

CURRICULUM VITAE

Dr Mikhail A. Filatov

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• Professional Experience

- 10/2017–current Lecturer in Organic Chemistry
School of Chemical and Pharmaceutical Sciences, Technological University Dublin, Ireland
- 09/2015 – 09/2017 Marie Curie Research Fellow (IF)
School of Chemistry, Trinity College Dublin, Ireland
- 04/2014 – 07/2015 Researcher in EU project POLINNOVA
Institute of Polymers, Bulgarian Academy of Sciences, Sofia, Bulgaria
- 02/2010 – 03/2014 Postdoctoral Fellow
Max Planck Institute for Polymer Research, Mainz, Germany
- 12/2008 – 12/2009 CNRS Postdoctoral Fellow
Institute of Molecular Chemistry, University of Burgundy, Dijon, France
- 06/2008 – 07/2008 Visiting Scientist
Department of Biochemistry and Biophysics, University of Pennsylvania, Philadelphia, USA
- 08/2005 – 10/2008 Managing Director
Esterkem Ltd., private chemical company, Moscow, Russia

• Education

- 01/2020 – 06/2020 Postgraduate Certificate in University Learning and Teaching
Learning, Teaching and Technology Centre (LTTC), TU Dublin, Ireland
- 10/2005 – 11/2008 PhD in Organic Chemistry
Department of Chemistry, Moscow State University, Moscow, Russia
Thesis title: "General synthetic approach to porphyrins and dipyrins with π -extended system". Supervisors: Prof. Irina Beletskaya, Dr. Andrei Cheprakov
- 09/2000 – 07/2005 Diploma of Chemist (with honours)
Department of Chemistry, Moscow State University, Moscow, Russia

• Research Interests

Multistep organic synthesis of functional dyes: π -extended porphyrins, dipyrins, BODIPYs. Synthesis of materials: modified biopolymers, graphene oxide, MOFs. Singlet oxygen generation, sensing and reactivity. Photoinduced electron transfer in donor-acceptor dyads. Intersystem crossing in heavy-atom-free dyes. Photodynamic therapy. Triplet-triplet annihilation photon upconversion. Photocatalysis.

• Funding and Support

- 2022 – 2026 SFI Frontiers for the Future Award (Principal Investigator)
Project: "Dyes with Switchable Intersystem Crossing for Photonics"
- 2020 – 2024 TU Dublin Research Scholarship (Principal Investigator)
Project: "Heavy-Atom-Free Photosensitizing Materials"
- 2015 – 2017 European Commission, Horizon 2020 Programme Grant (Principal Investigator)
Project: "Controlled Singlet Oxygen Release Sensitizer in Photodynamic Therapy"
- 2010 – 2014 Max Planck Society Scholarship

Project: "New Functional Dyes for NIR to Visible Light Upconversion"

2007 – 2008 Scholarship of the President of Russian Federation for outstanding PhD students

2005 – 2006 Russian Foundation for Assistance to Small Innovative Enterprises (spin-off)

Project: "Development of Technology of 24-Epibrassinolide Production"

• Teaching Experience

Current teaching responsibilities:

CHEM1007 – Introduction to Chemistry (24 lectures), CHEM2008 – Organic Chemistry (12 lectures), CHEM2022 – Spectroscopy (12 lectures), CHEM2024 - Pharmaceutical & Bioorganic Chemistry (12 lectures), CHEM2025 - Medicinal Chemistry & Pharmchem Processes (12 lectures), CHEM3011 - Organic Chemistry & Stereochemistry (12 lectures), CHEM4008 - Topics in Medicinal Chemistry (6 lectures)

Previously taught modules:

CHEM2009 - Principles of Drug Action (6 lectures), CHEM2023 - Organic Chemistry (12 lectures), CHEM3003 - Organic Chemistry & Stereochemistry (12 lectures), CHEM4004 - Advanced Organic Chemistry (12 lectures)

Departmental admin roles:

year coordinator of DT261-2 group (BSc in Medicinal Chemistry and Pharmaceutical Sciences)

module coordinator for CHEM3011 - Organic Chemistry & Stereochemistry

• Reviewer Activities

Journal articles (203):

