-00933 "The development of new methods of generation and stabilization of high-reactive intermediates bearing metal-element sigma-bond" (2008-2010) – *Holder*

12-03-97067 "The creation of new methods of electrochemical generation and activation of organonickel catalysts for ethylene oligomerization process" (2012-2014) - *Holder*

15-43-02667 "The development of new methods for selective production of linear alfa-olefines from ethylene"
(2015-2017) – *Holder*

- **INTAS**-grant Nr. 00-00018
  Coordinator Prof Dr.Maurizio Peruzzini (ICCOM, Florence, Italy).
  Team leader Dr.Yulia Budnikova (IOPC, Kazan, Russia)

- **INTAS Young Scientist Fellowship (Postdoctoral)** "Reactivity of white phosphorus with transition metal hydrides: a way to stoichiometric and electrocatalytic P-H bond formation" N 03-55-2050 (2004-2005)

- **NATO-Russia Collaborative Linkage Grant** "Metal-mediated chemical and electrochemical degradation of white phosphorus residues" CPB.NR.NRCLG 983375 (2008-2010)

- **DFG project** 436 RUS 17/53/03 "Electrochemical generation of low-coordinated phosphorus compounds – nickel-phosphinidene complexes" (2003)

- **DFG project** PE 771/4-1 "Electrochemical spin tuning in new magnetically active dinuclear nickel complexes" (2011-2012)

- **DAAD project** A/11/90605 "Electrochemical and magnetic properties of new organonickel sigma-bonded complexes" (2013)

- **Tatarstan Academy of Science:**

  07-7.1-228 "Electrochemical methods of synthesis of organometallic intermediates" (2004) - *Leader*

  07-7.1-291 "Organometallic complexes of the nickel-subgroup for the synthesis and functionalization of alpha-olefins"(2005-2007) – *Leader*

SCIENTIFIC VISITS

1. **Institut für Chemie und Biochemie, Ernst-Moritz-Arndt-Universität Greifswald (Institute of Chemistry and Biochemistry, University of Greifswald, Germany)**
   DFG-project "Selective oligomerization of monoolefins under the action of complexes of transition metals with P-O and P-N chelating ligands"
   (05.2000 – 10.2000)

2. **Institut für Chemie und Biochemie, Ernst-Moritz-Arndt-Universität Greifswald (Institute of Chemistry and Biochemistry, University of Greifswald, Germany)**
   Stipend of Ernst-Moritz-Arndt-Universität Greifswald (Germany). The topic of research is "Electrochemically induced polymerization of ethylene by generation of nickel catalysts in presence of tertiary o-phosphinophenols or their derivatives"
   (09.2001 – 11.2001)

3. **Ecole Polytechnique, Paleaseau, Paris, France**
   CNRS-project on the topic of "Electrochemical decomplexation in modern phosphinidene chemistry"
   (03.2003 – 05.2003)

4. **Institut für Anorganische Chemie, Universität Leipzig**
   (Institute of Inorganic Chemistry, Leipzig University, Germany)
   DFG-project 436 RUS 17/53/03
   "Electrochemical generation of low-coordinated phosphorus compounds – nickel-phosphinidene complexes"
   (10.2003 – 12.2003)

5. **Istituto di Chimica dei Composti OrganoMetallici (ICCOM-CNR), Firenze**

(Institute of Chemistry of Organometallic Compounds, Florence, Italy)
INTAS Young Scientist Fellowship project "Reactivity of white phosphorus with transition metal hydrides: a way to stoichiometric and electrocatalytic P-H bond formation"
(05.2004 – 09.2004 and 09.2005 – 11.2005)

6. **Institut für Chemie und Biochemie, Ernst-Moritz-Arndt-Universität Greifswald (Institute of Chemistry and Biochemistry, University of Greifswald, Germany)**
Stipend of Ernst-Moritz-Arndt-Universität Greifswald (Germany). The topic of research is "Electrochemical generation of nickel catalysts for ethylene oligomerization process"
(07.2007 – 08.2007)

