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Dr. Yaroslav V. Aulin

Date of birth: 09/25/1985
Nationality: Ukrainian
Driving license: category B

Professional Experience

2017-2019 **Postdoctoral Associate**,
Department of Chemistry, ***Rutgers University***, Newark, NJ, USA.

- ultrafast laser spectroscopy (time resolved fluorescence,transient absorption, transient reflectivity)
- installation and maintenance of laser spectroscopy setups
- supervision of undergraduate and graduate students
- ultrafast spectroscopy experiments on vibrational cooling of hot ground state of azulene
- data analysis in Igor Pro

2015-2017 **Postdoctoral Fellow**,
Department of Chemistry, ***Temple Universiy***, Philadelphia, PA, USA.

- developed ultrabroadband Mid-IR laser source based on noncollinear difference frequency generation in silver thiogallate crystal
- improved power conversion efficiency of two stage broadband KTP (potassium titanyl phosphate) NOPA (noncollinear optical parametric amplifier)
- built transient reflectivity setup, developed data acquisition software (in LabView)
- built intensity autocorrelator and prism compressor of laser pulses
- characterized 2D and layered materials by optical spectroscopy - Raman, UV/Vis, fluorescence
- studied the effect of environment on fluorescence kinetics of MoS_2 monolayers (experiments performed at Argonne National Laboratroy)
- data analysis in Igor Pro and Python

Education

2016 **Ph.D. in Chemical Engineering**,
Optoelectronic Materials Section, Department of Chemical Engineering, ***Delft University of Technology***, Delft, the Netherlands.

thesis: "Singlet exciton fission and photochemical upconversion".

- construction and maintenance of ultrafast laser spectroscopy setups
- optical spectroscopy on materials for photovoltaic applications (transient absorption, ultrafast fluorescence, flash photolysis)
- data analysis in Python and Igor Pro

2010 **MSc in Nanoscience, cum laude**,
Zernike Institute for Advanced Materials, ***University of Groningen***, Groningen, the Netherlands.
thesis: "Excitons in Organic Materials",.
- construction and maintenance of ultrafast laser spectroscopy setups
- optical spectroscopy on materials for photovoltaic applications
- data analysis in Origin

2008 **BSc and MSc in Applied Physics and Electrical Engineering, with honors**, *Quantum Radiophysics department,* ***Taras Shevchenko National University of Kyiv***, Kyiv, Ukraine.
- laser polarimetry and ellipsometry
- data analysis in Mathematica and Matlab

2002 **high school**, ***Ukrainian Physics and Mathematics Lyceum***, Kyiv, Ukraine.
- winner of Ukrainian National Olympiad in Physics

Certificates

- **IBM** Data Science Foundations Professional Certificate (2020)
- **IBM** DS0101EN: Intoroduction to Data Science, edX (2020)
- **IBM** DS0103EN: The Data Science Method, edX (2020)
- **IBM** DS0105EN: Data Science Tools, edX (2020)
- **IBM** PY0101EN: Python Basics for Data Science, edX (2020)
- **IBM** DV0101EN: Visualizing Data with Python, edX (2020)
- **The Linux Foundation** LFS101x: Introduction to Linux (2020)
- **Quantic School of Business and Technology** Customer Discovery (2020)
- **Quantic School of Business and Technology** Finance: Time Value of Money (2020)
- **Quantic School of Business and Technology** Marketing Fundamentals (2020)
- **Quantic School of Business and Technology** Microeconomics I: Supply and Demand (2020)
- **Quantic School of Business and Technology** Accounting I: Fundamentals (2020)
- **Quantic School of Business and Technology** One-variable Statistics (2020)

Computer skills

- Python (Numpy, Scipy, Matplotlib, Seaborn, Pandas)
- C/C++, SQL, R, bash, gnuplot, LaTeX, PGF/TikZ, HTML
- Matlab, Mathematica, Maple, Mathcad, Igor Pro, Origin
- LabView
- SNLO, Glotaran
- AutoCAD
- Linux, Unix, Windows
- MS Office, LibreOffice

Languages

Ukrainian (native), English (fluent), Russian (fluent), Dutch (intermediate), French (basic)

Technical Skills

- development of optical setups
- operation, alignment, installation and maintenance of laser systems

- ultrafast laser spectroscopy: time resolved fluorescence(streak camera, fluorescence upconversion, time correlated single photon counting), transient absorption, transient reflectivity
- supercontinuum generation, noncollinear optical parametric amplification (NOPA), difference frequency generation (DFG), second harmonic generation (SHG), sum frequency generation (SFG)
- characterization: UV/Vis, Raman, fluorescence FTIR, ellipsometry, polarized optical microscopy, AFM, profilometry, powder X-ray diffraction, differential scanning calorimetry, NMR
- fabrication: physical vapor deposition, spincoating, solutions degassing (freeze-pump-thaw), wet lab and clean room skills

