# Mikhail A. VOROTYNTSEV

**Ph.D., Doctor of Sciences, Professor**

**Member of Academia Europaea (The Academy of Europe)**

## Curriculum Vitae


**Current Affiliations:**

Institut de Chimie Moléculaire de l'Université de Bourgogne (ICMUB) - UMR 6302 CNRS, Dijon, France.
M.V.Lomonosov Moscow State University, Electrochemistry Dept., Moscow, Russia.
Institute for Problems of Chemical Physics, Russian Academy of Sciences, Chernogolovka, Russia.
D.I.Mendeleev University of Chemical Technology of Russia, Moscow, Russia.
Email addresses: mv@u-bourgogne.fr, mivo2010@yandex.com


**Education in Colleges or Universities; List of Titles and Diplomas Awarded:**

- Department of Chemistry, M. V. Lomonosov Moscow State University, 09/1962 - 01/1965
- Department of Mechanics & Mathematics, M. V. Lomonosov Moscow State University, specialized in Chemical Mechanics, 01/1965 - 06/1967, Diploma (Master Degree) in Mechanics, 06/1967
- Complete postgraduate course (3 years) of the same Department, 10/1967 - 09/1970
- Ph.D. thesis in Physical & Mathematical Sciences, Moscow University of Engineering Physics, 01/1971. Thesis: "Kinetics of Charge Transfer in Polar Media". Advisers: Prof. R.R.Dogonadze & Dr. A.M.Kuznetsov
- Doctor of Sciences Degree in Physical & Mathematical Sciences, Institute of General Physics, Academy of Sciences, 10/1987. Thesis: "Theory of Equilibrium and Kinetic Phenomena at Metal/Electrolyte Solution Interface"
- Research Professor Degree in Chemical Physics, Academy of Sciences of the USSR, 07/1988
- Associate Professor Degree ("Dozent") in Biophysics, Moscow University of Technological Physics (PhysTech), 11/1993
- Directeur de Recherche titulaire (Research Professor), CNRS, France, 10/1998

**Research and Teaching Experience:**

- Dept. Mechanics & Mathematics, M. V. Lomonosov Moscow State University, Assist. Professor (1970-78)
- Theoretical Department, A.N.Frumkin Institute of Electrochemistry, Academy of Sciences of the USSR Senior/Leading/Principal Researcher (1979-98)
- Moscow University of Technological Physics (PhysTech): Part-time Lecturer/Associate Professor (1990-94)
- Department of Applied Physics, Fukui University, Japan: Professor (1995-97)
- LSEO/ICMUB-UMR 5260/6302 CNRS, Université de Bourgogne, Dijon, Professeur Associé (1997-98), Directeur de Recherche 2 au CNRS (1998-2011), Director of Research Unit "Electrochemistry" of LSEO (1999-2006), Responsible for theme "Polymeric and Hybrid Electroactive Materials" (2007-2011), Directeur de Recherche Emerite (2011-)
- Department of Chemistry, M. V. Lomonosov Moscow State University, Senior Researcher (2005-)
- Institute for Problems of Chemical Physics, Russian Academy of Sciences, Principal Researcher (2012-)
- D.I.Mendeleev University of Chemical Technology of Russia, Moscow, Principal Researcher (2014-2016), Director of Laboratory (2015-), Professor (2016-)
- Department of Fundamental Physico-Chemical Engineering, M. V. Lomonosov Moscow State University, Professor (2016-).

**Invited Lecturer and Invited Scientific Fellowships:**

- Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany: Invited Professor, 05/1992 and 08/1994
- Lab. de Structure et Réactivité des Systèmes Interfaciaux, Université P. et M.Curie, Paris, France: Chercheur Associé: Directeur de Recherche au CNRS, 09/1992 - 08/1993
- Institut für Physikalische Chemie, Universität Freiburg, Germany: Guest Scientist, 02/1994 - 07/1994
- Lab. d'Electrochimie Moléculaire, Centre d'Etudes Nucléaires de Grenoble, France: Directeur de Recherche: Ingénieur au C.E.A., 09/1994 - 06/1995

- Lab. de Physique des Liquides et Électrochimie, Université P. et M.Curie, Paris, France: Guest Scientist, 06/1995 - 07/1995
- Chemical Faculty, University of Warsaw, Poland, Invited Professor (2012-13)
- Material Science Department, University of Darmstadt, Germany, Invited Lecturer (2014)