7. **Istituto di Chimica dei Composti OrganoMetallici (ICCOM-CNR), Firenze (Institute of Chemistry of Organometallic Compounds, Florence, Italy)**
THERMPHOS-project "Electrochemical synthesis of phosphorus compounds from from white phosphorus"
(10.2008 – 11.2008)

8. **Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden (IFW-Dresden) (Leibniz Institute for Solid State and Materials Research Dresden)**
Stipend of IFW-Dresden (Germany).
The topic of research is "Reactivity and stabilization pathways of high-reactive organometallic intermediates and new materials on their base"
(01.10.2009 – 30.11.2009)

9. **Istituto di Chimica dei Composti OrganoMetallici (ICCOM-CNR), Firenze (Institute of Chemistry of Organometallic Compounds, Florence, Italy)**
NATO-Russia CLG project "Metal-Mediated Chemical and Electrochemical Degradation of White Phosphorus Residues"
(02.2009 – 03.2009 and 11.2010 – 12.2010)

10. **Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden (IFW-Dresden) (Leibniz Institute for Solid State and Materials Research Dresden)**
DFG project PE 771/4-1
"Electrochemical spin tuning in new magnetically active dinuclear nickel complexes"
(30.05.2011 - 02.07.2011 and 01.03.2012 - 31.03.2012)

11. **Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden (IFW-Dresden) (Leibniz Institute for Solid State and Materials Research Dresden)**
DAAD project A/11/90605
"Electrochemical and magnetic properties of new organonickel sigma-bonded complexes"
(01.07.2013 - 31.08.2013)

PUBLICATIONS

The main ten publications:

1. **Yakhvarov D.**, Caporali M., Gonsalvi L., Latypov Sh., Mirabello V., Rizvanov I., Sinyashin O., Stoppioni P., Peruzzini M. Experimental evidence of phosphine oxide generation in solution and trapping by ruthenium complexes // *Angew. Chem. Int. Ed.*, **2011**, 50, 5370-5373 (hot paper)
2. **Yakhvarov D.**, Trofimova E., Sinyashin O., Kataeva O., Lönnecke P., Hey-Hawkins E., Petr A., Krupskaya Y., Kataev V., Klingeler R., Büchner B. New Dinuclear Nickel(II) Complexes: Synthesis, Structure, Electrochemical and Magnetic Properties // *Inorg. Chem.*, **2011**, 50(10), 4553-4558.
3. **Yakhvarov D.G.**, Gorbachuk E.V., Sinyashin O.G. Electrode reactions of elemental (white) phosphorus and phosphane PH_3 // *Eur. J. Inorg. Chem.*, **2013**, 4709-4726.

4. **Yakhvarov D.G.**, Khusnuriyalova A.F., Sinyashin O.G. Electrochemical synthesis and properties of organonickel σ-complexes // *Organometallics*, **2014**, 33, 4574-4589.
5. **Yakhvarov D.G.**, Petr A., Kataev V., Büchner B., Gómez-Ruiz S., Hey-Hawkins E., Kvashennikova S.V., Ganushevich Yu.S., Morozov V.I., Sinyashin O.G. Synthesis, structure and electrochemical properties of the organonickel complex [NiBr(Mes)(phen)] (Mes = 2,4,6-trimethylphenyl, phen = 1,10-phenanthroline) // *J. Organomet. Chem.*, **2014**, 750, 59-64.
6. Fomina O.S., Kislitsyn Y.A., Babaev V.M., Rizvanov I.K., Sinyashin O.G., Heinicke J.W., **Yakhvarov D.G.** Electrochemical properties and catalytic activity in the ethylene polymerization processes of nickel complexes with 2,2′-bipyridine in the presence of ortho-phosphinophenol derivatives // *Russ. J. Electrochem.*, **2015**, 51, 1069-1078.
7. Gorbachuk E.V., Badeeva E.K., Zinnatullin R.G., Pavlov P.O., Dobrynin A.B., Gubaidullin A.T., Ziganshin M.A., Gerasimov A.V., Sinyashin O.G., **Yakhvarov D.G.** Polymorphism and thermodynamic properties of chloro(cyclopentadienyl)bis(triphenylphosphine)ruthenium(II) complex // *J. Organomet. Chem.*, **2016**, 805, 49-53.
8. Gafurov Z.N., Sinyashin O.G., **Yakhvarov D.G.** Electrochemical methods for synthesis of organoelement compounds and functional materials // *Pure Appl. Chem.,* **2017**, 89, 1089-1103.
9. Khusnuriyalova A.F., Petr A., Gubaidullin A.T., Sukhov A.V., Morozov V.I., Büchner B., Kataev V., Sinyashin O.G., **Yakhvarov D.G.** Electrochemical generation and observation by magnetic resonance of superparamagnetic cobalt nanoparticles // *Electrochim. Acta*, **2018**, 260, 324-329.
10. Luconi L., Rossin A., Tuci G., Gafurov Z., Lyubov D.M., Trifonov A.A., Cicchi S., Ba H., Pham-Huu C., **Yakhvarov D.**, Giambastiani G. Benzoimidazole-pyridylamido zirconium and hafnium alkyl complexes as homogeneous catalysts for the tandem carbon dioxide hydrosilylation to methane // *ChemCatChem*, **2019**, 11(1), 495-510.

