Lev E. Zelenkov

CONTACT

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CORE SKILLS

- Experimental Design & Data Analysis
- Scientific Writing & Publication
- Literature Review & Critical Thinking
- Project Management & Team Collaboration
- Synthetic Chemistry
- Spectroscopy & Characterization
- Thermal and Structural Analysis
- Expertise in Designing Chemical Laboratories

Research Profiles

- **ORCID iD: 0000-0001-6387-7553**
- **Scopus Author ID: 23986551800**
- **ResearcherID: E-7914-2017**
- **Google Scholar: ijw-GXsAAAAJ**

AREAS OF RESEARCH EXPERTISE

My research focuses on the synthesis and photophysical characterization of luminescent materials, including perovskite nanomaterials and polymer–perovskite composites, for use in optoelectronic devices. I specialize in solid-state luminescence, with particular interest in structure–property relationships driven by non-covalent interactions. My background combines organoelement and coordination chemistry with the development of functional nanocomposites for advanced materials applications.

WORK EXPPERIENCE

Researcher

Qingdao Innovation and Development Center, Harbin Engineering University – China Jun 2023 – present

Research Fellow

ITMO University – Russia Sep 2019 – Jun 2023

Research Director (part time)

PeroX-ray LLC – Russia Dec 2021 – Jun 2024

Research Engineer (part time)

FlexLab LLC – Russia Feb 2021 – Dec 2021

Research Fellow

St. Petersburg State University – Russia Aug 2017 – Aug 2019

Research Fellow

A.E. Favorsky Irkutsk Institute of Chemistry SB Russian Academy of Science – Russia Feb 2011 – Aug 2017

Research Fellow (part time)

Irkutsk Scientific Center SB Russian Academy of Science – Russia Oct 2015 – Aug 2017

EDUCATION

PhD in Chemistry, Organoelement Chemistry

Oct 2007 – Oct 2010

A.E. Favorsky Irkutsk Institute of Chemistry SB Russian Academy of Science, Russia

Specialist Degree in Chemistry (5-year program, equivalent to MSc), qualification: Chemist

Sep 2002 – Jun 2007

Irkutsk State University, Russia

TEACHING & SUPERVISION EXPERIENCE

COURSES

Author of the course "Glovebox and Schlenk Line Techniques" for masters (St. Petersburg State University, in Russian, 2018, 16h)

Author of the course "Principles and Practice of Air-Free Techniques in Synthetic Chemistry" for masters of "Hybrid Materials" program (ITMO University, in English, 2021-2022, 32h)

Author of the course "Chemical Synthesis of Nanomaterials" for masters "Hybrid Materials" program (Harbin Engineering University, in English, 2023-2024, 32h)

SUPERVISION

4 bachelor students graduated

4 master students graduated

1 bachelor students supervising now

2 master student supervising now

1 PhD student supervising now

RESEARCH GRANTS

PRINCIPAL INVESTIGATOR

Foundation for Assistance to Innovations (Russia), 35ГТС1РЭС14/72126 Development of high-performance X-ray detectors of a new generation based on perovskites (2021-2023).

CO-PRINCIPAL INVESTIGATOR

RSF, 23-72-00031 Polariton condensate in planar structures with an optically active perovskite medium for low threshold laser generation (2023).

RSF, 21-73-20189 Controlled synthesis of stable hybrid nano- and microsystems based on halide perovskites with high-efficiency light-emitting characteristics (2021-2024).

RFBR, 20-03-00073 Ligand-induced switching of electrophilic and nucleophilic properties of positively charged d8 metal centers in complexes for fine tuning of noncovalent interactions (2019-2022).

RFBR, 18-33-01042 Novel Principles of Controlling the Luminescent Properties of Energy-Saving Pyrrole-Boron Complexes Based Emitters (2018 - 2019).

RESEARCH GRANTS

(continued)

INVESTIGATOR

Shandong Provincial Department of Science and Technology, Excellent Young Scientists Fund Project (Overseas), 2024HWYQ-082 "Sensory-to-integrated" sensor array based on luminescent nanocrystal arrangement for real-time molecular detection (2024-2026).

