

# Tetiana Orlova : Curriculum Vitae

## PERSONAL INFORMATION

ITMO Fellow, Leading Researcher  
Infochemistry Scientific Centre, ITMO University  
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## ACADEMIC DEGREES

### **Candidate of Sciences (comparable to the Ph.D. degree)**

Year: 2007  
Section: Physical and mathematical sciences  
Specialty: Physics of molecular and liquid crystals  
Organization: Institute of Physics, National Academy of Sciences of Ukraine, Kiev, Ukraine  
Thesis title: Optical and spectral properties of liquid crystals with photosensitive chiral steroid dopant  
Supervisor: Prof. Irina Terenetskaya, Leading researcher, Dept. Optical quantum electronics, Institute of Physics, National Academy of Sciences of Ukraine

### **M.Sc. with Honours**

Year: 2002  
Specialty: Physics  
Organization: Volodymyr Dahl East-Ukrainian National University, Luhansk, Ukraine  
Thesis title: Z-pinch dynamics in BiSb under conditions of transverse breakdown: The nature of the S-shaped volt-ampere characteristic  
Supervisor: Prof. Vyacheslav Gorshkov, Faculty of Natural Sciences, Volodymyr Dahl East-Ukrainian National University & Institute of Physics, National Academy of Sciences of Ukraine

## **B.Sc. with Honours**

Year: 2001  
Specialty: Physics  
Organization: Volodymyr Dahl East-Ukrainian National University, Luhansk, Ukraine

## **RESEARCH EXPERIENCE**

- Jan. 2021 – p.t.      Leading Researcher at the Infochemistry Scientific Centre, ITMO University, Russia. Supported by the individual ITMO University fellowship ‘Self-assembled supramolecular architectures in chiral soft condensed matter’.
- Visiting Researcher at the School of Physics and Astronomy, University of Southampton, UK.
- Jan. 2020 – Dec.2020      Research Fellow at the Soft Photonics Systems Group, School of Physics and Astronomy, University of Southampton, UK. Research topic ‘Taming disorder in soft matter materials with topology’.
- Dec. 2018 – Dec.2019      Post-doc at the Institute Charles Sadron UPR22 CNRS, University of Strasbourg, France. Research project ‘Interactions in thin liquid films towards non-aqueous foams’ supervised by DR CNRS Wiebke Drenckhan.
- Feb. 2018 – Nov. 2018      Senior Researcher at the Research Center for Physical Materials Science and Composite Materials, National Research Tomsk Polytechnic University, Russia. Research topic ‘Hybrid polymer-based materials with improved electrophysical and mechanical properties’.
- Jan. 2016 – Dec. 2017      Post-doc at the Laboratoire Ondes et Matière d'Aquitaine UMR5798 CNRS, University of Bordeaux, France. Supported by the Marie Skłodowska-Curie individual fellowship ‘Free-standing three-dimensional topological structures in geometrically confined chiral nematic liquid crystals: fundamentals and applications’ and supervised by DR CNRS Etienne Brasselet.
- Sept. 2014 – Dec. 2015      Post-doc at the Laboratory for Biomolecular Nanotechnology, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands. Research project ‘Light-controlled soft photonic materials’ supervised by Prof. Dr. Nathalie Katsonis.

- Oct. 2013 – July 2014 Post-doc at the Laboratoire Ondes et Matière d'Aquitaine UMR5798 CNRS, University of Bordeaux, France. Supported by the Erasmus BMU-MID post-doctoral grant 'Optically controlled generation of topological defects in photo-active chiral liquid crystals' and supervised by DR CNRS Etienne Brasselet
- July 2013 – Jan. 2014 Senior Researcher at the Dept. Optical Quantum Electronics, Institute of Physics, National Academy of Sciences of Ukraine. Research topic 'Molecular Photonics'.
- June 2008 – June 2013 Scientific Researcher at the Dept. Optical Quantum Electronics, Institute of Physics, National Academy of Sciences of Ukraine. Research topic 'Molecular Photonics'.
- Visiting Researcher from February 2011 to July 2011 at the Dept. Radiation Biology, Institute for Cancer Research, Oslo University Hospital, Norway. Supported by the Yggdrasil personal mobility grant 'Photomedicine and photobiology of vitamin D' from the Research Council of Norway and supervised by Prof. Asta Juzeniene.
- July 2005 – May 2008 Junior Researcher at the Dept. Optical Quantum Electronics, Institute of Physics, National Academy of Sciences of Ukraine. Research topic 'Molecular Photonics'.