Publications

14. **Y.V. Aulin**, M. Liu, and P. Piotrowiak, Ultrafast Vibrational Cooling Inside a Molecular Container, Journal of Physical Chemistry Letters, 10,10, 2434-2438 (2019)

13. H. Li, T. Marshall, **Y.V. Aulin**, A. Thenuwara, Y. Zhao, E. Borguet, D. Strongin, F. Ren, Effect of metal ion doping on the structure and electrical properties of carbonized polydopamine, Journal of Materials Science, 54, 8, 6393–6400 (2019)

12. **Y.V. Aulin**, A. Tuladhar, E. Borguet, Ultrabroadband mid-infrared noncollinear difference frequency generation in a silver thiogallate crystal, Optics Letters,43 (18), 4402-4405 (2018)

11. **Y.V. Aulin**, K. Felter, D.D. Günbaş, R.K. Dubey, W. Jager, F.C. Grozema, Morphology independent efficient singlet exciton fission in perylene diimide thin films, ChemPlusChem, 83, 230-238 (2018)

10. I.G. McKendry, A.C. Thenuwara, S.L. Shumlas, H. Peng, **Y.V. Aulin**, P.R. Chinnam, E. Borguet, D.R. Strongin, M.J. Zdilla, Systematic doping of cobalt into layered manganese oxide sheets substantially enhances water oxidation catalysis, Inorganic Chemistry, 57 (2), 557–564 (2018)

9. N.H. Attanayake, A.C. Thenuwara, A. Patra, **Y.V. Aulin**, T.M. Tran, H. Chakraborty, E. Borguet, M.L. Klein, J.P. Perdew, D.R. Strongin, Effect of Intercalated Metals on the Electrocatalytic Activity of 1T-MoS_2 for the Hydrogen Evolution Reaction, ACS Energy Letters, 3, 7-13 (2018)

8. H. Li, **Y.V. Aulin**, L. Frazer, E. Borguet, R. Kakodkar, J. Feser, Y. Chen, K. An, D. Dikin, and F. Ren, Structure evolution and thermoelectric properties of carbonized polydopamine thin films, ACS Appl. Mater. Interfaces, 9 (8), 6655-6660 (2017)

7. A.C. Thenuwara, S.L. Shumlas, N.H. Attanayake, **Y.V. Aulin**, I.G. McKendry, Q. Qiao, Y. Zhu, E. Borguet, M. J. Zdilla and D.R. Strongin, Intercalation of Cobalt into the Interlayer of Birnessite Improves Oxygen Evolution Catalysis, ACS Catalysis, 6, 7739-7743 (2016)

6. **Y.V. Aulin**, M. van Sebille, M. Moes, F.C. Grozema "Photochemical upconversion in metal-based octaethyl porphyrin-diphenylanthracene systems", RSC Advances, 5, 130 (2015)

5. S.C. Boehme, I.M. Azpiroz, **Y.V. Aulin**, F.C. Grozema, D. Vanmaekelbergh, L.D.A. Siebbeles, I. Infante, A.J. Houtepen, The Density of Trap States and Auger mediated electron trapping in CdTe Quantum-Dot Solids, Nano Letters, 15, 5 (2015)

4. L.T. Kunneman, M.D. Tessier, H. Heuclin, B. Dubertret, **Y.V. Aulin**, F.C. Grozema, J.M. Schins, L.D.A. Siebbeles, Bimolecular Auger recombination of electron-hole pairs in two-dimensional CdSe and CdSe/CdZnS core/shell nanoplatelets, The Journal of Physical Chemistry Letters, 4, 21 (2013)

3. N. Tian, **Y.V. Aulin**, D. Lenkeit, S. Pelz, O.V. Mikhnenko, P.W.M. Blom, M.A. Loi, E. Holder, Cyclometalated red iridium (III) complexes containing carbazolyl-acetylacetonate ligands: efficiency enhancement in polymer LED devices, Dalton Transactions, 39, 37 (2010)

2. S.N. Savenkov, Y.A. Oberemok, V.V. Yakubchak, **Y.V. Aulin**, O.I. Barchuk, Light depolarization by inhomogeneous linear birefringent media, Semiconductor Physics, Quantum Electronics & Optoelectronics, 12, 1 (2009)