Chemical Communications (65), *The Journal of Organic Chemistry* (25), *ChemistrySelect* (25), *Angewandte Chemie International Edition* (14), *Physical Chemistry Chemical Physics* (11), *Journal of Materials Chemistry C* (8), *Chemistry—A European Journal* (7), *Photochemical and Photobiological Sciences* (6), *Dyes and Pigments* (6), *Journal of Physical Chemistry* (6), *Journal of the American Chemical Society* (4), *Chemical Science* (3), *ACS Materials Letters* (3), *New Journal of Chemistry* (3), *RSC Advances* (3), *JACS Au* (2), *Chemistry and Biodiversity* (2), *European Journal of Inorganic Chemistry* (2), *Accounts of Chemical Research* (1), *Electroanalysis* (1), *Chemistry—An Asian Journal* (1), *Journal of Physical Chemistry Letters* (1), *ChemPhotoChem* (1), *ChemPhysChem* (1), *Organic Letters* (1), *Small* (1).

Reviewer Identifier: <https://www.webofscience.com/wos/author/record/A-2266-2013>

Funding applications (29):

European Commission H2020 – Marie Curie IEFs, ANR (Agence nationale de la recherche), Polish National Science Centre

• Memberships in Professional Societies

American Chemical Society, Marie Curie Fellows Association, Marie Curie Alumni Association (Irish chapter)

• Publications

Summary: 36 scientific papers published (14 as a corresponding author), 1 book chapter, 4 patents.

h index = 21 (Google Scholar), > 1500 citations

<https://scholar.google.bg/citations?user=g1IdjV4AAAAJ&hl=ru>

Orcid ID: orcid.org/0000-0002-1640-841X

Peer-review articles

(* corresponding author)

1. T. Mikulchyk, S. Karuthedath, C. De Castro, A.A. Buglak, A. Sheehan, A. Wieder, F. Laquai, I. Naydenova, M.A. Filatov,*, *J. Mater. Chem. C*, **2022**, *10*, 11588-11597.