## TEACHING EXPERIENCE

- March 2023 **Intensive modular course for master students** 'Introduction to soft matter physics and chemistry', ITMO University, Russia **(in English)**.
- Sept. 2022 – Dec. 2022 **Semester course for bachelor students** 'General chemistry: Mathematics with an application to physicochemical methods', ITMO University, Russia.
- Oct. 2022 **Selected lectures for master students** in the course 'Methodology of scientific research, ITMO University, Russia **(in English)**.
- Feb. 2022 – p.t. **Selected lectures for master students** in the course 'Modern research methods', ITMO University, Russia **(in English)**.

- Sept. 2021 – Dec. 2021 **Semester course for bachelor students** ‘General chemistry: Mathematics with an application to physicochemical methods’, ITMO University, Russia.
- Feb. 2021 **Intensive modular lecture course for master students** ‘Introduction to chemistry and physics of liquid crystals’, ITMO University, Russia **(in English)**.

## SUPERVISING ACTIVITY

- Sept. 2022 – p.t. **Supervisor of four 1<sup>st</sup> year MSc students:** Egor Goncharov, Roman Kirillov, Olga Matushova, Infochemistry Scientific Center, ITMO University, Russia.
- Sept. 2021 – p.t. **Supervisor of the PhD student** Darina Darmoroz, Infochemistry Scientific Center, ITMO University, Russia.
- Sept. 2021 – p.t. **Supervisor of the 1<sup>st</sup> year MSc student** Anastasiia Piven, Infochemistry Scientific Center, ITMO University, Russia.
- Sept. 2020 – Dec. 2020 **Tutor of the MPhys students** Benjamin Beddoes and Eleanor White in the project ‘Alignment and electrical switching of liquid crystal films for birefringence determination’, University of Southampton, UK.
- Oct. 2019 - Jan. 2020 **Co-supervisor of the M2 student** Nadia Sofia Macias Vera in the project ‘Drainage and stability of thin non-aqueous films stabilized by amphiphilic polymers’, International master program in polymer science, Institute Charles Sadron, University of Strasbourg, France.
- Sept. 2015 – Dec. 2015 **Tutor of the student group** on the lab practical project in the course ‘Fundamentals of Chemistry’, University of Twente, The Netherlands.