**Elected Functions. Editorial Duties. Awards:**

- Academician: member of Academia Europaea (the Academy of Europe), elected in 2014, www.ae-info.org/ae/User/Vorotyntsev_Mikhail_A.
- Vice-Chairman of Division 4 (2011-12, 2013-14, 2015-16) and of Division 2 (1995-96, 1997-98, 1999-2000) International Society of Electrochemistry (ISE)
- Member of the Committee in charge of awarding the ISE Prize for Electrochemical Materials Science (2016-18)
- Elected Representative of Russia at ISE (2013-15, 2016-18)
- Academic Secretary of the Moscow Seminar on Electrochemistry (since 2013)
- Honorary Title "Directeur de Recherche Emerite", CNRS, France (2011-2016)
- Deputy Editor in Chief - Scientific Editor of the Russ. J. Electrochem. (since 2016)
- Member of the Advisory Board of Electrochimica Acta (2011-14)
- Jubilar special issue of J. Solid State Electrochemistry (vol. 19, n° 9, 2015): http://link.springer.com/journal/10008/19/9/page/1
- Jubilar special issue of J. Solid State Electrochemistry (vol. 10, n° 3, 2006): http://link.springer.com/article/10.1007%2Fs10008-005-0057-z
- Award of Pro Renovanda Hungariae Foundation, Budapest, Hungary, 2000
- Expert of national research foundations (Russia, Poland, Czech, Hungary, Israel, France, Luxemburg)
- Guest Editor of the special issue "100th V. G. Levich anniversary" of "Russ. J. Electrochem.", in preparation
- Guest Editor of the special issue of Electrochimica Acta "EEM-2016", in preparation
- Guest Editor of the special Frumkin issue of Russ. J. Electrochem., 2016, v.52 (n.12), 2017, v.53 (n.1 & 3)
- Guest Editor of the special issue of Electrochimica Acta "ISE-2014", 2015, v. 179
- Guest Editor of the special issue of Electrochimica Acta "Electrochemistry of Electroactive Materials-2013", 2014, v. 122
- Guest Editor of the special issue of Journal of Solid State Electrochemistry, 2011, v. 15, n° 11-12
- Guest Editor of the special issue of Electrochimica Acta "Electrochemistry of Electroactive Materials-2010", 2011, v. 56, n° 10
- Guest Editor of the special issue of Electrochimica Acta "Electrochemistry of Electroactive Materials", 2008, v. 53, n° 11
- Guest Editor of the special issue of Journal of Solid State Electrochemistry "WEEM-2006", 2007, v. 11, n°8
- Guest Editor of the special issue of Electrochimica Acta "Electrochemistry of Electroactive Materials", 2005, v. 50, n° 7-8.
- Guest Editor of the special issue of Russian Journal of Electrochemistry "Spectroelectrochemistry of Conducting Polymers", 2004, v.40, n° 2-3.
- Guest Editor of the special issue of Electrochimica Acta "ISE-2003", 2004, v.49, n° 22-23
- Guest Editor of the special issue of Electrochimica Acta, "Electrochemistry of Electroactive Materials", 2001, v.46, n° 26-27
- Guest Editor of the special issue of Electrochimica Acta, "Electrochemistry of Electroactive Polymer Films", 1996, v.41, n°11-12

**Recent Conference Organizations:**

- Member of the Organizing Committee of Symposium "Synthesis and Applications of Electrochemically Active Materials", the 68$^{th}$ Meeting of International Society of Electrochemistry, Providence, USA, 2017, in preparation
- Member of the Organizing Committee of Symposium "Electroactive, Functionalized and Nanostructured Materials and Composites: Modern Trends in Synthesis and Applications", the 67$^{th}$ Meeting of International Society of Electrochemistry, Hague, Netherlands, 2016
- Member of the Organizing Committee of the International Conference "6$^{th}$ Baltic Electrochemistry Conference" (BEC 16), Helsinki, Finland, 2016
- Member of the Organizing Committee and Chairman of Microsymposium 2, 10$^{th}$ International Frumkin Symposium on Electrochemistry, Moscow, Russia, 2015