1. S.N. Savenkov, **Y.V. Aulin**, Orthogonal properties of homogeneous anisotropy medium, Proc. SPIE, 6536 (2007)

Talks

8. *"Laser spectroscopy of advanced materials for photovoltaics and catalysis"*, Southern Illinois University, Carbondale, IL, USA (2017)

7. *"Laser spectroscopy of advanced materials for photovoltaics and catalysis"* Rutgers University, Newark, NJ, USA (2017)

6. *"Laser spectroscopy of advanced materials for photovoltaics and catalysis"*, Pacific Northwest National Laboratory, Richland, WA, USA (2017)

5. *"Laser spectroscopy of advanced materials for photovoltaics and catalysis"*, Drexel University, Philadelphia, PA, USA (2017)

4. *"Phonons: Theory and Experiments"*, EFRC CCDM tutorial, Temple University, Philadelphia, PA, USA (2016)

3. *"Singlet Exciton Fission and Photochemical Upconversion"*, AMOLF, Amsterdam, the Netherlands (2014)

2. *"Extremely efficient singlet exciton fission in perylenediimides"*, FOM Physics Conference, Veldhoven, the Netherlands (2014)

1. *"Crystal engineering of singlet exciton fission in perylenediimides"*, Singlet Fission Workshop, Lyons, CO, USA (2013)

Poster presentations

11. **Y.V. Aulin**, T.M. Tran, J.H. Odhner, N.H. Attanayake, D. Trainer, I. McKendry, A. Thenuwara, R.J. Levis, M.J. Zdilla, M. Iavarone, X. Xi, D.R. Strongin, E. Borguet, Optical characterization and ultrafast spectroscopy of MoS_2 monolayers, bilayers, and ion intercalated structures, EFRC CCDM Annual Meeting, Philadelphia, PA, USA (2017)

10. **Y.V. Aulin**, T.M. Tran, J.H. Odhner, N.H. Attanayake, D. Trainer, I. McKendry, A. Thenuwara, R.J. Levis, M.J. Zdilla, M. Iavarone, X. Xi, D.R. Strongin, E. Borguet, Optical characterization and ultrafast spectroscopy of MoS_2 monolayers, bilayers, and ion intercalated structures, ACS YCC Poster Session and Grad School/Career Fair, Philadelphia, PA, USA (2017)

9. **Y.V. Aulin**, D. Trainer, L. Frazer, J.H. Odhner, R.J. Levis, R. Schaller, M. Iavarone, E. Borguet, Control of exciton and trion dynamics in a molybdenum disulfide monolayer with interfacial dielectrics, 252nd ACS National Meeting, Philadelphia, PA, USA (2016)

8. **Y.V. Aulin**, L. Frazer, E. Borguet, Steady state and ultrafast optical characterization of 2D materials, EFRC CCDM Annual Meeting, Philadelphia, PA, USA (2016)

7. **Y.V. Aulin**, A. Tuladhar, S. Piontek, E. Borguet, Optical Characterization Techniques, Temple Materials Institute Symposium, Philadelphia, PA, USA (2016)

6. **Y.V. Aulin**, D.D. Günbaș, N. Gorczak, W. Jager, E.S.R. Sudhölter, F.C. Grozema, Relation between crystal structure and efficiency of singlet fission in perylene diimides, NWO CW Study group meeting "Chemistry in Relation to Physics and Materials Sciences", Veldhoven, the Netherlands (2013)

5. **Y.V. Aulin**, D. Günbaș, N. Gorczak, W. Jager, E.J.R Sudhölter, F.C. Grozema, Relation between crystal structure and efficiency of singlet fission in perylene diimides, FOM Physics, Veldhoven, the Netherlands (2013)

4. **Y.V. Aulin**, D.D. Günbaș, N. Gorczak, W.F. Jager, E.J.R. Sudhölter, and F.C. Grozema, Relation between crystal structure and efficiency of singlet fission in perylene diimides, Electron Donor-Acceptor Interactions Grodon Research Conference, Salve Regina University, Newport, RI (2012)

3. **Y.V. Aulin**, M. van Sebille, L.D.A. Siebbeles, F.C. Grozema, Photochemical upconversion kinetics in solution, TULIP 2012 summer school, Noordwijk, the Netherlands (2012)

2. **Y.V. Aulin**, M. van Sebille, M. Moes, L.D.A. Siebbeles, F.C. Grozema, Photochemical Upconversion kinetics in solution, 10^{th} International Conference on Excitonic Processes in Condensed Matter, Nanostructured and Molecular Materials, Groningen, the Netherlands (2012)

1. **Y.V. Aulin**, M. Moes, L.D.A. Siebbeles, F.C. Grozema, Kinetics of photochemical upconversion in solution", FOM Physics, Veldhoven, the Netherlands (2012)