## **LIST OF PUBLICATIONS AND PROCEEDINGS**

### **Reviews and publications in the peer-reviewed journals**

1. T. Orlova, A. Piven, D. Darmoroz, T. Aliev, T.M.T.A. Razik, A. Boitsev, N. Grafeeva, and E. Skorb, 'Machine learning for soft and liquid molecular materials: A review', *Digital Discovery*, 15 Feb 2023. Advance Article.
2. D.D. Darmoroz, A. O. Piven and T. Orlova, 'Method of optical molecular generation of localized chiral structures in photoactive liquid crystal films', *Journal of Instrument Engineering*, 2023 (accepted).
3. S.A. Shvetsov, T. Orlova, A.V. Emelyanenko, A.S. Zolot'ko, and H.L. Ong, 'Optical nonlinearity of a dual-frequency nematic liquid crystal via temperature-mediated mapping of dielectric anisotropy', *Opt. Express* 30, 47909, 2022.
4. I. Lobanov, E. Aksenova, T. Orlova, D. Darmoroz, V. Uzdin, and A.D. Kiselev, 'Optical imaging and analytical design of localized topological structures in chiral liquid crystals', *Symmetry* 14(12), 2476, 2022.
5. S.A. Shvetsov, T. Orlova, and A.V. Emelyanenko, 'Light-Induced structures and microparticle transportation in a free-surface frustrated chiral nematic film', *Crystals* 12, 549, 2022.
6. N. Brouckaert, N. Podoliak, T. Orlova, D. Bankova, A.F. De Fazio, A.G. Kanaras, O. Hovorka, G. D'Alessandro, and M. Kaczmarek, 'Nanoparticle-Induced property changes in nematic liquid crystals', *Nanomaterials*, 12, 341, 2022.
7. I. Korolev, T.A. Aliev, T. Orlova, S.A. Ulasevich, M. Nosonovsky, and E.V. Skorb, 'When Bubbles Are Not Spherical: Artificial Intelligence Analysis of Ultrasonic Cavitation Bubbles in Solutions of Varying Concentrations', *J. Phys. Chem. B*, 126 (16), 3161, 2022.
8. I. Membrillo Solis, T. Orlova, K. Bednarska, P. Lesiak, T.R. Woliński, G. D'Alessandro, J. Brodzki and M. Kaczmarek, 'Tracking the time evolution of soft matter systems via topological structural heterogeneity', *Commun. Mater. (Nature Publisher)*, 3, 1, 2022.
9. S. Shvetsov, T. Orlova, A.V. Emelyanenko and A. Zolot'ko, 'Thermo-optical generation of particle-like structures in frustrated chiral nematic film', *Crystals*, 9, pp. 574, 2019.
10. T. Orlova, R. Plamont, A. Depauw and N. Katsonis, 'Dynamic spirals of nanoparticles in light-responsive polygonal fields', *Small*, 15 (39), pp. 1902419, 2019.
11. R.A. Surmenev, T.N. Orlova, R.V. Chernozem, A.A. Ivanova, A. Bartasyte, S. Mathur and M.A. Surmeneva, 'Hybrid lead-free polymer-based scaffolds with improved piezoelectric response for biomedical energy-harvesting applications: A review', *Nano Energy*, 62, pp. 475-506, 2019.
12. T. Orlova, F. Lancia, C. Loussert, S. Iamsaard, N. Katsonis and E. Basselet, 'Revolving supramolecular chiral structures powered by light in nanomotor-doped liquid crystals', *Nat. Nanotech.*, 13, pp. 304-308, 2018.
13. O. Dmitrenko, T. Orlova and I. Terenetskaya, 'Medium controlled photochemistry of Provitamin D: From solutions to liquid crystals', *J. Mol. Liq.*, 267, pp. 428-435, 2018.