- Member of the Scientific Committee, 4th International Symposium on Surface Imaging/Spectroscopy at the Solid/Liquid Interface (ISSIS 2015), Cracow, Poland, 2015
- Chairman of the Organizing Committee, International Workshop on Electrochemistry of Electroactive Materials (WEEM-2015), Bad Herrenalb, Germany, 2015
- Coordinating Organizer of Symposium "Modern Electroactive Polymeric, Organic, Inorganic and Nanocomposite Materials", the 65th Meeting of International Society of Electrochemistry, Lausanne, Switzerland, 2014
- Organizer of Symposium "Electroactive Polymeric and Inorganic Materials", the 63rd Meeting of International Society of Electrochemistry, Prague, Czech Republic, 2012
- Member of the Organizing Committee, 10th International Symposium on Systems with Fast Ionic Transport (ISSFIT-10), Chernogolovka, Russia, 2012
- Chairman of the Organizing Committee, International Workshop on Electrochemistry of Electroactive Materials (WEEM-2012), Szeged, Hungary, 2012
- Organizer of Symposium "Nanostructured and Functionalized Electroactive Polymer Films and Related Materials", the 219th Meeting of the Electrochemical Society, Montréal, Canada, 2011
- Member of the Scientific Committee, 9th International Frumkin Symposium, Moscow, Russia, 2010
- Coordinating Organizer of Symposium "Electroactive Polymers, Inorganic Electroactive Solids, Nano-composite Materials", the 61st Meeting of International Society of Electrochemistry, Nice, France, 2010
- Chairman of the Organizing Committee, International Workshop on Electrochemistry of Electroactive Materials (WEEM-2009), Szczyrk, Poland, 2009
- Co-Organizer of International Conference "Conducting Polymer Expert Meeting" (CONPOEX), Borovets, Bulgaria, 2008
- Chairman of the Organizing Committee, International Workshop on Electrochemistry of Electroactive Materials (WEEM-2006), Repino, Sankt-Petersburg, Russia, 2006
- Member of the Scientific Committee, 8th International Frumkin Symposium, Moscow, Russia, 2005
- Organizer of Symposium "Nanostructured and Functionalized Conducting Polymer Films and Related Materials", The 207th Meeting of the Electrochemical Society, Quebec, Canada, 2005
- Member of the Advisory Board, 4th Baltic Conference on Electrochemistry, Greifswald, Germany, 2005
- Member of the Scientific Committee, International Conference on Electrode Processes, Szczyrk, Pologne, 2004
- Chairman of the Organizing Committee, International Workshop on Electrochemistry of Electroactive Materials (WEEM-2003), Bad Herrenalb, Germany, 2003
- Organizer of Symposium "Electronically and Ionically Conducting Materials", the 54th Meeting of International Society of Electrochemistry, Sao Paolo, Brazil, 2003
- Organizer of Symposium "Electrochemistry of Conducting Polymers", the 53rd Meeting of International Society of Electrochemistry, Düsseldorf, Germany, 2002
- Organizer of International Meeting "Spectroelectrochemistry of Conducting Polymers", Moscow, Russia, 2002
- Organizer of Symposium "Fuel Cells and Conducting Polymers", Joint International Meeting (ECS-ISE), San-Francisco,USA,2001
- Director of NATO ARW, Chairman of the Organizing Committee, International Workshop on Electrochemistry of Electroactive Polymer Films (WEEPF-2000), Poraj, Poland, 2000
- Organizer of Symposium "Electrochemistry of Active Polymers", the 50th Meeting of International Society of Electrochemistry, Pavia, Italy, 1999
- Chairman of the Organizing Committee of Symposium "Molecular Design on Electrodes and Electroactive Materials", the 49th Meeting of International Society of Electrochemistry, Kitakyushu, Japan, 1998
- Member of the Organizing Committee, WEEPF-97, Dourdan, France, 1997
- Chairman of the Scientific Committee, WEEPF-95, Moscow, Russia 1995

**Responsable of Bilateral Agreements "Socrates/Erasmus"**

between University of Burgundy and Warsaw University (Poland), Gdansk University of Technology (Poland), University of Szeged (Hungary), University of Bari (Italy), University of Modena (Italy) and University of Alicante (Spain)

## Publications, citation indices, presentations at conferences

**Publications:** A monograph, 20 monographic reviews and over 200 original papers in leading international and national journals in Physics, Chemistry, Mechanics and Biology, see below for the period of 2008-2014 and supplementary list of all publications

**Citations** (Web of Knowledge 03/2016): H-index: **35**
Total number of citations (only to publications in journals) since 1989: **3550** (see diagram below).
Journals with highest citation indices where 16 papers were published (publication years are indicated):
Adv. Colloid Interface Sci., 2008 (**8.7**); Adv. Funct. Mater., 2011 (**8.5**); J. Phys. Chem. C, 2008 (**4.5**); Electrochim. Acta, 2014 (4), 2013 (2), 2012, 2011, 2010 (2) & 2008 (**3.8**); J. Phys. Chem. B. 2009 & 2001 (**3.6**); Phys. Chem. Chem. Phys., 2010 (**3.5**)

**Recent selected publications (2008 - 2015):**

30. Stability of Prussian Blue-polypyrrole composite films synthesized via one-step redox-reaction procedure
N. V. Talagaeva, E. V. Zolotukhina, I. Bezverkhyy, D. V. Konev, Y. Lacroute, E. Yu. Maksimova, S. L. Koryakin, M. A. Vorotyntsev
J. Solid State Electrochem., 2015, vol. 19, 2701-2709

29. In situ UV-visible spectroelectrochemistry in the course of oxidative electrolysis as a tool to determine the molecular structure of poly(Mg(II)porphine)
D. V. Konev, O. I. Istakova, O. A. Sereda, M. A. Shamraeva, C.H. Devillers, M. A. Vorotyntsev
Electrochim. Acta, 2015, vol. 179, 315-325

28. Electroreduction of halogen oxoanions via autocatalytic redox mediation by halide anions: novel EC" mechanism. Theory for stationary 1D regime
M. A. Vorotyntsev, D. V. Konev, Y. V. Tolmachev
Electrochim. Acta, vol. 173C, 779-795

27. Silver/ion exchanger nanocomposites as low-temperature redox-catalysts for methanal oxidation
E. A. Sakardina, T. A. Kravchenko, E. V. Zolotukhina, M. A. Vorotyntsev
Electrochim. Acta, 2015, vol. 179, 364-371

26. Energy cycle based on a high specific energy aqueous flow battery and its potential use for fully electric vehicles and for direct solar-to-chemical energy conversion
Y. V. Tolmachev, A. Pyatkivskiy, V. V. Ryzhov, D. V. Konev, M. A. Vorotyntsev
J. Solid State Electrochem., 2015, vol. 19, 2711-2722

25. Electropolymerization of non-substituted Mg(II) porphine: Effects of proton acceptor addition
D. V. Konev, C. H. Devillers, K. V. Lizgina, V. E. Baulin, M. A. Vorotyntsev
J. Electroanal. Chem., 2015, vol. 737, 235-242

