

CURRICULUM VITAE

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PERSONAL DATA

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Sex: Male

Citizenship: RUSSIA

EDUCATION

2000

D.Sc. in Physical Chemistry
Institute of Solution Chemistry of Russian Academy
of Sciences, Ivanovo

1982

Ph.D. in Physical Chemistry
Institute of Petrochemical Synthesis of Russian Academy
of Sciences, Moscow

1973

Honors Diploma and Engineer in Technology of Materials
and Devices of Electronics, Ivanovo State University of Chemistry
and Technology

ACADEMIC HISTORY

Chief Researcher / Head of department/ Vice-rector/ Full professor/ associate professor/ assistant of professor
1973- present

Ivanovo State University of Chemistry and Technology

The head of the department scientific specialization of which are plasma application for microelectronics (etching of semiconductors, resists etc.), surface modification of polymers for microelectronics, textile and light industry, for solution of some environmental tasks (purification of water from organic and inorganic pollutants). Research interests are focused on application for these purpose both plasma of atmospheric pressure (including plasma in contact with solutions) and low pressure plasma in molecular and noble gases.

Responsibilities include: basic research and development work; writing grant applications, scientific papers, project final reports, abstracts, supporting patent filings, presentations and publications as necessary to generate and protect intellectual property of the institute, supervising and project management, managing collaborations with outside research institutes and contract research/manufacturing organizations, supervising B.S., M.S. and Ph.D. students.

The basic research and development projects:

* Development and applications of different plasma sources (DBD, DC) of atmospheric pressure for water purification from organic and inorganic pollutants.

The mechanisms of processes of decomposition of some pollutants (phenol and its derivatives, carboxylic acids, aldehydes) and reduction of ions of heavy metals (Mn,Cr) were studied. Physical parameters and chemical composition of solutions and gas phase were studied as well using experimental method and self-consistent modeling based on common solution of Boltzmann equation for electrons, equation of vibration and chemical kinetics including excited states of atoms and molecules.

* Development and applications of different plasma sources (DBD, DC) of atmospheric pressure for polymer modification both in gas phase and in water solution.

It was shown that the action of discharge on water results in a modification of surface of polymer (PE, PP) immersed into water as it takes place under the action of a low pressure discharge but without any etching.

Modified samples were able to immobilize the porphyrine molecules on their surface. Obtained materials show the catalytic activity with respect to conversion of molecular oxygen to singlet oxygen.

* Interaction of low temperature plasma with polymers.

The study of the mechanism of plasma-polymer interaction: the determination of gaseous products rate formation, as well as the formation of free radicals, crosslinks, double bonds under various conditions of gas discharge generation; the role of plasma active components: ions, electrons, active neutral species as well as vacuum ultraviolet in the formation of different functional groups in the surface layer of polymers (PE, PP, PETF, Polycarbonates, Polyimides, PVC etc.). Argon, argon-oxygen mixtures, air and oxygen were used as plasma-forming gases. The following methods were used: OES, Langmuir probes, mass-spectrometry, ATR FTIR, ESR, XPS, contact angle measurement. For interpretation of results obtained the methods of self-consistent simulation of plasma properties were widely used.

* Obtaining new textiles with improved properties.

The study of processes of action of low pressure plasma on textiles. The industrial scale setups for treatment of roll textiles were created. Plasma treatment allowed to improve the wettability, printing, adhesion properties of synthetic and natural fabrics without application of any chemicals. Combination of plasma treatment and magnetron sputtering resulted to creation of fabrics with improved and new properties. For example, these fabric have a strong protective action against various types of radiation.

* Plasma-solution synthesis of oxide nano-sized materials (semiconductors, catalysts, ferrites).

Additional information

- the Deputy Chief Editor of International Journal ChemChemTech (Izvestiya Vysshykh Uchebnykh Zavedeniy. Khimiya i Khimicheskaya Tekhnologiya) (since 2003)

- member of the editorial board of the international journal Plasma Processes and Polymers

- more then 290 publications on plasma chemistry and physics of plasma

- invited lecturer of 12 International Symposium on Plasmachemistry (Minneapolis, USA, 1995), Techtextil International Symposium (Frankfurt, Germany, 1997), IV-VII International Symposium on Theoretical and Applied Plasma Chemistry (Ivanovo, Russia, 1995-2021).

Hirsch index: 28 according to RSCI, 21 according to Scopus

15 candidate's theses and 2 doctoral theses were defended.

FUNDED GRANTS

1995 - 1997 - **Russian Foundation for Basic Research**, Grant No. 95-02-0677

2000 - 2002- **Russian Foundation for Basic Research**, Grant No. 00-02-17101

2004 - 2006- **Russian Foundation for Basic Research**, Grant No. 04-02-17525

2007 - 2009- **Russian Foundation for Basic Research**, Grant No. 07-02-00578

2014 - 2016- **Russian Foundation for Basic Research**, Grant No. 14-32-10058

2005 KOSEF (Korea) Grant

2006 KRF (Korea) Grant

2012-2016 Tempus grant (EC)

2022-2023 **Russian Science Foundation**, Grant No 22-22-00372

2024-2025 **Russian Science Foundation**, Grant No 24-22-00364

Referee of Journals: Plasma Chem. Plasma Process., J. Phys. D: Appl.Phys., Hazard. Materials, Plasma Sours. Sci, Technol., Chem. Ing. J., Plasma Proc. Polym.

D.Sc. Dissertation

Physical-chemical processes in system oxygen plasma-polymer, Institute for Solutions Chemistry, Russian Academy of Sciences, Ivanovo, 2000

Ph.D. Dissertation

Processes of excitation and ionization in an oxygen plasma of low pressure, Institute of Petrochemical Synthesis, Acad. Sci. USSR, Moscow, 1982

Author's profile

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Scopus Author ID: 56351418800

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Google Scholar: <https://scholar.google.ru/citations?hl=ru&user=b3lCsd0AAAAJ>

Research Gate: https://www.researchgate.net/profile/V_Rybkin

Books

Rybkin V.V., Titov V.A. Physicochemical processes in the non-equilibrium plasma polymer system. In Encyclopedia of Low Temperature Plasma, Edited by V.E. Fortov, Ser B, v. VIII-1: Chemistry of low temperature plasma, Moscow, Yanus-K, 2005.

Budanov V.V., Lomova T.N., Rybkin V.V. Chemical kinetics. Textbook. SpB, Lan, 2014, 288 p.