2. G.V. Morozkov, A.S. Abel, M.A. Filatov, S.E. Nefedov, V.A. Roznyatovsky, A.V. Cheprakov, A.Yu. Mitrofanov, I.S. Ziankou, A. Averin, I.P. Beletskaya, J. Michalak, C. Bucher, L. Bonneviot, A. Bessmertnykh-Lemeune, *Dalton Trans.*, **2022**, 51, 13612-13630.
3. N. Kiseleva, M.A. Filatov, J.C. Fischer, M. Kaiser, M. Jakoby, D. Busko, I.A. Howard, B.S. Richards, A. Turshatov* BODIPY–pyrene donor–acceptor sensitizers for triplet–triplet annihilation upconversion: the impact of the BODIPY-core on upconversion efficiency. *Phys. Chem. Chem. Phys.*, **2022**, 24, 3568-3578.
4. A.A. Buglak, A. Charisiadis, A. Sheehan, C.J. Kingsbury, M.O. Senge, M.A. Filatov* Quantitative Structure–Property Relationship Modelling for the Prediction of Singlet Oxygen Generation by Heavy-atom-free BODIPY Photosensitizers. *Chem. Eur. J.*, **2021**, 27, 9934-9947.
5. J. Isokuortti, K. Kuntze, M. Virkki, Z. Ahmed, E. Vuorimaa-Laukkanen, M.A. Filatov, A. Turshatov, T. Laaksonen, A. Priimagi, N. Durandin, Expanding Azobenzene Photoswitching into Near-Infrared via Endothermic Triplet Energy Transfer. *Chem. Sci.*, **2021**, 12, 7504-7509.
6. N. Kiseleva, D. Busko, B.S. Richards, M.A. Filatov*, A. Turshatov, Determination of Upconversion Quantum Yields Using Charge-Transfer State Fluorescence of Heavy-Atom-Free Sensitizer as a Self-Reference. *J. Phys. Chem. Lett.*, **2020**, 11, 6560-6566.
7. A. A. Buglak, M.A. Filatov, M.A. Hussain, M. Sugimoto, Singlet Oxygen Generation by Porphyrins and Metalloporphyrins Revisited: a Quantitative Structure-Property Relationship (QSPR) Study. *J. Photochem. Photobiol. A*, **2020**, 43, 112833.
8. M.A. Filatov* Heavy-atom-free BODIPY Photosensitizers with Intersystem Crossing Mediated by Intramolecular Photoinduced Electron Transfer. *Org. Biomol. Chem.*, **2020**, 18, 10-27.
9. S. Callaghan, M.A. Filatov, H. Savoie, R.W. Boyle, M.O. Senge, In vitro cytotoxicity of a library of BODIPY-anthracene and -pyrene dyads for application in photodynamic therapy. *Photochem. Photobiol. Sci.*, **2019**, 18, 495-504.
10. M.A. Filatov*, S. Karuthedath, P.M. Polestshuk, S. Callaghan, K. Flanagan, T. Wiesner, F. Laquai, M.O. Senge, BODIPY-Pyrene and Perylene Dyads as Heavy-Atom-Free Singlet Oxygen Sensitizers. *ChemPhotoChem*, **2018**, 2, 606-615.
11. M.A. Filatov*, S. Karuthedath, P.M. Polestshuk, S. Callaghan, K. Flanagan, M. Telitchko, T. Wiesner, F. Laquai, M.O. Senge, Control of triplet state generation in heavy atom-free BODIPY–anthracene dyads by media polarity and structural factors. *Phys. Chem. Chem. Phys.*, **2018**, 20, 8016-8031.
12. N. Kiseleva, M.A. Filatov*, M. Oldenburg, D. Busko, M. Jakoby, I.A. Howard, B.S. Richards, M.O. Senge, S.M. Borisov, A. Turshatov, The Janus-Faced Chromophore: A Donor-Acceptor Dyad with Dual Performance in Photon Up-conversion. *Chem. Commun.*, **2018**, 54, 1607-1610.
13. M.A. Filatov*, S. Karuthedath, P.M. Polestshuk, H.Savoie, K.J. Flanagan, C. Sy, E. Sitte, M. Telitchko, F. Laquai, R.W. Boyle, M.O. Senge, Generation of Triplet Excited States via Photoinduced Electron Transfer in *meso*-anthra-BODIPY: Fluorogenic Response toward Singlet Oxygen in Solution and *in Vitro*. *J. Am. Chem. Soc.*, **2017**, 139, 6282–6285.
14. S. Callaghan, M.A. Filatov*, E. Sitte, H. Savoie, R.W. Boyle, K.J. Flanagan, and M.O. Senge, Delayed release singlet oxygen sensitizers based on pyridone-appended porphyrins. *Photochem. Photobiol. Sci.*, **2017**, 16, 1371-1374.
15. M.A. Filatov*, M.O. Senge, Molecular devices based on reversible singlet oxygen binding in optical and photomedical applications. *Mol. Syst. Des. Eng.*, **2016**, 1, 258-272.
16. M.A. Filatov*, S. Balushev, K. Landfester, Protection of Densely Populated Excited Triplet State Ensembles Against Deactivation by Molecular Oxygen. *Chem. Soc. Rev.*, **2016**, 45, 4668-4689.
17. T.G.B. de Souza, M.G. Vivas, C.R. Mendonça, S. Plunkett, M.A. Filatov, M.O. Senge, L. De Boni, Studying the intersystem crossing rate and triplet quantum yield of *meso*-substituted porphyrins by means of pulse train fluorescence technique. *J. Porphyrins Phthalocyanines*, **2016**, 20, 1–10.