24. One-stage periodical anodic-cathodic double pulse deposition of nanocomposite materials. Application to Prussian Blue/polypyrrole film coated electrodes
E. V. Zolotukhina, I. S. Bezverkhyy, M. A. Vorotyntsev
Electrochim. Acta, 2014, vol. 122, 247-258

23. Palladium Nanoparticles – Polypyrrole Composite as an Efficient Catalyst for Cyanation of Aryl Halides
T. V. Magdesieva, O. M. Nikitin, E. V. Zolotukhina, M. A. Vorotyntsev
Electrochim. Acta, 2014, vol. 122, 289-295

22. Synthesis of new electroactive polymers by ion-exchange replacement of Mg(II) by 2 H+ or Zn(II) cations inside Mg(II) polyporphine film, with their subsequent electrochemical transformation to condensed-structure materials
D. V. Konev, C. H. Devillers, K. V. Lizgina, T. S. Zyubina, A. S. Zyubin, L. A. Valkova, M. A. Vorotyntsev
Electrochim. Acta, 2014, vol. 122, 3-10

21. Electrochemistry of Electroactive Materials
A. R. Hillman, P. Pickup, R. Seeber, M, Skompska, M, A. Vorotyntsev
Electrochim. Acta, 2014, vol. 122, 1-2

20. Atomic force microscopy study of conducting polymer films near electrode's edge or grown on microband electrode
M. A. Vorotyntsev, D. V. Konev, U. Lange, Yu. V. Tolmachev, M. Skompska
Electrochim. Acta, 2013, vol. 110, 452-458

19. Li-ion diffusion in $Li_xNb_9PO_{25}$
O. A. Drozhzhin, N. R. Khasanova, M. A. Vorotyntsev, S. R. Maduar, A. M. Abakumov, E. V. Antipov
Electrochim. Acta, 2013, vol. 89, 262–269

18. Palladium – Polypyrrole Nanoparticles – Catalyzed Sonogashira Coupling
T. V. Magdesieva, O. M. Nikitin, E. V. Zolotukhina, V. A. Zinovyeva, M. A. Vorotyntsev
Mendeleev Commun., 2012, vol. 22, 305-306

17. Polypyrrole - Palladium Nanoparticles Composite as Efficient Catalyst for Suzuki-Miyaura Coupling
T. V. Magdesieva, O. M. Nikitin, O. A. Levitsky, V. A. Zinovyeva, I. Bezverkhyy, E. V. Zolotukhina, M. A. Vorotyntsev
J. Molec. Catal. A: Chemical, 2012, vol. 353-354, 50-57

16. Chronoamperometric response of a disk electrode coated with a conducting film
M. A. Vorotyntsev, D. V. Konev
Electrochim. Acta, 2011, vol. 56, 9105– 9112

15. A New Strategy towards Electroactive Polymer-Inorganic Nanostructure Composites. Silver Nanoparticles inside Polypyrrole Matrix with Pendant Titanocene Dichloride Complexes
M. A. Vorotyntsev, M. Skompska, A. Rajchowska, J. Borysiuk, M. Donten
J. Electroanal. Chem., 2011, vol. 662, 105-115

14. Highly-Dispersed Palladium-Polypyrrole Nanocomposites Pd@PPy: “in-Water”. Synthesis and Application for Catalytic Arylation of Heteroaromatics by Direct C–H Bond Activation
V. A. Zinovyeva, M. A. Vorotyntsev, I. Bezverkhyy, D. Chaumont, J.-C. Hierso
Adv. Funct. Mater., 2011, vol. 21, 1064-1075

13. Electrochemistry of Electroactive Materials
P. J. Kulesza, M. Skompska, V. Tsakova, M. A. Vorotyntsev
Electrochim. Acta, 2011, vol. 56, 3417-3418

12. Electroactive Polymeric Material with Condensed Structure on the Basis of Magnesium(II) Polyporphine
M. A. Vorotyntsev, D. V. Konev, C. H. Devillers, I. Bezverkhyy, O. Heintz
Electrochim. Acta, 2011, vol. 56, 3436-3442

11. Mixed Solutions of Silver Cation and Chloride Anion in Acetonitrile: Voltammetric and EQCM Study
M. Skompska, M. A. Vorotyntsev, A. Rajchowska, O. V. Levin
Phys. Chem. Chem. Phys., 2010, vol. 12, 10525 - 10535

10. Magnesium(II) Polyporphine: The First Electron-Conducting Polymer with Directly Linked Unsubstituted Porphyrin Units Obtained by Electrooxidation at a Very Low Potential
M. A. Vorotyntsev, D. V. Konev, C. H. Devillers, I. Bezverkhyy, O. Heintz
Electrochim. Acta, 2010, vol. 55, 6703-6714

9. Diffusional Transport in Ionic Liquids: Stokes-Einstein Relation or “Sliding Sphere” Model? Ferrocene (Fc) in Imidazolium Liquids
M. A. Vorotyntsev, V. A. Zinovyeva, M. Picquet.
Electrochim. Acta, 2010, vol. 55, 5063-5070