Shandong Provincial Department of Science and Technology, Excellent Young Scientists Fund Project (Overseas), 2025HWYQ-073 Semiconductor nanowire solar cell materials, devices and carrier dynamics (2025-to present).

Priority 2030 Federal Academic Leadership Program (ITMO University), № 922011 Solution-processable laser diodes (2022-2024).

RSF, 19-73-30023 Halide perovskite nanomaterials and multifunctional optoelectronic devices based on them (2019-2022).

RSF, 19-13-00013 Metal complexes featuring N-donor ligands for design of new metal-containing materials using weak non-covalent interactions (2019-2021).

RFBR, 15-03-05591-A New scorpion-like metal complexes based on tris(hetaryl)- and tris[ω-(hetaryl)alkyl]phosphines and phosphine chalcogenides: synthesis, structure and catalytic activity (2015-2017).

FASO RF, state assignment research work A.E. Favorsky Irkutsk institute of chemistry SB RAS. "A new level of deep processing of renewable organic raw materials: directed synthesis of functionalized biopolymers and their hybrid nanobiocomposites for medicine, veterinary medicine and other critical technologies" (2017).

FASO RF, state assignment research work Irkutsk Scientific Center SB RAS, Integration program "Fundamental research and breakthrough technologies as a basis for the advanced development of the Baikal region and its interregional links". Project "Nanobiotechnology in the creation of highly effective vaccines, nanostructured biocompatible agents for visualizing diagnosis and therapy" (2015-2016).

PATENTS

Danilovskiy, E., **Zelenkov, L.**, Pushkarev, A., Gets, D., Anoshkin, S., Makarov, S., Zakhidov, A. "Smart Window Module", **RU 205602 U1**

Obraztsova, A., Danilovskiy, E., **Zelenkov, L.**, Makarov, S., Zakhidov, A. "Irreversible critical temperature indicator", **RU 212052 U1**

INVITED TALKS AT THE INTERNATIONAL CONFERENCES & WORKSHOPS

Lev E. Zelenkov and Dmitry Gets. *Defect Assisted Suppression of Auger Recombination in Perovskite Quantum Dots and Nanocrystals* at MOST2024. META-OPTICS, FROM SCIENCE TO TECHNOLOGY, 2024. Uzbekistan.

Lev E. Zelenkov. *Luminescent Halide Perovskite–Polymer Composites* at Research Trends in Macromolecular Science in China, 2024. China.

Lev E. Zelenkov. *Composite and functional materials with nanosized perovskites* at BIT-ITMO workshop. Russia-China, 2023.

Lev E. Zelenkov. *Vacancy-Ordered Double Perovskites* at Peroseminar ITMO University. 2022

Lev E. Zelenkov. *The case of cocrystals of group 10 metal dithiocarbamates with electrondeficient arenes: the first example of Ni(II) reverse sandwich structure* at 2nd International Symposium "Noncovalent interactions in Synthesis, Catalysis, and Crystal Engineering" (NCI-2022). Russia.

EXPERTISE IN DESIGNING CHEMICAL LABORATORIES

Harbin Engineering University, 2024. Two chemical laboratories with a total area of 380 m^2, equipped with 7 glove boxes, 18 fume hoods featuring a reticulated support frame and integrated connections for nitrogen/argon, vacuum, and compressed air.

ITMO University, 2022. Three chemical laboratories with a total area of 270 m^2, equipped with 2 glove box, 13 fume hoods featuring a reticulated support frame and integrated connections for nitrogen/argon, vacuum, and compressed air.

ITMO University, 2020. A chemical laboratory with a total area of 35 m^2, equipped with 1 glove box, 1 fume hood featuring a reticulated support frame and integrated connections for nitrogen/argon, vacuum, and compressed air.

St. Petersburg State University, 2018. A chemical laboratory with a total area of 40 m^2, equipped with 1 glove box, 2 fume hood featuring a reticulated support frame and integrated connections for argon and vacuum.

