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Адрес

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академиков М.М. Шемякина и Ю.А.
Овчинникова Российской академии
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Контакты

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Образование

1970– 2007	Россия, Москва	Московский государственный университет имени М.В. Ломоносова (МГУ), Биологический факультет	Присвоено ученое звание профессора по специальности «биофизика».
1970– 1999	Россия, Москва	Московский государственный университет имени М.В. Ломоносова (МГУ), Биологический факультет	Диплом доктора физико-математических наук (тема диссертации: «Молекулярное моделирование мембрано- связанных участков белков и пептидов»)
1970– 1986	Россия, Москва	Московский государственный университет имени М.В. Ломоносова (МГУ), Биологический факультет	Диплом кандидата физико-математических наук (тема диссертации: «Топография и микроокружение хромофоров в бактериальном и зрительном родопсинах (спектроскопия комбинационного рассеяния света и квантовохимические расчеты)»)
1977– 1983	Россия, Москва	Московский инженерно- физический институт (МИФИ), Факультет экспериментальной и теоретической физики	Диплом с отличием (тема: «Математические методы определения вторичной структуры белков и полипептидов на основании спектров КР и полуэмпирических расчетов»)

Работа в ИБХ

2018–наст.вр.	Главный научный сотрудник
2018–наст.вр.	Ведущий научный сотрудник
2021–2025	Заместитель директора по научной работе

Членство в советах и комиссиях ИБХ

Методическая комиссия
Диссертационный совет
Ученый совет
Аттестационная комиссия

Владение языками

английский, французский

Членство в сообществах

Член редколлегии журналов «Биоорганическая химия», Москва; «The Open Structural Biology Journal», «The Open Bioinformatics Journal».

Член Ученого Совета ИБХ РАН.

Член специализированных диссертационных советов (МГУ, ГУ НИИ БМХ РАМН).

Степени и звания

2007	Профессор
2000	Доктор наук (Физико-математические науки, 03.00.02 — Биофизика)
1986	Кандидат наук (Физико-математические науки)

Ссылки и контакты

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Гранты и проекты

2024– наст.вр.	Онкотераностика и проблемы резистентности к противоопухолевым и антибактериальным препаратам
2014– 2016	Компьютерный анализ структурно-функциональных аспектов олигомеризации трансмембранных доменов рецепторов сигнальных систем клетки
2023– 2025	Молекулярно-биофизическая платформа для изучения мембранных белков: роль олигомеризации и белок-липидных взаимодействий
2018– 2022	Молекулярно-биофизические аспекты олигомеризации мембранных доменов рецепторов, определяющие клеточную сигнализацию в норме и онкогенезе
2018– 2021	Управление димеризацией сиалидазы NEU1 как перспективный подход к лечению атеросклероза
2019– 2021	Динамический «молекулярный портрет» клеточной мембраны и его биологическая роль
2019– 2022	Структурная биология мембранных белков для создания новых лекарственных и диагностических средств

Публикации

- Neuberger A, Veretenenko II, Shalygin A, Trofimov YA, Gudermann T, Chubanov V, **Efremov RG**, Sobolevsky AI (2026). Open-channel block of human TRPV6 by polyamine spermine. *Nat Commun* 17 (1), , [10.1038/s41467-026-73653-5](https://doi.org/10.1038/s41467-026-73653-5)
- Serova OV, Gavrilenkova AA, Kuznetsov AS, Goryashchenko AS, Agisheva AR, Bershatsky YV, Lushpa VA, Zangieva OT, Karbyshev MS, Gerasimov AS, Okhrimenko IS, **Efremov RG**, Deyev IE, Bocharov EV (2026). Insulin Receptor-Related Receptor Activation by Artificial Double-ER Mutations in the Transmembrane Domain. *Int J Mol Sci* 27 (10), , [10.3390/ijms27104364](https://doi.org/10.3390/ijms27104364)
- Bagaeva DI, Demina GR, Panina IS, Krylov NA, Khrenova MG, Agaphonov MO, Savitsky AP, **Efremov RG**,

