# Ilia Rasskazov

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## Summary

**PhD with 10+ years experience in academia and industry**, specializing in electromagnetics, optics, photonics, and light-matter interactions. **Developed advanced MATLAB tools** for light scattering analysis, thin film modeling, and FTIR microspectroscopy signal correction. **Published 44 articles in top-tier journals** and served as an expert reviewer for renowned publishers including NPG, ACS, Optica, Wiley, Elsevier, and SAGE.

## Education

**Siberian Federal University | Krasnoyarsk, Russia**
**Physics/Optics**
PhD in Physics/Optics (2015); BSc/MSc in Engineering Physics (2009/2011)

## Skills

MATLAB, Python, Lumerical FDTD, Project Management, Computational Electromagnetism

## Experience

**SunDensity Inc. | Rochester, NY**
**Lead Computational Modeling and Simulation Engineer | 09/2023 - Present**

- Led computational team in designing coatings to enhance solar panel yield and to control light in architectural glasses
- Collaborated with internal experimental team and external industrial partners to develop realistic theoretical model, achieving less than 5% error in predicting key optical and thermal parameters of multilayered thin films
- Developed MATLAB tool for low-E coatings design, reducing manufacturing sample turnaround from weeks to days
- Optimized power conversion efficiency of perovskite solar modules through optoelectronic calculations

**KLA | Milpitas, CA**
**Research Scientist | 10/2022 - 08/2023**

- Executed challenging Python-based simulations on high-performance computing clusters for UV defect inspection
- Contributed to next-generation tool design roadmap through collaboration with major industrial and government research partners, both nationally and internationally

**University of Rochester | Rochester, NY**
**Scientist | 07/2021 - 10/2022**

- Developed theoretical models and numerical approaches for solar cells with downconverting materials

**University of Rochester | Rochester, NY**
**Postdoctoral Research Associate | 07/2018 - 06/2021**

- Conducted seminal research on engineering metasurfaces with ultranarrow high-quality resonances in UV-Vis-IR ranges [summarized in the most-cited review in Reviews in Physics journal]
- Discovered fundamental properties of light scattering from multilayered spheres in conjunction with biomedicine [most downloaded in JQSRT], upconversion [most downloaded in OMEx], atomistic physics [Hot PCCP article], and fluorescence [cover article]
- Developed unique theoretical treatments and MATLAB tools for light scattering from multilayered spheres [STRATIFY package]
- Co-advised PhD students successfully graduated from UIUC (USA) and KTH (Sweden)

**University of Illinois at Urbana-Champaign | Urbana-Champaign, IL**
**Postdoctoral Research Associate | 07/2016 - 07/2018**

- Contributed to the development of numerical algorithms for signal processing in Standoff Illuminator for Measuring Absorbance and Reflectance Infrared Light Signatures (SILMARILS) [IARPA program]
- Developed efficient numerical solution for refractive index recovery in infrared microspectroscopy of cylindrical-shaped samples [Editor's choice in Applied Spectroscopy journal]

## Invited Talks

1. *Numerical modeling of light-matter interactions: from theory to industrial applications,* 08/2024, **Colorado School of Mines**, Golden, CO USA
2. *Collective lattice resonances: Plasmonics, all-dielectric photonics and beyond*, 07/2020, **Skolkovo Institute of Science and Technology**, Moscow, Russia
3. *Light scattering from multilayered spheres*, 07/2020 **ITMO University**, Saint Petersburg, Russia
4. *Electromagnetic light scattering from particles*, 05/2019, **KTH Royal Institute of Technology**, Stockholm, Sweden
5. *Plasmon-enhanced upconversion*, 05/2019, **KTH Royal Institute of Technology**, Stockholm, Sweden

## Publications

44. L. M. Sidor, M. M. Beaulieu, I. Rasskazov, B. C. Acarturk, J. Ren, L. Kamoen, M. V. Vitali, P. S. Carney, G. R. Schmidt, W. V. Srubar, E. A. Abbondanzieri, and A. S. Meyer, Engineered bacteria that self-assemble “bioglass” polysilicate coatings display enhanced light focusing, *Proceedings of the National Academy of Sciences*, **in press** (2024).