EXPERT ACTIVITY

Journal Referee

Chemical Engineering Journal, Light: Advanced Manufacturing, Chemistry - an Asian Journal, Optical Materials, Photonics and Nanostructures, International journal of Molecular Sciences, Molecules, Polymers, Inorganics, Processes

PUBLICATION LIST

Coauthored more than 60 papers in Scopus database
Scopus h-index 11
Google Scholar h-index 11

FEATURED PUBLICATIONS IN THE LAST 5+ YEARS (2019–2025)

in Q1 journals of Scopus/WoS, ('*' is the corresponding author)

1. Ignatov, E. V., **Zelenkov, L. E.**, Baykov, S. V., Shurikov, M. K., Semenov, A. V., Bokach, N. A., Postnikov, P. S., Kukushkin V. Yu.* *Controlled Mono- and Double-Insertion of Sulfonamide Fragments into Ni–S Bonds of Nickel(II) Dithiocarbamate Complexes via Sulfonyl Azide Reactivity*. Inorganic Chemistry. 2025, Accepted, in press. Impact Factor (2023): **4.3**.

2. Talianov, P. M., Mikushina D. D., Rzhevskiy S., Arabuli K. V., **Zelenkov L. E.**, Khubezhov S., Logunov L. S., Gets D. S., Peltek* O. O., Zyuzin*, M. V., Makarov* S. V. *Template-Assisted Synthesis of CsPbBr3 Nanocrystals with a Humidity-Induced Fluorescent Response: Mechanism and Sensing Applications*. The Journal of Physical Chemistry Letters. 2025, Volume 16, Issue 17, Pages 4205–4213. Impact Factor (2023): **4.9**. DOI: 10.1021/acs.jpclett.5c00151.

3. Wang, K., Bi, C., **Zelenkov, L.**, Liu, X., Song, M., Wang, W., Makarov, S. and Yin, W. *Fluorescent Sensing for the Detection and Quantification of Sulfur-Containing Gases*. ACS Sensors. 2024, Volume 9, Issue 11, Pages 5708-5727. Impact Factor (2023): **8.3**. DOI: 10.1021/acssensors.4c02033.

4. Psilodimitrakopoulos, S., Ilin, S., **Zelenkov, L. E.***, Makarov, S.* and Stratakis, E.*. *Tailoring of the polarization-resolved second harmonic generation in two-dimensional semiconductors*. Nanophotonics. 2024, Volume 13, no. 18, Page 3181-3206. Impact Factor (2023): **6.5**. DOI: 10.1515/nanoph-2024-0267.

5. Cheranyova A. M., **Zelenkov L. E.**, Baykov Sergey V., Yulia A. Izotova, Daniil M. Ivanov, Nadezhda A. Bokach, and Vadim Yu. *Kukushkin. Intermolecular Metal-Involving Pnictogen Bonding: The Case of σ-(SbIII)-Hole···dz2[PtII] Interaction*. Inorganic Chemistry. 2024, Vol. 63, Issue 32, Page 14943-14957. Impact Factor (2023): **4.3**. DOI: 10.1021/acs.inorgchem.4c01570.

6. Ilin S., Khmelevskaia D., Nikolaeva A., Maragkakis G. M., Psilodimitrakopoulos S., Mouchliadis L., Talianov P. M., Khubezhov S. A., Stratakis E., **Zelenkov L. E.***, Makarov S. V*. *Lead-Free Halide Perovskite Nanoparticles for Up-Conversion Lasing and Efficient Second Harmonic Generation*. Advanced Optical Materials. 2024, Volume 12, Page 2400170. Impact Factor (2023): **8.0**. DOI: 10.1002/adom.202400170.