- Kaprelyants AS, Shleeva MO (2026). Methyltransferase CPmtA drives dormancy-associated synthesis of coproporphyrin III tetramethyl ether via a “carousel” mechanism in *Mycobacterium smegmatis*. *Int J Biol Macromol* 358, 151714, [10.1016/j.ijbiomac.2026.151714](https://doi.org/10.1016/j.ijbiomac.2026.151714)
4. Terekhov SS, Ivanisenko NV, Zhang N, Mokrushina YA, Nolde DE, Lomakin YA, Zalevsky A, Ovchinnikova LA, Malabuiok DM, Baranova MN, Shashkova T, Aliper E, Zhang M, Guo K, Duga S, Akhmetyanov N, Mamontov S, Smirnova AO, Mamedov I, Bobik TV, Kostin NN, Chernov AS, Eliseev IE, Yaroshevich I, Boitsov VM, Stepanov AV, Zhang D, **Efremov RG**, Smirnov IV, Kardymon O, Zhang H, Guo Y, Lerner R, Gabibov AG, Kornberg RD (2026). Mining antibody functionality via AI-guided structural landscape profiling. *Nat Commun* 17 (1), [10.1038/s41467-026-70553-6](https://doi.org/10.1038/s41467-026-70553-6)
 5. Aliper ET, Ryzhov IM, Obukhova PS, Tuzikov AB, Galanina OE, Ziganshina MM, Sukhikh GT, Krylov NA, Henry SM, **Efremov RG**, Bovin NV (2026). Immune antibodies recognizing the stem region of SARS-CoV-2 spike protein: Molecular modeling and in vitro study of synthetic peptides presentation to the antibodies. *BIOCHIM BIOPHYS ACTA* 1868 (1), 184472, [10.1016/j.bbamem.2025.184472](https://doi.org/10.1016/j.bbamem.2025.184472)
 6. Kim DH, Hong MT, Bocharov EV, Park S, Bershatsky YV, Volynsky PE, Kim E, **Efremov RG**, Cho W, Park SY, Ryu SH (2025). EGFR activation requires cholesterol interaction at the inner leaflet of the plasma membrane. *Sci Adv* 11 (51), eadx2398, [10.1126/sciadv.adx2398](https://doi.org/10.1126/sciadv.adx2398)
 7. Sudareva SM, Bershatsky YV, Urban AS, Zagryadskaya YA, Aliper ET, **Efremov RG**, Zhu D, Okhrimenko IS, Bocharov EV (2025). Transmembrane Domain of Wild Type Spike Protein from SARS-CoV-2: Cell-Free Expression and Fast Purification for Structural-Dynamic NMR Studies. *Biochem (Mosc) Suppl Ser A Membr Cell Biol* 19 (4), 491–497, [10.1134/S1990747825700497](https://doi.org/10.1134/S1990747825700497)
 8. Neuberger A, Shalygin A, Veretenenko II, Trofimov YA, Gudermann T, Chubanov V, **Efremov RG**, Sobolevsky AI (2025). The locking mechanism of human TRPV6 inhibition by intracellular magnesium. *Nat Commun* 16 (1), 9826, [10.1038/s41467-025-65919-1](https://doi.org/10.1038/s41467-025-65919-1)
 9. Aliper ET, **Efremov RG** (2025). The coronavirus spike HR2 domain: An obscure player entering the limelight during membrane fusion? *BIOCHIM BIOPHYS ACTA* 1867 (8), 184445, [10.1016/j.bbamem.2025.184445](https://doi.org/10.1016/j.bbamem.2025.184445)
 10. Lohan S, Konshina AG, Mohammed EHM, Helmy NM, Jha SK, Tiwari RK, Maslennikov I, **Efremov RG**, Parang K (2025). Impact of stereochemical replacement on activity and selectivity of membrane-active antibacterial and antifungal cyclic peptides. *npj Antimicrob Resist* 3 (1), 56, [10.1038/s44259-025-00121-3](https://doi.org/10.1038/s44259-025-00121-3)