43. J. Wurm, S. T. Fujisava-Phillips, and I. L. Rasskazov, Optimal design of low-emissivity coatings, *Solar Energy Materials and Solar Cells*, **280**, 113267 (2024).

42. A. Joshi and I. L. Rasskazov, Plasmon-enhanced downshifting and downconversion: fundamentals and applications in photovoltaics, *Reviews in Physics* **12**, 100096 (2024).

41. A. Utyushev, V. I. Zakomirnyi, A. Shcherbakov, I. L. Rasskazov, and A. Moroz, Intuitive understanding of extinction of small particles in absorbing and active host media within the MLWA, *Journal of the Optical Society of America B* **41**, 2519–2526 (2024).

40. V. I. Zakomirnyi, A. Moroz, R. Bhargava, and I. L. Rasskazov, Large fluorescence enhancement via lossless all-dielectric spherical mesocavities, *ACS Nano* **18**, 1621–1628 (2024).

39. A. Utyushev, R. Gaponenko, S. Sun, A. Shcherbakov, A. Moroz, and I. L. Rasskazov, Generation of nearly pure and highly directional magnetic light in fluorescence of rare earth ions, *Physical Review B* **109**, 045413 (2024).

38. L. Wang, I. L. Rasskazov, and P. S. Carney, Clausius-Mossotti relation revisited: Media with electric and magnetic response, *Optics Communications* **549**, 129844 (2023).

37. R. Gaponenko, M. S. Sidorenko, D. Zhirihin, I. L. Rasskazov, A. Moroz, K. Ladutenko, P. Belov, and A. Shcherbakov, Experimental demonstration of superdirective spherical dielectric antenna, *Journal of Applied Physics* **134**, 014901 (2023).

36. Y. Ji, W. Xu, I. L. Rasskazov, H. Liu, J. Hu, M. Liu, D. Zhou, X. Bai, H. Ågren, and H. Song, Perovskite photonic crystal photoelectric devices, *Applied Physics Reviews* **9**, 041319 (2022) **[Featured Article]**.

35. I. L. Rasskazov, N. Sonwalkar, and P. S. Carney, Light scattering by plasmonic disks and holes arrays: Different or the same?, *Journal of Physics D: Applied Physics* **55**, 455104 (2022).

34. I. L. Rasskazov and A. Moroz, Is there a proper figure of merit for a plasmonic structure involved in metal-enhanced fluorescence?, *Plasmonics* **17**, 1091–1094 (2022).

33. A. S. Kostyukov, I. L. Rasskazov, V. S. Gerasimov, S. P. Polyutov, S. V. Karpov, and A. E. Ershov, Multipolar lattice resonances in plasmonic finite-size metasurfaces, *Photonics* **8**, 109 (2021).

32. L. Wang, I. L. Rasskazov, and P. S. Carney, Clustering diffused-particle method for scattering from large ensembles of electromagnetically polarizable particles, *Physical Review B* **104**, 115418 (2021).

31. V. S. Gerasimov, A. E. Ershov, R. G. Bikbaev, I. L. Rasskazov, I. L. Isaev, P. N. Semina, A. S. Kostyukov, V. I. Zakomirnyi, S. P. Polyutov, and S. V. Karpov, Plasmonic lattice Kerker effect in ultraviolet-visible spectral range, *Physical Review B* **103**, 035402 (2021).

30. R. Gaponenko, A. Moroz, I. L. Rasskazov, K. Ladutenko, A. Shcherbakov, and P. Belov, Harnessing superdirectivity in dielectric spherical multilayer antennas, *Physical Review B* **104**, 195406 (2021).

29. A. S. Kostyukov, A. E. Ershov, R. G. Bikbaev, V. S. Gerasimov, I. L. Rasskazov, S. V. Karpov, and S. P. Polyutov, Substrate mediated lattice Kerker effect in Al metasurfaces, *Journal of the Optical Society of America B* **38**, C78–C83 (2021) **[Feature Issue on “Light-Matter Interaction in Complex Photonic Systems”]**.