7. Bodiago E. V., Gets D. S., Ryabov D. R., **Zelenkov L. E.**, Makarov S. V., Zakhidov A. A. *Transparent light-emitting electrochemical cells with acid treated multi-wall carbon nanotubes as a top electrode*. Journal of Alloys and Compounds. 2023, Volume 968, Page 172201. Impact Factor (2023): **5.8**. DOI: 10.1016/j.jallcom.2023.172201.
8. **Zelenkov L. E.**, Smirnov P., Baranov G., Tsyrinova A., Ilyin S., Danilovskiy E., Makarov S., Kapitanova P. *Bright and Stable Perovskite Nanocrystals Lighted Up Remotely by Means of Wireless Power Transfer*. Advanced Optical Materials. 2023, Volume 11, Page 2301123. Impact Factor (2023): **8.0**. DOI: 10.1002/adom.202301123.
9. Smirnov A., Polushkin A., Falchevskaya A., Mikhailova M., Shamkhi H., **Zelenkov L.**, Pogosian T., Morozov M., Makarov S., Vinogradov A. *Fully Inkjet-Printed Perovskite Microlaser with an Outcoupling Waveguide*. Advanced Optical Materials. 2023, Volume 11, Page 2300385. Impact Factor (2023): **8.0**. DOI: 10.1002/adom.202300385.
10. Peltek O. O., Talianov P. M., Krylova A., Polushkin A. S., Anastasova E. I., Mikushina D. D., Gets D., **Zelenkov L. E.**, Khubezhov S., Pushkarev A., Zyuzin M. V. and Makarov S. V. *Ligand-free template-assisted synthesis of stable perovskite nanocrystals with near-unity photoluminescence quantum yield within the pores of vaterite spheres*. Nanoscale. 2023. Volume 15. Page 7482-7492. Impact Factor (2023): **5.8**. DOI: 10.1039/D3NR00214D.
11. Sinelnik A. D., Rybin M. V., Gets D. S., Khubezhov S. A., **Zelenkov L. E.**, Makarov S. V., Shishkin I. I. *Ultra-Broadband Photoluminescent Carbon Dots Synthesized by Laser-Induced Thermal Shock*. Laser & Photonics Reviews. 2023, Volume 17, Issue 1, Pages 2200295. Impact Factor (2023): **9.8**. DOI: 10.1002/lpor.202200295.
12. Artem'ev A. V., Davydova, M. P., Berezin A. S., Samsonenko D. G., Bagryanskaya I. Yu., Brel V. K., Hei X., Brylev K. A., Artyushin O. I., **Zelenkov L. E.**, Shishkin I. I., and Li J. *New Approach toward Dual-Emissive Organic–Inorganic Hybrids by Integrating Mn(II) and Cu(I) Emission Centers in Ionic Crystals*. ACS Applied Materials & Interfaces. 2022, Volume 14, Issue 27, Pages 31000-31009. Impact Factor (2023): **8.3**. DOI: 10.1021/acsami.2c06438.
13. **Zelenkov L. E.**, Ivanov D. M., Tyumentsev I. A., Izotova Yu. A., Kukushkin V. Yu., Bokach N. A. Structure-directing Interplay between *Tetrel and Halogen Bonding in Cocrystal of Lead(II) Diethyldithiocarbamate with Tetraiodoethylene*. Journal of Molecular Sciences. 2022, Volume 23, Issue 19, Page 11870. Impact Factor (2023): **4.9** DOI: 10.3390/ijms231911870.
14. Abzaeva K. A., Sukhov B. G., Khutsishvili S. S., Tarabukina E. B., **Zelenkov L. E.**, Nevezhina A. V. and Fadeeva T. V. *Spontaneous Transformation of Biomedical Polymeric Silver Salt into a Nanocomposite: Physical–Chemical and Antimicrobial Properties Dramatically Depend on the Initial Preparation State*. Journal of Molecular Sciences. 2022, Volume 23, Issue 18, Page 10963. Impact Factor (2023): **4.9**. DOI: 10.3390/ijms231810963.
15. Smirnov A., Pogosian T., **Zelenkov L.**, Butonova S., Makarov S., Vinogradov A. *Structural color image augmented by inkjet printed perovskite patterning*. Applied Materials Today. Volume 28, August 2022, Page 101545. Impact Factor (2023): **7.2**. DOI: 10.1016/j.apmt.2022.101545.
16. **Zelenkov L. E.,** Eliseeva A. A., Baykov S. V., Ivanov D. M., Sumina A. I., Gomila R. M., Frontera A., Kukushkin V. Yu. and Bokach N. A. *Inorganic–organic {dz2-MIIS4}···π-hole stacking in reverse sandwich structures: the case of cocrystals of group 10 metal dithiocarbamates with electron-deficient arenes*. Inorganic Chemistry Frontiers. 2022, Issue 9, Pages 2869-2879. Impact Factor (2023): **6.1**. DOI: 10.1039/D2QI00438K.
17. Khmelevskaia D., Markina D., Tonkaev P., Masharin M., Peltek A., Talianov P., Baranov M. A., Nikolaeva A., Zyuzin M. V., **Zelenkov L. E.**, Pushkarev A. P., Rogach A. L., Makarov S. V. *Excitonic versus Free-Carrier Contributions to the Nonlinearly Excited Photoluminescence in CsPbBr3 Perovskites*. ACS Photonics. 2022, Volume 9, Issue 1, Pages 179–189. Impact Factor (2023): **6.5**. DOI: 10.1021/acsphotonics.1c01347.
18. Talianov P., Peltek O., Masharin M., Khubezhov S., Baranov M., Drabavičius A., Timin A., **Zelenkov L.**, Pushkarev A., Makarov S., Zyuzin M. *Halide Perovskite Nanocrystals with Enhanced Water Stability for Upconversion Imaging in a Living Cell. The Journal of Physical Chemistry Letters*. Volume 12, Issue 37, Pages 8991–8998. 2021. Impact Factor (2023): **4.9**. DOI: 10.1021/acs.jpclett.1c01968.
19. **Zelenkov L. E.**, Eliseeva A. A., Baykov S. V., Suslonov V. V., Galmés B., Frontera A., Kukushkin V. Yu.,