Contributed Presentations

19. Michael Zdilla, Daniel Strongin, John Perdew, Ian McKendry, Michael Klein, Richard Remsing, Ran Ding, Haowei Peng, Eric Borguet, Laszlo Frazer, **Yaroslav Aulin**, Tim Marshall, Akila Thenuwara, Turning a Cheap, Poor Catalyst into a Cheap, Excellent Catalyst—Optimizing Layered MnO-Based Materials for Water Oxidation Using Experiment and Theory, MRS Spring Meeting, Phoenix, AZ, USA (2019)

18. Lujia Fang, **Yaroslav V. Aulin**, Piotr Piotrowiak, Intramolecular vibrational energy transport studied by ultrafast laser spectroscopy, Chemistry Graduate Open House and Poster Session, Rutgers University, Newark, NJ, USA (2018)

17. M. Zdilla, R. Ding, I. McKendry, R. Remsing, H.W. Peng, J. Perdew, D. Strongin, Q. Kang, A. Thenuwara, E. Borguet, **Y. Aulin**, Layer-by-layer assembly of colloidal nanosheets with individually differing properties to generate improved water oxidation catalysts, 256^{th} ACS National Meeting, Boston, MA, USA, (2018)

16. Michael Zdilla, Daniel Strongin, Eric Borguet, Michael Klein, John Perdew, Ian McKendry, Ran Ding, Richard Remsing, Haowei Peng, Ravneet Bhullar, Loveyy Mohamad, Akila Thenuwara, Samantha Shumlas, **Yaroslav Aulin**, Qing Kang, Modifying layered manganese oxides for enhanced water oxidation: Turning a cheap, poor catalyst into a cheap, excellent catalyst, 255^{th} ACS National Meeting, New Orleans, LA, USA (2018)

15. Ferdinand Grozema, Kevin Felter, **Yaroslav Aulin**, Maria Fravventura, Tom Savenije, Effect of Intermolecular Interactions on Excited State Dynamics in Aromatic Molecular Crystals, 10^{th} International Conference on Porphyrins and Phthalocyanines, Munich, Germany (2018)

14. M. Iavarone, E. Borguet, A. Bansil, I. Cone, G. Karapetrov, C. Lane, T. Polakovic, M. Precner, A. Putilov, Q. Qiao, D. Trainer, B. Wang, X.X. Xi, **Y. Aulin**, Y. Zhu, Electronic and Structural Properties of 2D Materials, EFRC PI's Meeting, Washington, DC, USA (2017)

13. Ian McKendry, Akila Thenuwara, Sam Shumlas, **Yaroslav Aulin**, Haowei Peng, Rick Remsing, Daniel Strongin, Michael Zdilla, Modification of 2D complexes for cheap and efficient water-oxidation catalysis, ACS YCC Poster Session and Grad School/Career Fair, Philadelphia, PA, USA (2017)

12. Marshall Tim, **Aulin Yaroslav**, Gilroy Kyle, Neretina Svetlana, Aguilera Ares, Borguet Eric, Second Harmonic Generation Spectroscopy of Substrate-Based Surfactant Free Gold and Silver Nano-Hemispheres, ACS YCC Poster Session and Grad School/Career Fair, Philadelphia, PA, USA (2017)

11. Attanayake Nuwan, Thenuwara Akila, **Aulin Yaroslav**, Borguet Eric, Strongin Daniel, Effect of the interlayer spacing and charge on the electrocatalytic activity of 1T-MoS2 for the hydrogen evolution reaction, ACS YCC Poster Session and Grad School/Career Fair, Philadelphia, PA, USA (2017)

10. Thi M. Tran, **Yaroslav V. Aulin**, Ian G. McKendry, Dan Trainer, Maria Iavarone, Eric Borguet, Functionalization of MoS2 with organic molecules, ACS YCC Poster Session and Grad School/Career Fair, Philadelphia, PA (2017)

9. Ares Aguilera, **Yaroslav V. Aulin**, Stefan Piontek, Eric Borguet, Optimization of an Ultrashort Pulse Prism Compressor for Plasmon Dephasing Experiments, 100^{th} Annual Meeting of the Optical Society of America, Symposium on Undergraduate Research, Division of Laser Science, Rochester, NY, USA (2016)

8. Ares Aguilera, **Yaroslav Aulin**, Stefan Piontek, and Eric Borguet, Optimization of an Ultrashort Pulse Prism Compressor for Plasmon Dephasing Experiments, Undergraduate Research Poster Symposium, College of Science and Technology, Temple University, Philadelphia, PA, USA (2016)