28. A. D. Utyushev, V. I. Zakomirnyi, and I. L. Rasskazov, Collective lattice resonances: Plasmonics and beyond, *Reviews in Physics* **6**, 100051 (2021).

27. I. L. Rasskazov, A. Moroz, and P. S. Carney, Extraordinary fluorescence enhancement in metal-dielectric core–shell nanoparticles, *Journal of Physical Chemistry Letters* **12**, 6425–6430 (2021) **[Cover Article]**.

26. I. L. Rasskazov, V. I. Zakomirnyi, A. D. Utyushev, P. S. Carney, and A. Moroz, Remarkable predictive power of the modified long wavelength approximation, *Journal of Physical Chemistry C* **125**, 1963–1971 (2021).

25. A. D. Utyushev, I. L. Isaev, V. S. Gerasimov, A. E. Ershov, V. I. Zakomirnyi, I. L. Rasskazov, S. P. Polyutov, H. Ågren, and S. V. Karpov, Engineering novel tunable optical high-Q nanoparticle array filters for a wide range of wavelengths, *Optics Express* **28**, 1426–1438 (2020).

24. I. L. Rasskazov, P. S. Carney, and A. Moroz, STRATIFY: a comprehensive and versatile MATLAB code for a multilayered sphere, *OSA Continuum* **3**, 2290–2309 (2020).

23. A. D. Utyushev, V. I. Zakomirnyi, A. E. Ershov, V. S. Gerasimov, S. V. Karpov, and I. L. Rasskazov, Collective lattice resonances in all-dielectric nanostructures under oblique incidence, *Photonics* **7**, 24 (2020).

22. V. I. Zakomirnyi, I. L. Rasskazov, L. K. Sørensen, P. S. Carney, Z. Rinkevicius, and H. Ågren, Plasmonic nano-shells: atomistic discrete interaction versus classic electrodynamics models, *Physical Chemistry Chemical Physics* **22**, 13467–13473 (2020) **[2020 Hot Article]**.

21. S. Sun, I. L. Rasskazov, P. S. Carney, T. Zhang, and A. Moroz, Critical role of shell in enhanced fluorescence of metal-dielectric core-shell nanoparticles, *Journal of Physical Chemistry C* **124**, 13365–13373 (2020).

20. I. L. Rasskazov, P. S. Carney, and A. Moroz, Intriguing branching of the maximum position of the absorption cross section in Mie theory explained, *Optics Letters* **45**, 4056–4059 (2020).

19. I. L. Rasskazov, A. Moroz, and P. S. Carney, Electromagnetic energy in multilayered spherical particles, *Journal of the Optical Society of America A* **36**, 1591–1601 (2019).

18. V. I. Zakomirnyi, S. V. Karpov, H. Ågren, and I. L. Rasskazov, Collective lattice resonances in disordered and quasi-random all-dielectric metasurfaces, *Journal of the Optical Society of America B* **36**, E21–E29 (2019) **[Feature Issue on "Collective Effects and Coupling Phenomena in Resonant Optical Metasurfaces"]**.

17. I. L. Rasskazov, R. Singh, P. S. Carney, and R. Bhargava, Extended multiplicative signal correction for infrared microspectroscopy of heterogeneous samples with cylindrical domains, *Applied Spectroscopy* **73**, 859–869 (2019) **[Editor's Choice]**.

16. V. S. Gerasimov, A. E. Ershov, R. G. Bikbaev, I. L. Rasskazov, I. V. Timofeev, S. P. Polyutov, and S. V. Karpov, Engineering mode hybridization in regular arrays of plasmonic nanoparticles embedded in 1D photonic crystal, *Journal of Quantitative Spectroscopy and Radiative Transfer* **224**, 303–308 (2019).

15. A. S. Kostyukov, A. E. Ershov, V. S. Gerasimov, S. A. Filimonov, I. L. Rasskazov, and S. V. Karpov, Super-efficient laser hyperthermia of malignant cells with core-shell nanoparticles based on alternative plasmonic materials, *Journal of Quantitative Spectroscopy and Radiative Transfer* **236**, 106599 (2019).