 11. Maryewski XA, Krasilnikov MS, Straková P, Holoubek J, Frčková T, Panina IS, Krylov NA, Gvozdev DA, Denisov VS, Semenov AN, Lotosh NY, Selishcheva AA, Chistov AA, Gulyak EL, Kozhemyakin GL, Korshun VA, **Efremov RG**, Ustinov AV, Růžek D, Eyer L, Alferova VA (2025). Membrane-Active Singlet Oxygen Photogenerators as a Paradigm for Broad-Spectrum Antivirals: The Case of Halogenated (BORon)-DIPYromethenes. *ACS Appl Mater Interfaces* 17 (3), 4502–4528, [10.1021/acsmi.4c17482](https://doi.org/10.1021/acsmi.4c17482)
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 14. Neuberger A, Shalygin A, Trofimov YA, Veretenenko II, Nadezhdin KD, Krylov NA, Gudermann T, **Efremov RG**, Chubanov V, Sobolevsky AI (2024). Structure-function analyses of human TRPV6 ancestral and derived haplotypes. *Structure* 33 (1), 91–103.e5, [10.1016/j.str.2024.10.018](https://doi.org/10.1016/j.str.2024.10.018)
 15. Konshina AG, Bocharov EV, Konovalova EV, Schulga AA, Tolmachev V, Deyev SM, **Efremov RG** (2024). Structural Basis of Activity of HER2-Targeting Construct Composed of DARPIn G3 and Albumin-Binding Domains. *Int J Mol Sci* 25 (21), 11370, [10.3390/ijms252111370](https://doi.org/10.3390/ijms252111370)
 16. Polyansky AA, **Efremov RG** (2024). Lipid-Mediated Adaptation of Proteins and Peptides in Cell Membranes. *Biochem (Mosc) Suppl Ser A Membr Cell Biol* 18 (3), 241–256, [10.1134/S1990747824700235](https://doi.org/10.1134/S1990747824700235)
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18. Polyansky AA, **Efremov RG** (2024). Transmembrane Domains of Bitopic Proteins as a Key to Understand the Cellular Signaling (A Review). *Russ. J. Bioorganic Chem.* 50 (4), 1202–1214, [10.1134/S1068162024040095](https://doi.org/10.1134/S1068162024040095)
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 21. Lohan S, Konshina AG, Tiwari RK, **Efremov RG**, Maslennikov I, Parang K (2024). Broad-Spectrum Activity of Membranolytic Cationic Macrocyclic Peptides Against Multi-Drug Resistant Bacteria and Fungi. *Eur J Pharm Sci* 197, 106776, [10.1016/j.ejps.2024.106776](https://doi.org/10.1016/j.ejps.2024.106776)
 22. Polyansky AA, **Efremov RG** (2024). Lipid-Mediated Adaptation of Proteins and Peptides in Cell Membranes. *BIOL MEMBRANY* 41 (5-6), 473–491, [10.31857/S0233475524050093](https://doi.org/10.31857/S0233475524050093)
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 24. El-Mowafi SA, Konshina AG, Mohammed EHM, Krylov NA, **Efremov RG**, Parang K (2023). Structural Analysis and Activity Correlation of Amphiphilic Cyclic Antimicrobial Peptides Derived from the [W4R4] Scaffold. *Molecules* 28 (24), 8049, [10.3390/molecules28248049](https://doi.org/10.3390/molecules28248049)
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 26. Aliper ET, **Efremov RG** (2023). Inconspicuous Yet Indispensable: The Coronavirus Spike Transmembrane Domain. *Int J Mol Sci* 24 (22), 16421, [10.3390/ijms242216421](https://doi.org/10.3390/ijms242216421)