8. Electropolymerization of Pyrrole in Acetonitrile as Affected by the Nature of Substitute and Deposition Potential
M. Graczyk-Zajac, S. Yu. Vassiliev, M. A. Vorotyntsev, G. A. Tsirlina
J. Solid State Electrochem., 2010, vol. 14, 2039-2048

7. Mechanisms of Electropolymerization and Redox Activity: Fundamental Aspects
M. A. Vorotyntsev, V. A. Zinovyeva, D. V. Konev.
In: Electropolymerization: Concepts, Materials and Applications, S. Cosnier and A. A. Karyakin, Eds., Wiley-VCH, Weinheim, chapter 2, 2010, pp. 27-50

6. Electrochemical and Spectral Properties of Ferrocene (Fc) in Ionic Liquid: 1-Butyl-3-Methylimidazolium Triflimide, [BMIM][$NTf_2$]. Concentration Effects
M. A. Vorotyntsev, V. A. Zinovyeva, D. V. Konev, M. Picquet, L. Gaillon, C. Rizzi
J. Phys. Chem. B, 2009, vol. 113, 1085-1099

5. Synthesis and Characterization of Palladium Nanoparticle/Polypyrrole Composites
S. V. Vasilyeva, M. A. Vorotyntsev, I. Bezverkhyy, R. Chassagnon, O. Heintz, E. Lesniewska

J. Phys. Chem. C, 2008, vol. 112, 19878-19885

4. Electrochemistry of Electroactive Materials
A. R. Hillman, P. J. Kulesza, M. A. Vorotyntsev
Electrochim. Acta, 2008, vol. 53, 3742-3743

3. Electrochemical Properties of Metallocene Hydroxo and Oxo Complexes of Ta(V): $[Cp^*(CpR)TaOHCl]^+$ and $Cp^*(CpR)TaOCl$, with R = H, $SiMe_3$ or $(CH_2)_3NC_4H_4$ . Electrochemical Deposition of Conducting Polymer Film with Incorporated Tantalocene Complexes
M. Skompska, M. A. Vorotyntsev, J. Goux, P. Le Gendre, C. Moise
Electrochim. Acta, 2008, vol. 53, 3843-3852

2. Metallocene-Containing Conjugated Polymers
M. A. Vorotyntsev, S. V. Vasilyeva
Adv. Colloid Interface Sci., 2008, vol. 139, 99-151

1. Electrochemical and Spectral properties of Some Tantalocene Derivatives with One Pentamethylated Cyclopentadienyl Ligand: $Cp^*(Cp\text{-}R)TaCl_2$ , R = H, $SiMe_3$ or $(CH_2)_3NC_4H_4$
M. A. Vorotyntsev, M. Skompska, M. Graczyk, J. Heinze, J. Goux, P. Le Gendre, C. Moise
J. Solid State Electrochemistry, 2008, vol. 12, 421-435

**Presentations at Conferences:** Plenary or invited speaker at numerous international conferences, see below for the period of since 2008 and the supplementary list

**Recent plenary, keynote and invited lectures at conferences**

- Porphine-Based Electroactive Materials
D. V. Konev, C. H. Devillers, M. A. Vorotyntsev
French-Russian Conference on Soft-Matter Systems, 2015, Moscow, Russia

- Spectroelectrochemistry as a tool to characterize the molecular structure of conjugated polymer films
D. V. Konev, O. I. Istakova, O. A. Sereda, M. A. Shamraeva, C. H. Devillers, M. A. Vorotyntsev
4th International Symposium on Surface Imaging/Spectroscopy at the Solid/Liquid Interface (ISSIS 2015), 2015, Cracow, Poland

- Spectroelectrochemistry in the course of oxidative electrolysis as a tool to characterize the molecular structure of electroactive polymer based on Mg(II) porphine
D. V. Konev, O. I. Istakova, O. A. Sereda, M. A. Shamraeva, C. H. Devillers, M. A. Vorotyntsev
International Workshop on the Electrochemistry of Electroactive Materials (WEEM-2015), 2015, Bad Herrenalb, Germany

- Novel in situ method for measuring the specific conductivity of a thin film on the disk electrode surface and its dependence on potential
M. A. Vorotyntsev, D. V. Konev
International conference "Ion transport in organic and inorganic membranes", 2015, Sochi, Russia

- AFM study of conducting polymer films near electrode's edge or grown on microband electrode
International conference "Ion transport in organic and inorganic membranes", 2014, Agoi, Russia

- One-step chemical synthesis of Prussian Blue-Polypyrrole (PB/PPy) composite films: prospective electrodes for hydrogen peroxide (bio)sensors
International Workshop on the Electrochemistry of Electroactive Materials (WEEM), 2012, Czeged, Hungary

- Electrochemistry of Porphine-Based Electroactive Polymers
International symposium "Conducting Polymers", 2011, Prague, Czech Republik

- Polyporphines: a New Family of Conducting Polymers
9th International Frumkin Symposium, 2010, Moscow, Russia

- New Family of Electroactive Polymer Materials on the Basis of Porphyrin Units, with Unusual Electronic and Optical Properties
10th Meeting "Fundamental Problems of Solid State Ionics", 2010, Chernogolovka, Russia