18. M.A. Filatov*, F. Etzold, D. Gehrig, F. Laquai, D. Busko, K. Landfester, S. Balushev, Interplay between singlet and triplet excited states in a conformationally locked donor–acceptor dyad. *Dalton Trans.*, **2015**, 44, 19207-19217.
19. M.A. Filatov*, E. Heinrich, K. Landfester, S. Balushev, meso-Tetraphenylporphyrin with a pi-system extended by fusion with anthraquinone. *Org. Biomol. Chem.*, **2015**, 13, 6977-6983.
20. M.A. Filatov*, E. Heinrich, D. Busko, I.Z. Ilieva, K. Landfester, S. Balushev, Reversible Oxygen Addition on a Triplet Sensitizer Molecule: Protection from Excited States Depopulation. *Phys. Chem. Chem. Phys.*, **2015**, 17, 6501-6510.
21. M.A. Filatov, S. Ritz, I. Ilieva, V. Mailänder, K. Landfester, S. Balushev, Extending the infrared limit of oxygenic photosynthesis. *SPIE Newsroom*, **2014**, doi: 10.1117/2.1201403.005378.
22. C. Wohnhaas, V. Mailänder, M. Dröge, M.A. Filatov, D. Busko, Y. Avlasevich, Stanislav Balushev, T. Miteva, K. Landfester, A. Turshatov, Fabrication of low-power upconverting nanocapsules for bioimaging in red and far-red spectral regions. *Macromolecular Bioscience*, **2013**, 13, 1422–1430.
23. M.A. Filatov*, S. Balushev, I.Z. Ilieva, V. Enkelmann, T. Miteva, K. Landfester, S. Aleshchenkov, A.V. Cheprakov, Tetraanthraporphyrins: synthesis, structure and optical properties. *J. Org. Chem.*, **2012**, 77, 11119–11131.
24. P.D. Harvey, A. Langlois, M.A. Filatov, D. Fortin, K. Ohkubo, S. Fukuzumi, R. Guillard, Decoupling the Artificial Special Pair to Slow Down the Rate of Singlet Energy Transfer. *J. Porphyrins Phthalocyanines*, **2012**, 16, 8-10.
25. E.R. Ranyuk, M.A. Filatov, A.D. Averin, A.V. Cheprakov, I.P. Beletskaya, The Synthesis of Highly Basic π -Extended Porphyrins by Palladium Catalyzed Amination. *Synthesis*, **2012**, 3, 393-398.
26. S. Thyagarajan, B. Ghosh, M.A. Filatov, A.V. Moore, A.V. Cheprakov, S.A. Vinogradov, Near infrared dipyrin-based fluorogenic chelators for metal ions. *Proc. SPIE*, **2011**, 7910, 79100Z.
27. P.D. Harvey, M.A. Filatov, R. Guillard, Bis- and Trisporphyrin Bio-Inspired Models for Bacterial Antennas and Photosystems. *J. Porphyrins Phthalocyanines*, **2011**, 15, 1-22.
28. M.A. Filatov, A.V. Cheprakov, The Synthesis of New Tetrabenz- and Tetranaphthoporphyrins via the Addition Reactions of 4,7-Dihydroisindole. *Tetrahedron*, **2011**, 3559-3566.
29. M.A. Filatov, F. Laquai, D. Fortin, R. Guillard, P.D. Harvey, Strong Donor–Acceptor Couplings in a Special Pair-Antenna Model. *Chem. Comm.*, **2010**, 46, 9176-9178.
30. M.A. Filatov, A. Y. Lebedev, S.N. Mukhin, S. A. Vinogradov and A. V. Cheprakov, π -Extended Dipyrins Capable of Highly Fluorogenic Complexation with Metal Ions. *J. Am. Chem. Soc.*, **2010**, 132, 9552-9554.
31. M.A. Filatov, R. Guillard, P. Harvey, Selective Stepwise Suzuki Cross-coupling Reaction for the Modelling of Photosynthetic Donor–Acceptor Systems. *Org. Lett.*, **2010**, 12, 196-199.
32. A.V. Cheprakov, M.A. Filatov, The Dihydroisindole Approach to π -Extended Porphyrins. *J. Porphyrins and Phthalocyanines*, **2009**, 13, 291-303.
33. A.Y. Lebedev, M.A. Filatov, A.V. Cheprakov, S.A. Vinogradov, Effects of Structural Deformations on Optical Properties of Tetrabenzoporphyrins: Free-bases and Pd Complexes. *J. Phys. Chem. A*, **2008**, 112, 7723-7733.
34. M.A. Filatov, A.Y. Lebedev, S.A. Vinogradov, A.V. Cheprakov, Synthesis of 5,15-Diaryltetrabenzoporphyrins. *J. Org. Chem.*, **2008**, 73, 4175-4185.
35. M.A. Filatov, A.V. Cheprakov, I.P. Beletskaya, A Facile and Reliable Method for the Synthesis of Tetrabenzoporphyrins from 4,7-Dihydroisindole. *Eur. J. Org. Chem.*, **2007**, 3468-3475.
36. O.S. Finikova, A.V. Cheprakov, S.Y. Chernov, M.A. Filatov, S.A. Vinogradov, I.P. Beletskaya. Novel Synthesis of Substituted Tetraaryltetrabenzoporphyrins. *Doklady Chemistry*, **2003**, 391, 222-224.