PATENTS

1. **Yakhvarov D.G.**, Lukin R.Yu., Gorelov S.M., Morozov A.N., Erschov O.L., Goryachkina O.M., Podoynitsyna I.M, Polivanov A.N., Myasnikov A.A., Mubarakshina G.K., Zobneva O.Yu. «Process for the preparation of tetremethylammonium hydroxide» // Russ. Pat. № 2647845 published 21.03.2018, priority 04.05.2017.

2. **Yakhvarov D.G.**, Lukin R.Yu. «Process for the preparation of an additive vulcanization catalyst for silicone rubbers based on solutions of platinum complexes (0) and a catalyst prepared by this method» // Russ. Pat. № 2644153 published 08.02.2018, priority 28.04.2017.

3. Mindubaev A.Z., Alimova F.K., Voloshina A.D., Gorbachuk E.V., Kulik N.V., Minzanova T.S., Tukhbatova R.I., **Yakhvarov D.G.** «Process for white phosphorus detoxication using stamm of Trichoderma asperellum F-1087» // Russ. Pat. № 2603259 published 29.08.2016, priority 28.07.2015.

4. **Yakhvarov D.G.**, Kagirov R.M., Sinyashin O.G. «Process for preparation of phosphorous acid from white phosphorus» // Russ. Pat. № 2460687 published 10.09.2012, priority 25.02.2011.

5. **Yakhvarov D.G.**, Yakhvarova N.A., Trofimova E.A., Sinyashin O.G. «Electrochemical flow cell for preparation of organonickel sigma-complexes» // Russ. Pat. № 97132 published 27.08.2010, priority 19.04.2010.

6. **Yakhvarov D.G.**, Ganushevich Yu.S., Trofimova E.A., Sinyashin O.G. «Electrochemical method of organonickel sigma-complexes preparation» // Russ. Pat. № 2396375 published 10.08.2010, priority 09.04.2009.

7. **Yakhvarov D.G.**, Ganushevich Yu.S., Sinyashin O.G. «New organonickel sigma-complex

– precatalyst for ethylene oligomerisation process» // Russ. Pat. № 2400488 published 27.09.2010, priority 09.04.2009.

8. **Yakhvarov D.G.**, Trofimova E.A., Sinyashin O.G. «Electrochemical cell for preparation of organonickel sigma-complexes» // Russ. Pat. № 85903 published 20.08.2009, priority 09.04.2009

9. Budnikova Yu.G., Sinyashin O.G., **Yakhvarov D.G.** «Process for electrolytic preparation of triphenylphosphine from white phosphorus and phenyl halides». Russ. Pat. № 2221805 published 20.01.2004, priority 09.07.2002.

Total number of scientific papers in peer-reviewed journals:	**100**
Total number of communications on scientific meetings:	**80**
Patents:	**9**

The full list of publications is available upon request