- Chemical Synthesis of Composite Materials: Polypyrrole/Incorporated Metal Nanoparticles
International Conference "Ion Transport in Organic and Inorganic Membranes", 2010, Tuapse, Russia

•Polyporphines: a New Family of Conducting Polymers
WEEM-2009 ("International Workshop on Electrochemistry of Electroactive Materials"), 2009, Szczyrk, Poland

•Theory of Charge Transport in Mixed Conductors: Description of Interfacial Contributions Compatible with the Gibbs Thermodynamics
International Conference "Ion Transport in Organic and Inorganic Membranes", 2009, Tuapse, Russia

•Synthesis and Characterization of Hybrids Materials: Conducting Polymer/Incorporated Ag Nanoparticles
9th Spring Meeting of the International Society of Electrochemistry, 2009, Szczyrk, Poland

•Synthesis and Characterization of Hybrids Materials: Conducting Polymer/Incorporated Ag Nanoparticles
59th Annual Meeting of the International Society of Electrochemistry, 2008, Sevilla, Spain

•Theory of Charge Transport in Mixed Conductors: Description of Interfacial Contributions Compatible with the Gibbs Thermodynamics
9th Meeting "Fundamental Problems of Solid State Ionics", 2008, Chernogolovka, Russia

•Composite Materials Based on Conducting Polymers
CONPOEX Meeting ("International Conducting Polymer Expert Meeting"), 2008, Borovets, Bulgaria

**Current and Previous Research Domains:**

Electrochemistry, Electroactive Polymers, Functional and Nanostructured Materials, Mixed Conductors, Transport Phenomena, Physics of Interfaces, Chemical Kinetics, Physics of Condensed Matters, Electron Transfer, Biophysics

**Short Summary of Research Activities**

- **1967-1977** Quantum mechanical theory of electron and proton transfer in polar solvents and at the metal/electrolyte interface. Theory of radiationless transitions in polar media. Kinetics of low-temperature chemical reactions.
- **1975-1978** Theory of light absorption by solute species in polar solvents.
- **1976-1982** Non-local theory of electrostatic phenomena in polar media.
- **1976-1981** Modeling of the interfacial structure and ionic transport in solid electrolytes.
- **1979-1980** General approach to kinetics of primary steps of the charge-separation process in the photosynthetic reaction center
- **1979-1984** Condensed-matter physics approach to the structure of a metal/electrolyte solution interface. Electric double layer effects in kinetics of electrochemical reactions. Electrostatics of thin solid films. Interfacial structure at charged electrodes with non-uniform surface properties.
- **Since 1976** Theory of transport phenomena in fluid and solid media. Statistical mechanical theory of ionic transport near a solid wall at the turbulent flow regime; theory of electrochemical current fluctuations induced by turbulent pulsations. Theory of "mirage effect" technique to study interfacial ion fluxes. Approach of the irreversible thermodynamics to the passage of a direct or alternating current through conducting media; impedance of electroactive films; systems with a mixed interfacial exchange; "natural" equivalent circuits.
- **1983-1989** Theory of electric interactions at the metal/solution interface. Statistical mechanical approach to two-dimensional ionic ensembles. Theory for the interaction potentials between adsorbed ions and/or dipole molecules, ionic adsorption isotherms and correlation properties of adsorbed ion ensembles.
- **1987-1989** Electric interactions and interfacial structure at an insulator/electrolyte solution interface.
- **Since 1988** Theory of electrochemical phenomena in electron-conducting polymer films: charging-discharging process, direct and alternating current passage, ionic and solvent exchange with the solution, kinetics of redox reactions at the film/solution interface.
- **Since 1997** Creation of numerical algorithms for simulation of electrochemical phenomena: complex reaction mechanisms in solution, mixed transport on conducting polymers, modelling of a SECM response.
- **Since 1998** Theory of thin layer voltammetry: effects of rapid chemical steps.
- **Since 1999** Modelling of electron-ion transport inside intercalation layers of $Li^+$ cation.
- **1999-2002** Studies of redox transformations of Cp-oxo complexes du Mo in protic media by means of cyclic voltammetry, electrocapillary and "electrochemical mass spectrometry".

- **Since 2000** Experimental studies of synthesis and characterization of conducting polymer films based on pyrrole or EDOT and functionalized by metallocene centers (Ti, Zr, Ta), for the use as modified electrodes.
- **Since 2005** Experimental studies of synthesis and characterization of composite materials based on conducting polymers with incorporated inorganic nanoelements (transition metals, Prussian Blue). Their catalytic and sensor applications
- **Since 2007** Experimental and theoretical studies of transport phenomena and electropolymerization in viscous ionic liquids
- **Since 2009** Synthesis and characterization of a new family of electroactive polymer materials ("polyporphines") composed of unsubstituted porphyrin building blocks
- **Since 2010** Theoretical basis of original method for in situ specific conductivity measurements of a thin film on electrode surface in contact with solution and its experimental applications
- **Since 2012** Theory of functioning and optimal construction of flow cells with multi-electron oxidizers

**Lecture Courses Delivered at M. V. Lomonosov Moscow State University, A. N. Frumkin Institute of Electrochemistry, Moscow University of Technological Physics (PhysTech), Fukui University, Universities of Burgundy, of Warsaw and of Darmstadt:**