Patents

1. Long-term stable composition, such as phosphorescent composition or TTA-photon upconversion composition, EP 2 851 407 A1, US 2016/0222286 A1, WO 2015/044129 A1, **2015**

2. Method of Synthesis of 5,5'-Disubstituted π -extended Dipyrrromethenes and Their Use as Analytical Reagents for Metal Ions and Fluorescent Imaging Probes, US 2011/0144351 A1, **2009**
3. Method of Reduction of Unsaturated Ketones into Saturated Ketones, RU 2 293 720 C1, **2007**
4. Method of Synthesis of 24-Epibrassinolide, RU 2 272 044 C1, **2006**

Book chapters

M.A. Filatov, Protection of triplet excited state materials from oxygen quenching and photooxidation in optical sensing applications *in Applications of Quenched Phosphorescence Detection of Molecular Oxygen in Life Sciences*, ed. D. B. Papkovsky and R. I. Dmitriev, Royal Society of Chemistry, Cambridge, **2018**, pp. 91-116, ISBN: 978-1-78801-175-4.

• Talks and Seminars

07/2022	"Photosensitizers with Charge Transfer-Mediated Intersystem Crossing: Design and Applications" Laboratoire de Chimie, ENS de Lyon, Lyon, France	Research seminar
05/2021	"Modulating Charge Transfer and Intersystem Crossing in BODIPY Sensitizers for PDT and Photon Upconversion" 1st HighLIGHTing Science Conference	Invited talk
12/2018	"Heavy atom-free donor-acceptor dyads with efficient and tunable intersystem crossing" 10th Asian Photochemistry Conference, Taipei, Taiwan	Invited talk
07/2018	"Janus-faced chromophores: Dual performance of BODIPY in triplet-triplet annihilation photon upconversion" 27th PhotoIUPAC, Dublin, Ireland	Oral presentation
11/2017	"Molecular oxygen shuttles for applications in energy conversion and biomedicine" 2 nd Silk Road International Symposium for Young Distinguished Scholars, Xian, China	Invited talk
07/2017	"Heavy atom-free BODIPY donor-acceptor dyads as singlet oxygen sensitizers" 28th International Conference on Photochemistry, Strasbourg, France	Oral presentation
04/2017	"Interplay Between Singlet and Triplet Energy States of Organic Molecules and Oxygen: Applications in Energy Conversion and Biomedicine" ICMUB, University of Burgundy, Dijon, France	Research seminar
12/2016	"Protection of Triplet Excited State Materials Against Quenching by Oxygen" 9th Asian and Oceanian Conference on Photochemistry, Singapore	Oral presentation
09/2016	"Deactivation of Photon Upconversion Systems by Oxygen: Protection strategy" EMN Meeting on Photonics, Barcelona, Spain	Invited Talk
04/2016	"Controlled Singlet Oxygen Release Photosensitizers in Photodynamic Therapy" TBSI Postdoctoral Research Day, TCD, Dublin, Ireland	Oral presentation
01/2016	"New Molecular Devices for the Control of Singlet Oxygen Generation in Photonic and Biomedical Applications" Central European Conference on Photochemistry CECP, Bad Hofgastein, Austria	Oral presentation
11/2016	"Delayed Singlet Oxygen Release Materials for Photodynamic Therapy" TBSI Knowledge Exchange Seminar, TCD, Dublin, Ireland	Research seminar
07/2015	"Triplet-Triplet Annihilation Photon Upconversion: Extending the Infrared Limit of Oxygenic Photosynthesis"	Oral presentation

27th International Conference on Photochemistry, Jeju, South Korea

07/2015

“Polymeric Singlet Oxygen Generating Scaffolds”

27th International Conference on Photochemistry, Jeju, South Korea

Oral presentation