14. M.V. Vasnetsov, V.A. Pas'ko, T.N. Orlova, D.A. Plutenko, A.D. Kudryavtseva and N.V. Chernega, 'Photonic bandgap deformation in a nonideal synthetic opal photonic crystal', JETP, 126 (5), pp. 579-591, 2018.
15. H. Huang, T. Orlova, B. Matt and N. Katsonis, 'Long-lived supramolecular helices promoted by fluorinated photo-switches', Macromol. Rapid Commun., 39, pp. 1700387, 2018.
16. T. Orlova, S.J. Aßhoff, T. Yamaguchi, N. Katsonis and E. Brasselet, 'Creation and manipulation of topological states in chiral nematic microspheres', Nat. Commun., 6, pp. 7603, 2015.
17. Vasnetsov M.V., Orlova T.N., Bazhenov V.Yu., Shevchuk A.S., Kudryavtseva A.D. and Tcherniega N.V., 'Photonic bandgap examination in an immersed synthetic opal', Appl. Phys. B., 116 (3), pp. 541-548, 2014.
18. Orlova T.N., Iegorov R.I. and Kiselev A.D., 'Light-induced pitch transitions in photosensitive cholesteric liquid crystals: Effects of anchoring energy', Phys. Rev. E, 89, pp. 012503, 2014.
19. Terenetskaya I., Samchenko Y., Orlova T., Pasmurceva N., Kapinos P., Boldeskul I. and Ulberg Z., 'Photoisomerization of provitamin D in hydrogel matrix', Soft, 2, pp. 8-12, 2013.
20. Orlova T., Moan J., Lagunova Z., Aksnes L., Terenetskaya I. and Juzeniene A., 'Increase in serum 25-hydroxyvitamin-D<sub>3</sub> in humans after sunbed exposures compared to previtamin D<sub>3</sub> synthesis in vitro', J. Photochem. Photobiol. B: Biology, 122, pp. 32-36, 2013.
21. Kapinos P., Orlova T. and Terenetskaya I., 'Method for the measurement of the vitamin-D synthetic capacity of UV radiation', Lighting engineering and power engineering, 1 (29), pp. 25-33, 03.2012 [in Russian].
22. Terenetskaya I. and Orlova T., 'Variability of solar UV-B irradiance: in situ monitoring and model calculation of the vitamin D synthetic capacity of sunlight', Int. J. Remote Sensing, 32 (21), pp. 6205-6218, 2011.
23. Orlova T.N., Terenetskaya I.P., Eremenko A.M. and Surovtseva N.I., 'Provitamin D doped silica and polymeric films: new materials for UV biosensor', Mat. Sci. Appl., 1 (5), pp. 267-271, 2010.
24. Orlova T.N. and Terenetskaya I.P., 'Numerical simulations of provitamin D<sub>3</sub> photoisomerization kinetics: specific features of *cis-trans* isomerization in liquid crystals', Reports of the East-Ukrainian National University, 8 (150), part 2, pp. 36-43, 2010 [in Russian].
25. Orlova T.N. and Terenetskaya I.P., 'Specific features of provitamin D<sub>3</sub> photoisomerization in a cholesteric liquid crystal', Opt. Spectr., 108 (4), pp. 608-612, 2010.
26. Orlova T.N. and Terenetskaya I.P., 'Possible use of provitamin D<sub>3</sub> photoisomerization for spectral dosimetry of bioactive antirachitic UV radiation', J. Applied Spectroscopy, 76 (2), pp. 240-244, 2009.
27. Egorov R.I., Orlova T.N. and Terenetskaya I.P., 'Application of the Stokes polarimetry in the study of UV-induced transformations of cholesteric liquid crystals', Reports of the National Academy of Sciences of Ukraine, 11, pp. 73-78, 2006 [in Russian].
28. Orlova T.N. and Terenetskaya I.P., 'Specific features of photoisomerization of provitamin D<sub>3</sub> in a nematic liquid crystal', Opt. Spectr., 100 (4), pp. 584-589, 2006.
29. Gvozдовskyy I., Orlova T. and Terenetskaya I., 'Features of previtamin D *cis-trans* isomerization in the nematic LC matrices: orientation and cholesteric order effects', Mol. Cryst. Liq. Cryst., 434, pp. 325/[653]-332/[660], 2005.

30. Gvozдовskyy I., Orlova T. and Terenetskaya I., 'UV induced photoalignment and colour change in nematic liquid crystals with provitamin D dopant', *Mol. Cryst. Liq. Cryst.*, 430, pp. 199-203, 2005.