14. V. I. Zakomirnyi, A. E. Ershov, V. S. Gerasimov, S. V. Karpov, H. Ågren, and I. L. Rasskazov, Collective lattice resonances in arrays of dielectric nanoparticles: a matter of size, *Optics Letters* **44**, 5743–5746 (2019).

13. V. Zakomirnyi, I. Rasskazov, V. Gerasimov, A. Ershov, S. Polyutov, S. Karpov, and H. Ågren, Titanium nitride nanoparticles as an alternative platform for plasmonic waveguides in the visible and telecommunication wavelength ranges, *Photonics and Nanostructures - Fundamentals and Applications* **30**, 50–56 (2018) **[Invited Artilce]**.

12. I. L. Rasskazov, L. Wang, C. J. Murphy, R. Bhargava, and P. S. Carney, Plasmon-enhanced upconversion: engineering enhancement and quenching at nano and macro scales, *Optical Materials Express* **8**, 3787–3804 (2018).

11. A. E. Ershov, V. S. Gerasimov, A. P. Gavrilyuk, S. V. Karpov, V. I. Zakomirnyi, I. L. Rasskazov, and S. P. Polyutov, Thermal limiting effects in optical plasmonic waveguides, *Journal of Quantitative Spectroscopy and Radiative Transfer* **191**, 1–6 (2017).

10. V. S. Gerasimov, A. E. Ershov, S. V. Karpov, A. P. Gavrilyuk, V. I. Zakomirnyi, I. L. Rasskazov, H. Ågren, and S. P. Polyutov, Thermal effects in systems of colloidal plasmonic nanoparticles in high-intensity pulsed laser fields [Invited],

*Optical Materials Express* **7**, 555–568 (2017) **[Invited Article]**.

9. V. I. Zakomirnyi, I. L. Rasskazov, V. S. Gerasimov, A. E. Ershov, S. P. Polyutov, and S. V. Karpov, Refractory titanium nitride two-dimensional structures with extremely narrow surface lattice resonances at telecommunication wavelengths, *Applied Physics Letters* **111**, 123107 (2017).

8. V. I. Zakomirnyi, I. L. Rasskazov, S. V. Karpov, and S. P. Polyutov, New ideally absorbing Au plasmonic nanostructures for biomedical applications, *Journal of Quantitative Spectroscopy and Radiative Transfer* **187**, 54–61 (2017).

7. I. L. Rasskazov, N. Spegazzini, P. S. Carney, and R. Bhargava, Dielectric sphere clusters as a model to understand infrared spectroscopic imaging data recorded from complex samples, *Analytical Chemistry* **89**, 10813–10818 (2017).

6. I. L. Rasskazov, S. V. Karpov, G. Y. Panasyuk, and V. A. Markel, Overcoming the adverse effects of substrate on the waveguiding properties of plasmonic nanoparticle chains, *Journal of Applied Physics* **119**, 043101 (2016).

5. I. L. Rasskazov, S. V. Karpov, and V. A. Markel, Waveguiding properties of short linear chains of nonspherical metal nanoparticles, *Journal of the Optical Society of America B* **31**, 2981–2989 (2014).

4. I. L. Rasskazov, S. V. Karpov, and V. A. Markel, Surface plasmon polaritons in curved chains of metal nanoparticles, *Physical Review B* **90**, 075405 (2014).

3. I. L. Rasskazov, S. V. Karpov, and V. A. Markel, Nondecaying surface plasmon polaritons in linear chains of silver nanospheroids, *Optics Letters* **38**, 4743–4746 (2013).

2. S. V. Karpov and I. L. Rasskazov, Simulation of conditions for fabrication of optical nanowaveguides in the form of chains of spherical metal nanoparticles by electrostatic functionalization of the process substrate, *Colloid Journal* **75,** 279–288 (2013).

1. I. L. Rasskazov, V. A. Markel, and S. V. Karpov, Transmission and spectral properties of short optical plasmon waveguides, *Optics and Spectroscopy* **115**, 666–674 (2013).