7. F. Grozema, **Y. Aulin**, D. Günbaș, Structure-property relations in perylene bisimids: charge mobility, exiton diffusion and singlet exciton fission, Charge transport in organic materials workshop, Bremen, Germany (2014)

6. S. Sengupta, R.K. Dubey, **Y. Aulin**, K. Knierim, S.P.P. Eeden, R.W.M. van Hoek, E.J.R. Sudhölter, F.C. Grozema, W.F. Jager, Modular perylene-based light harvesting antenna systems for efficient energy transfer, Annual Meeting BioSolar Cells Program, Wageningen, the Netherlands (2014)

5. L. Kunneman, M.D. Tessier, H. Heuclin, B. Dubertret, **Y. Aulin**, F. Grozema, J. Schins, L. Siebbeles, Auger recombination of electron-hole pairs in two-dimensional CdSe nanoplatelets, FOM Physics, Veldhoven, the Netherlands (2014)

4. Fatemeh Mirjani, **Yaroslav Aulin**, Natalie Gorczak, Nicolas Renaud, Laurens Siebbeles, Ferdinand Grozema, Optimizing the efficiency of singlet fission in Perylenediimide (PDI) derivatives by crystal engineering, FOM Physics, Veldhoven, the Netherlands (2014)

3. F. Mirjani, **Y. Aulin**, N. Renaud, D.D. Günbaș, L.D.A. Siebbeles, F.C. Grozema, Optimizing the efficiency of singlet fission in Perylenediimide (PDI) derivatives by crystal engineering: experiment and theory, Singlet Fission Workshop, Lyons, CO, USA (2013)

2. W.F. Jager, J. Madern, D.D. Günbaș, **Y.V. Aulin**, F.C. Grozema, E.J.R. Sudhölter, Rigid antenna systems for investigating solvent-dependent energy transfer, Artificial Photosynthesis: Faraday Discussions, Edinburgh, United Kingdom (2011)

1. Oleksandr V. Mikhnenko, **Yaroslav V. Aulin**, Hamed Azimi, Markus Scharber, Mauro Morana, Alexander B. Sieval, Jan C. Hummelen and Maria Antonietta Loi, Exciton Diffusion Measurements in Narrow Band Gap Polymers for Applications in Solar Cells, MRS Spring Meeting, San Francisco, CA (2011)

Mentoring

13. *Devon Nwosu*, Ultrafast transient absorption spectroscopy of bifluorenylidene, undergraduate student, Rutgers University, 09/2017 -04/2018
12. *Kamal Wagle*, Transient reflectivity spectroscopy of 2D materials, Ph.D. student, Temple University, 02/2017-08/2017
11. *Tim Marshall*, Intensity autocorrelator, second harmonic generation in nanoparticles, Ph.D. student, Temple University, 01/2017-03/2017
10. *Thi M. Tran*, Characterization of 2D materials, undergraduate student, Temple University, 02/2016-05/2017
9. *Ares Aguilera*, Prism compressor of laser pulses and autocorrelator, undergraduate student, Temple University, 07/2016-02/2017
8. *Josh Carey*, Transient reflectivity of Si, undergraduate research, Temple University, 09/2016-01/2017
7. *Matthew Johnson*, Development of transient reflectivity spectroscopy setup, undergraduate research, Temple University, 01/2016-08/2016
6. *Anouk van der Wolf*, Photochemical upconversion: the role of Dexter energy transfer, bachelor thesis, Delft University of Technology, 2012
5. *Martijn van Sebille*, Upconversion kinetics of a model system, master thesis, Delft University of Technology, 2011-2012
4. *Toon Nieboer and Bob Mossink*, Singlet oxygen production by the porphyrin molecules for photodynamic therapy against cancer, undergraduate research project, Delft University of Technology, 2012
3. *Roeland Dijkema and Tom Postma*, Singlet oxygen production of substituted zinc-and freebase porphyrins for use in photodynamic therapy, undergraduate research project, Delft University of Technology, 2012
2. *Michiel Moes*, "Photochemical upconversion in the system PtOEP/DPA", bachelor thesis, Delft University of Technology, 2011
1. *Tobias Coppejans*,Towards efficient use of sunlight by up-conversion of (near) infrared photons", bachelor thesis, Delft University of Technology, 2011

References

- Dr. Ferdinand Grozema, Delft University of Technology, Delft, the Netherlands
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- Dr. Eric Borguet, Temple University, Philadelphia, PA, USA
  eborguet@temple.edu
- Dr. Piotr Piotrowiak, Rutgers University, Newark, NJ USA
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- Dr. Maria Loi, University of Groningen, Groningen, the Netherlands
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