 27. Neuberger A, Trofimov YA, Yelshanskaya MV, Khau J, Nadezhdin KD, Khosrof LS, Krylov NA, **Efremov RG**, Sobolevsky AI (2023). Molecular pathway and structural mechanism of human oncochannel TRPV6 inhibition by the phytocannabinoid tetrahydrocannabivarin. *Nat Commun* 14 (1), 4630, [10.1038/s41467-023-40362-2](https://doi.org/10.1038/s41467-023-40362-2)
 28. Chugunov AO, Dvoryakova EA, Dyuzheva MA, Simonyan TR, Tereshchenkova VF, Filippova IY, **Efremov RG**, Elpidina EN (2023). Fighting Celiac Disease: Improvement of pH Stability of Cathepsin L In Vitro by Computational Design. *Int J Mol Sci* 24 (15), 12369, [10.3390/ijms241512369](https://doi.org/10.3390/ijms241512369)
 29. Polyansky AA, Gallego LD, **Efremov RG**, Köhler A, Zagrovic B (2023). Protein compactness and interaction valency define the architecture of a biomolecular condensate across scales. *Elife* 12, , [10.7554/eLife.80038](https://doi.org/10.7554/eLife.80038)
 30. Neuberger A, Trofimov YA, Yelshanskaya MV, Nadezhdin KD, Krylov NA, **Efremov RG**, Sobolevsky AI (2023). Structural mechanism of human oncochannel TRPV6 inhibition by the natural phytoestrogen genistein. *Nat Commun* 14 (1), 2659, [10.1038/s41467-023-38352-5](https://doi.org/10.1038/s41467-023-38352-5)
 31. Goryacheva E, **Efremov R**, Krylov N, Artemyev I, Bogdanov A, Mamontova A, Pletnev S, Pletneva N, Pletnev V (2023). Crystal Structure of Bright Fluorescent Protein BrUSLEE with Subnanosecond Fluorescence Lifetime; Electric and Dynamic Properties. *Int J Mol Sci* 24 (7), 6403, [10.3390/ijms24076403](https://doi.org/10.3390/ijms24076403)
 32. Bershatsky YV, Kuznetsov AS, Idiatullina AR, Bocharova OV, Dolotova SM, Gavrilenkova AA, Serova OV, Deyev IE, Rakitina TV, Zangieva OT, Pavlov KV, Batishchev OV, Britikov VV, Usanov SA, Arseniev AS, **Efremov RG**, Bocharov EV (2023). Diversity of Structural, Dynamic, and Environmental Effects Explain a Distinctive Functional Role of Transmembrane Domains in the Insulin Receptor Subfamily. *Int J Mol Sci* 24 (4), , [10.3390/ijms24043906](https://doi.org/10.3390/ijms24043906)
 33. Trofimov YA, Minakov AS, Krylov NA, **Efremov RG** (2023). Structural Mechanism of Ionic Conductivity of the TRPV1 Channel. *Dokl Biochem Biophys* 508 (1), 1–5, [10.1134/S1607672922600245](https://doi.org/10.1134/S1607672922600245)
 34. Panina IS, Balandin SV, Tsarev AV, Chugunov AO, Tagaev AA, Finkina EI, Antoshina DV, Sheremeteva EV, Paramonov AS, Rickmeyer J, Bierbaum G, **Efremov RG**, Shenkarev ZO, Ovchinnikova TV (2023). Specific Binding of the α -Component of the Lantibiotic Lichenicidin to the Peptidoglycan Precursor Lipid II Predetermines Its Antimicrobial Activity. *Int J Mol Sci* 24 (2), 1332, [10.3390/ijms24021332](https://doi.org/10.3390/ijms24021332)
 35. Polyansky AA, **Efremov RG** (2023). On a mechanistic impact of transmembrane tetramerization in the