### **Publications in the peer-reviewed conference proceedings:**

31. T. Orlova and I. Terenetskaya, 'UV Phototherapy: A New Look at the UV Sources and Doses', *Clin. Med.*, 2(1) p.CIM-02-1018, 2020.
32. I. Terenetskaya and T. Orlova, 'Metrology of the vitamin-D-synthetic activity of UV lamps', *Proc. 18<sup>th</sup> International Congress of Metrology*, p. 10003, 2017.
33. Kapinos P.S., Orlova T.N. and Terenetskaya I.P., 'UV biosimulator with visual detection of vitamin D synthesis using  $\theta$ -cell', *Mol. Cryst. Liq. Cryst.*, 615:1, pp. 42-49, 2015.
34. Terenetskaya I., Orlova T. and Kapinos P., 'Adequate UV exposures for healthy life: in situ monitoring and model calculation of the vitamin-D-synthetic capacity of sunlight', *Chem. J. Moldova. General, Industrial and Ecological Chemistry*, 7 (1), pp. 98-103, 2012.
35. Orlova T.N. and Terenetskaya I.P., 'Polarization properties and structure changes of plane-oriented nematic LCs with provitamin D<sub>3</sub> chiral dopant', *Mol. Cryst. Liq. Cryst.*, 547, pp. 10 [1700]-17 [1707], 2011.
36. Terenetskaya I.P. and Orlova T.N., 'Collective character of previtamin D cis-trans isomerization in liquid-crystalline matrices', *Mol. Cryst. Liq. Cryst.*, 541, pp. 96 [334]-103 [341], 2011.
37. Melnikova I., Terenetskaya I. and Orlova T., 'Modelling and observations of biologically active solar UV radiation: towards balancing between health risks and benefits', *Proc. 34th International Symposium on Remote Sensing of Environment 'The GEOSS Era: Towards Operational Environmental Monitoring'*, paper 00535, pp. 1-4, 2011.
38. Mukha Yu.P., Eremenko A.M., Smirnova N.P., Doroshenko A.O., Valakh M.Ya., Dzhagan V.I., Terenetskaya I.P. and Orlova T.N., 'Influence of gold nanoparticles in SiO<sub>2</sub> matrix on the spectral properties and photochemistry of adsorbed molecules of Rhodamine 6G and provitamin D', *Nanosystems, Nanomaterials, Nanotechnologies*, 8:3, pp. 813-828, 2010 [in Russian].
39. Zavora L.N., Kasyan N.A., Lisetski L.N., Panikarskaya V.D., Terenetskaya I.P., Orlova T.N. and Torgova S.I., 'Photoinduced phase transition smectic A – cholesteric in liquid crystal matrices containing provitamin D', *Liquid Crystals and Their Applications*, 3, pp. 39-44, 2008 [in Russian].
40. Orlova T.N. and Terenetskaya I.P., 'Useful algorithm for calculations the vitamin -D synthetic capacity of sunlight', *Proc. 18th Int. Congress of Biometeorology, Ecosystem, Eco-P06*, pp. 1-4, 2008.
41. Orlova T.N. and Terenetskaya I.P., 'UV-biosensor for visual indication of vitamin D synthesis', *Proc. SPIE*, 7003, pp. 70031O, 2008.
42. Terenetskaya I.P. and Orlova T.N., 'Personal UV biosimulator for healthy indoor tanning', *Proc. SPIE*, 6991, pp. 69911F, 2008.
43. Terenetskaya I. and Orlova T., 'UV radiation, vitamin D and cancer: how to measure the vitamin D synthetic capacity of UV sources?' *Proc. SPIE*, 5969, pp. 465- 471, 2005.
44. Gvozдовskyy I., Orlova T., Salkova E., Terenetskaya I. and Milinevsky G., 'Ozone and solar UVB radiation: monitoring of the vitamin D synthetic capacity of sunlight in Kiev and Antarctica', *Int. J. Remote Sensing*, 26 (16), pp. 3555-3559, 2005.

45. Terenetskaya I., Orlova T., Gvozдовskyy I. and Milinevsky G., 'Solar UVB radiation and vitamin D synthesis: direct monitoring of the vitamin D synthetic capacity of sunlight in Kiev and in Antarctic', *Annalen der Meteorologie*, 41 (part 2), pp. 676-678, 2005.

**Others:**

46. Orlova T.N. 'Optical and spectral properties of liquid crystals with photosensitive chiral steroid dopant', *Newsletters of the European Photochemistry Association*, 12, pp. 38-39, 2007.



## **PATENTS AND PATENT APPLICATIONS**

### **Ukrainian Patent for Utility Model UA 84586 U**

Patent title: **Method for determining the biological dose of ultraviolet radiation**  
Inventors: Samchenko Y.M., Ulberg Z.P., Boldeskul I.E., Terenetska I.P., Orlova T.M., Kapinos P.S.  
Dates: Date of filling Ukrainian patent application is 23.04.2013. Date of effective is 25.10.2013.

### **United States Patent US 8552391 B2**

Patent title: **Methods and devices for in situ determination of a vitamin-D synthesizing amount of natural and artificial UV radiation**  
Inventors: Terenetska I.P., Orlova T.M., Kirilenko E.K., Galich G.A., Eremenko A.M.  
Dates: International filing date is 23.03.2010. Entry date is 10.08.2011. National number is 13148804. Date of national patent is 08.10.2013.

### **Ukrainian Patent UA 93569 C2**

Patent title: **A method for in situ determination of the vitamin-D-synthetic dose of natural and artificial ultraviolet irradiation and its implementation in a personal biosimeter**  
Inventors: Terenetska I.P., Orlova T.N., Kirilenko E.K., Eremenko A.M., Galich G.A.  
Dates: Date of filling Ukrainian patent application is 24.03.2009. Date of effective is 25.02.2011.