Ivanov D. M., Bokach N. A. *Electron belt-to-σ-hole switch of noncovalently bound iodine(i) atoms in dithiocarbamate metal complexes*. Inorganic Chemistry Frontiers. 2021, Volume 8, Issue 10, Pages 2505-2517. Impact Factor (2023): **6.1**. DOI: 10.1039/D1QI00314C.

20. Berestennikov A. S., Vakulenko A., Kiriushechkina S., Li M., Li Ya., **Zelenkov L. E.**, Pushkarev A. P., Gorlach M. A., Rogach A. L., Makarov S. V., Khanikaev A. B. *Enhanced Photoluminescence of Halide Perovskite Nanocrystals Mediated by a Higher-Order Topological Metasurface*. The Journal of Physical Chemistry C. Volume 125, Issue 18, Pages 9884-9890. 2021. Impact Factor (2023): **3.3**. DOI: 10.1021/acs.jpcc.1c01492.
21. **Zelenkov, L. E.**, Ivanov, D. M., Sadykov, E. K., Bokach, N. A., Galmés B., Frontera A., Kukushkin V. Yu. *Semicoordination Bond Breaking and Halogen Bond Making Change the Supramolecular Architecture of Metal-Containing Aggregates. Crystal Growth & Design*. Volume 20, Issue 10, Pages 6956–6965. 2020. Impact Factor (2023): **3.2**. DOI: 10.1021/acs.cgd.0c00999.
22. Shetnev, A., Baykov, S., Kalinin, S., Belova, A., Sharoyko, V., Rozhkov, A., **Zelenkov, L.**, Tarasenko, M., Sadykov, E., Korsakov, M., Krasavin M. *1,2,4-Oxadiazole/2-imidazoline hybrids: Multi-target-directed compounds for the treatment of infectious diseases and cancer*. International Journal of Molecular Sciences. 2019, Volume 20, Issue 7, Page 1699. Impact Factor (2023): **4.9**. DOI: 10.3390/ijms20071699.