- pathological activation of RTKs. *Comput Struct Biotechnol J* 21, 2837–2844, [10.1016/j.csbj.2023.04.021](https://doi.org/10.1016/j.csbj.2023.04.021)
36. Lohan S, Konshina AG, **Efremov RG**, Maslennikov I, Parang K (2022). Structure-Based Rational Design of Small α -Helical Peptides with Broad-Spectrum Activity against Multidrug-Resistant Pathogens. *J Med Chem* 66 (1), 855–874, [10.1021/acs.jmedchem.2c01708](https://doi.org/10.1021/acs.jmedchem.2c01708)
 37. Goncharuk MV, Baleeva NS, Nolde DE, Gavrikov AS, Mishin AV, Mishin AS, Sosorev AY, Arseniev AS, Goncharuk SA, Borshchevskiy VI, **Efremov RG**, Mineev KS, Baranov MS (2022). Structure-based rational design of an enhanced fluorogen-activating protein for fluorogens based on GFP chromophore. *Commun Biol* 5 (1), 706, [10.1038/s42003-022-03662-9](https://doi.org/10.1038/s42003-022-03662-9)
 38. Panina IS, Krylov NA, Chugunov AO, **Efremov RG**, Kordyukova LV (2022). The Mechanism of Selective Recognition of Lipid Substrate by hDHHC20 Enzyme. *Int J Mol Sci* 23 (23), 14791, [10.3390/ijms232314791](https://doi.org/10.3390/ijms232314791)
 39. Gigolaev AM, Lushpa VA, Pinheiro-Junior EL, Tabakmakher VM, Peigneur S, Ignatova AA, Feofanov AV, **Efremov RG**, Mineev KS, Tytgat J, Vassilevski AA (2022). Artificial pore blocker acts specifically on voltage-gated potassium channel isoform KV1.6. *J Biol Chem* 298 (11), 102467, [10.1016/j.jbc.2022.102467](https://doi.org/10.1016/j.jbc.2022.102467)
 40. Aliper ET, Krylov NA, Nolde DE, Polyansky AA, **Efremov RG** (2022). A Uniquely Stable Trimeric Model of SARS-CoV-2 Spike Transmembrane Domain. *Int J Mol Sci* 23 (16), , [10.3390/ijms23169221](https://doi.org/10.3390/ijms23169221)
 41. Panina I, Krylov N, Gadalla MR, Aliper E, Kordyukova L, Veit M, Chugunov A, **Efremov R** (2022). Molecular Dynamics of DHHC20 Acyltransferase Suggests Principles of Lipid and Protein Substrate Selectivity. *Int J Mol Sci* 23 (9), , [10.3390/ijms23095091](https://doi.org/10.3390/ijms23095091)
 42. Dubovskii PV, Dubova KM, Bourenkov G, Starkov VG, Konshina AG, **Efremov RG**, Utkin YN, Samygina VR (2022). Variability in the Spatial Structure of the Central Loop in Cobra Cytotoxins Revealed by X-ray Analysis and Molecular Modeling. *Toxins (Basel)* 14 (2), , [10.3390/toxins14020149](https://doi.org/10.3390/toxins14020149)
 43. Volynsky P, Maltseva D, Tabakmakher V, Bocharov EV, Raygorodskaya M, Zakharova G, Britikova E, Tonevitsky A, **Efremov R** (2022). Differences in Medium-Induced Conformational Plasticity Presumably Underlie Different Cytotoxic Activity of Ricin and Viscumin. *Biomolecules* 12 (2), , [10.3390/biom12020295](https://doi.org/10.3390/biom12020295)
 44. Lohan S, Mandal D, Choi W, Konshina AG, Tiwari RK, **Efremov RG**, Maslennikov I, Parang K (2022). Small Amphiphilic Peptides: Activity Against a Broad Range of Drug-Resistant Bacteria and Structural Insight into Membranolytic Properties. *J Med Chem* 65 (1), 665–687, [10.1021/acs.jmedchem.1c01782](https://doi.org/10.1021/acs.jmedchem.1c01782)
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 46. Panina I, Taldaev A, **Efremov R**, Chugunov A (2021). Molecular dynamics insight into the lipid ii recognition by type a lantibiotics: Nisin, epidermin, and gallidermin. *Micromachines (Basel)* 12 (10), , [10.3390/mi12101169](https://doi.org/10.3390/mi12101169)
 47. Kulbatskii D, Shenkarev Z, Bychkov M, Loktyushov E, Shulepko M, Koshelev S, Povarov I, Popov A, Peigneur S, Chugunov A, Kozlov S, Sharonova I, **Efremov R**, Skrebitsky V, Tytgat J, Kirpichnikov M, Lyukmanova E (2021). Human Three-Finger Protein Lypd6 Is a Negative Modulator of the Cholinergic System in the Brain. *Front Cell Dev Biol* 9, 662227, [10.3389/fcell.2021.662227](https://doi.org/10.3389/fcell.2021.662227)
 48. Chernykh MA, Kuldyushev NA, Peigneur S, Berkut AA, Tytgat J, **Efremov RG**, Vassilevski AA, Chugunov AO (2021). Derivative of Scorpion Neurotoxin BeM9 Is Selective for Insect Voltage-Gated Sodium Channels. *Russ. J. Bioorganic Chem.* 47 (4), 854–863, [10.1134/S1068162021040063](https://doi.org/10.1134/S1068162021040063)
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