Quantum mechanics of atoms and molecules. Statistical physics. Chemical kinetics. Theory of boundary layers. Asymptotic methods in physics and mechanics of continuous media. Physical techniques for electrochemistry. Electrochemistry (all levels). Electroactive materials and mixed conductors. Synthesis and properties of porphine-based polymers

**Supervision of PhD theses:**

S. A. Martemyanov, V. Yu. Izotov, E. F. Skurygin (Russia), M. Graczyk, V. A. Zinovyeva (Dijon, France)

**Supervision of post-doctoral stages (Dijon, France):**

A. Jackson, J. Gun, M. Skompska, T. V. Magdesieva, O. V. Levin, S. V. Vasilyeva, D. V. Konev, O. Yu. Kuksina, E. V. Zolotukhina

**Knowledge of Languages:** English (fluent), French (fluent), German, Russian (native)

**Research Collaborations** with joint publications (since 1988):

**Bulgaria**: V.Tsakova; **Canada**: P.G.Pickup; **Denmark**: J.Ulstrup; **France**: J.P.Badiali, I.Bezverkhyy, C.Deslouis, C.H.Devillers, O.Heintz, J.-C.Hierso, P.Le Gendre, E.Lesniewska, C.Moise, M.Picquet, R.Poli, A.Pron, B.Tribollet, E.Vieil; **Germany**: K.Doblhofer, J.Heinze, A.A.Kornyshev, F.Scholz, E.Spohr, E.Staude; **Hungary**: G.Inzelt; **Israel**: D.Aurbach, J.Gun, O.Lev, M.D.Levi; **Italy**: M.Musiani, R.Seeber; **Japan**: K.Aoki; **Poland**: M.Skompska, P.J.Kulesza, A. Lisowska-Oleksiak; **Portugal**: L.M.Abrantes, J.Correia; **Russia**: E.V.Antipov, B.M.Grafov, A.A.Karyakin, T.V.Magdesieva, V.V.Malev, S.A.Martemyanov, G.A.Tsirlina, Yu.B.Vassiliev, Yu.M.Volfkovich; **UK**: A.R.Hillman; **USA**: Yu.V.Tolmachev, A.G.Volkov

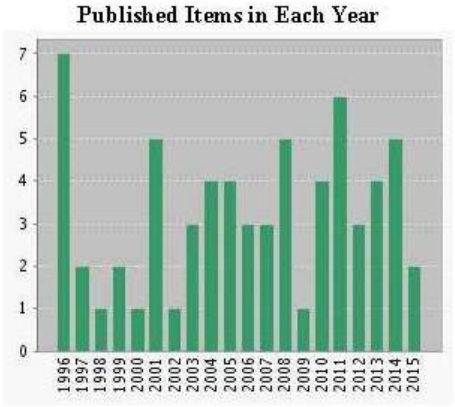
**Recent Research Grants:**

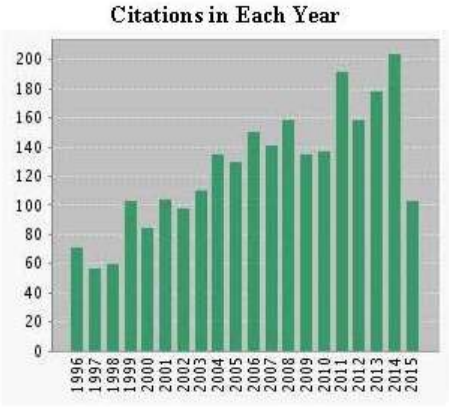
- Novel electrochemical synthesis of conducting polymer powders with no use of oxidizing agents, Russian Foundation for Basic Research (RFBR), 16-03-00916-a, with D. V. Konev, 2016-2018
- Method to measure of the specific conductivity of a film on electrode surface, Russian Academy of Sciences, program "Synthesis and study of macromolecules and macromolecular structures of new generations", 2016
- Synthesis and characterization of novel polymeric materials based on the porphine macrocycle and possessing a zero-width forbidden zone, Russian Academy of Sciences, program "Synthesis and study of macromolecules and macromolecular structures of new generations", 2015
- Electroactive composites based on inorganic particles dispersed inside conjugated polymer matrix, RFBR, 15-030-06351, 2015-2017
- Polyporphinic metallocomplexes and their derivatives as novel materials for electrocatalysis and electrochemical devices for energy storage and transformation, Russian Science Foundation 14-13-01244, 2014-2016
- Methods of non-local electrostatics in the theory of ion transport in biological cell systems, RFBR 14-03-00221-a, with A.A.Rubashkin, 2014-2016
- Synthesis and characterization of novel polymeric materials with zero band-gap width on the basis of porphine macrocycle, Russian Academy of Sciences, program "Synthesis and study of macromolecules and macromolecular structures of new generations", 2014
- Synthesis and characterization of novel polymeric materials on the basis of porphine macrocycle, program of

OHNM RAS "Synthesis and study of macromolecules and macromolecular structures of new generations", 2013

- Synthesis and characterization of novel family of electroactive polymers on the basis of porphine monomer with coordinated metal ion, RFBR 12-03-00797-a, with D.V.Konev, 2012-2014
- Electrochemical and redox syntheses of composite materials on the basis of conducting polymers and inorganic nanoparticles for applications in amperometric sensors and catalysis, RFBR 12-03-01119-a, 2012-2014
- Electroactive modified layers of various applications on the basis of the novel family of conjugated polyporphines and their metallocomplexes, Minobrnauki-FCP Kadry 1.5, grant 8644, with E.M.Antipov and A.G.Volkov, 2012-2013
- Development of innovative one-step method to synthesize functional nanocomposite materials with inorganic nanocomponents dispersed inside conducting polymers, Minobrnauki-FCP Kadry 1.1, grant 8373, with E.M.Antipov, 2012-2013
- Synthèse, caractérisation et applications de nouveaux matériaux composites combinant nanoparticules de Pd et un support polypyrrole greffés sur nanotubes de carbone: nouveaux catalyseurs recyclables de couplage d'arylation directe par l'activation de la liaison C–H, BQR 173, Дижон, с J.-C. Hierso, 2012
- Conception, synthèse et caractérisation des matériaux hybrides nanobâtonnets CdS/polymère conjugé pour cellules photovoltaïques, PAI franco-polonian "Polonium", project 8445/2011, with I. Bezverkhyy and M. Skompska, 2011-2012
- Synthèse de matériaux composites polypyrrole – nanoparticules de Bleu de Prusse et leur utilisation en capteurs du peroxyde d'hydrogène, BQR-2011, Dijon, 2011
- Synthèse et propriétés catalytiques de matériaux hybrides à base de polymères conducteurs contenant des nanoparticules de Pd, BQR-2010, Dijon, 2010
- Equipement électrochimique pour la synthèse et la caractérisation de matériaux organométalliques, CPER 2009, Dijon, 2010
- Electrochemical design of electrode materials and modified electrodes on the basis of conducting polymers and transition metal nanoparticles, RFBR 09-03-01172-a, 2009-2012
- Synthesis and characterization of conducting polymers functionalized with titanocene complexes: effect of the length of the monomer-complex bridge, CCUBF (France-Germany), with O. S. Wolfbeis, 2009-2010
- Hybrid Materials on the basis of Mixed Valence Oxides, Conducting Polymers and Carbon or Metal Nanoelements, ECO-NET, with P. J. Kulesza, M. Skompska, G. A. Tsirlina and G. Ragoisha, 2008-2009
- Synthesis and characterization of hybrid materials combining conducting polymers and semiconductor micro/nanostructures, with application for photovoltaic cells, PAI franco-polonian "Polonium", with P. J. Kulesza and M. Skompska, 2008-2009
- Synthèse de matériaux hybrides à base de polymères conducteurs contenant des nanoparticules de Pd, Fédération de Recherche 2604, with I. Bezverkhyy, Dijon, 2007
- Modification of Conducting Polymers by Metal Nanoparticules and Carbon Nanostructures, PAI franco-polonian "Polonium", with M. Jouini, P. J. Kulesza and M. Skompska, 2006-2007
- Conducting Polymers Containing Metallocene Centers for Catalytic and Luminescent Applications, PAI franco-portugaise "PESSOA", with J. Correia, 2005-2006
- Microbalance à quartz électrochimique et nano-électrochimie par microscope à force atomique (AFM). Applications aux films de polymères fonctionnalisés et de solides hétérogènes, FR 2604, Dijon, 2004-2007
- Equipement Electrochimique pour la Synthèse et la Caractérisation in situ de Matériaux Organométalliques Electrocatalytiques et Electroconducteurs, CPER 2004, Dijon, 2004
- Spectroélectrochimie des Polymères Conjugés avec Centres Titanocéniques, DAAD, with J. Heinze, 2004
- Synthèse et Caractérisation des Films de Polymères Conducteurs Fonctionnalisés par des Centres Métallocéniques, PAI franco-polonian "Polonium", with P. C. Lacaze, P. J. Kulesza and M. Skompska, 2004-2005
- Propriétés luminescentes des films de polymères conducteurs fonctionnalisés, CNRS-Russian Academy of Sciences, with G. Horowitz, G. Loukova et A. V. Vannikov, 2004-2005
- Synthesis and Characterization of Polymer Films Based on Pyrrole or Thiophene Containing Organometallic Centers, CNRS-ICCTI, with L. M. Abrantes, 2002
- New Approaches to the Description of Intercalation Mechanisms of Mono and Divalent Ions in Realization of High Energy Density Batteries of Li or Mg ion, "Arc-en-Ciel", with D. Aurbach & J.P. Badiali, 2001-2002

- Theory of Transport at the Nanometer Scale, financed by Freiburg University, with J. Heinze, 2000-2002
- Electrochemical Synthesis and Characterization Combined with MS/ES of New Organometallic Complexes, "Arc-en-Ciel", with R. Poli and J. Gun, 2001-2002
- Theory and Experiments at Nanoelectrodes. Steady-State Regime, Cyclic Voltammetry and SECM, France-Germany "PROCOPE" (N° 00237YE), with C. Amatore and J. Heinze, 2000-2001

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