

## Przemysław Gawel

Email: [pgawel@icho.edu.pl](mailto:pgawel@icho.edu.pl), Tel. (+48) 22 343 2129,  
Website: [www.gawel.edu.pl](http://www.gawel.edu.pl) LinkedIn: [linkedin.com/in/gawelprzemyslaw](https://www.linkedin.com/in/gawelprzemyslaw)  
OrCID: [0000-0003-1555-376X](https://orcid.org/0000-0003-1555-376X)

### Education

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- 2012 - 2015** PhD in Physical Organic Chemistry, ETH Zurich, Switzerland.  
Supervisor: Prof. François Diederich, PhD examination: 23.09.2015.  
Thesis title: *Functional Cumulene-Based Synthetic Molecular Materials*.
- 2006 - 2011** MSc in Chemistry (5 year) within MISMaP (Interdepartmental Individual Studies in the College of Mathematics and Natural Sciences), University of Warsaw, Poland.  
Supervisor: Prof. Tomasz Bauer.  
Thesis title: *2-Glucosamine derivatives as iridium ligands for catalysis of asymmetric allylic substitution reactions*.
- 2006 - 2009** BSc in Biotechnology within MISMaP, University of Warsaw, Poland.  
Supervisor: Dr. Monika Adamczyk-Poplawska.  
Thesis title: *The role of restriction and modification system NgoAV from N. gonorrhoeae in global gene expression: construction of NgoAV<sup>-</sup> mutant*.

### Employment History

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- 01.2021-present**      **Group Leader and Principal Investigator at the Institute of Organic Chemistry of the Polish Academy of Sciences**
- Managing independent research group.
  - Developing and studying organic electronic materials.
- 09.2019-12.2020**      **Senior Scientist at Cambridge Display Technology a Sumitomo Chemical Group Company**
- Managing research project from the design to delivery stage.
  - Identifying and developing new research themes. Conducting trend analysis and technology mapping to identify unmet needs to support this objective.
  - Assisting other chemists with synthetic routes and material design to meet the technical needs of their projects. Providing input based on both technical and health and safety aspects.
- 11.2015 – 08.2019**      **Post-Doctoral Research Associate at the University of Oxford with Prof. Harry L. Anderson**
- Funded by my two individual fellowships from the Swiss National Science Foundation.
  - Initiated and developed until full success a collaborative project (with IBM Zurich, Switzerland) aiming synthesis of new carbon allotropes on a surface by atom manipulation.
  - Leading a team of 5 researchers aiming to obtain new carbon allotropes.
  - Senior Postdoc in the group: responsible for maintenance and efficient running of the 8 fume cupboard laboratory, group expenses and compliance with health and safety rules.
  - Consulting for Polish Ministry of Science and Higher Education in their recent reforms.
  - Since 10.2017 – Research Associate at Keble College, position aiming to academic ideas exchange between college members.

**01.2012 – 10.2015      PhD at ETH Zürich, Switzerland with Prof. François Diederich**

- Provided evidence for proacetylenic character of cumulenes and established two new reaction types of cumulenes. Developed a new class of cyanotetracenes – stable compounds with high potential for application in optoelectronic materials.
- Initiated and developed a collaborative project (with Prof. M. Wasielewski, Northwestern University, USA) aiming to explore potential application of cyanotetracenes as singlet fission dyes in solar cells.
- Head of the laboratory: responsible for maintenance and efficient running of the 5 fume cupboard laboratory and compliance with health and safety rules.
- IT Officer in the group of Prof. Diederich, responsible for maintenance, purchases and problem solving in 30 computers.

**09 – 10.2011      Scientific Internships at the Technical University Braunschweig, Germany****09 – 10.2010**

- Supervised by Prof. Henning Hopf at the Technical University Braunschweig and Prof. Helena Dodziuk at the Polish Academy of Sciences.
- Synthesised superphane and partially completed the synthesis of hexahydrosuperphane.

**Research Projects**

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- Cyclophane-based Organic Semiconductors. Polish Returns grant by the National Agency of Academic Exchange, Poland.
- Towards New Carbon Allotropes – main postdoctoral research project in the group of Prof. H. L. Anderson, University of Oxford. Financed by two individual SNF Postdoc.Mobility Fellowships and The Leverhulme Trust Research Grant.
- Synthesis of polyynes by atomic manipulation – Research project in collaboration with the group of Dr. Leo Gross, IBM Research Zurich.
- Singlet Fission in Cyanotetracenes – Research project in collaboration with the group of Prof. M. Wasielewski, Northwestern University, USA.
- Functional Cumulene Based Molecular Materials – My main PhD project in the group of Prof. F. Diederich, ETH Zurich.

**Supervision of Junior Researchers**

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- Supervising one Postdoctoral researcher and one PhD student as independent PI and the Institute of Organic Chemistry PAS.
- During my postdoctoral research at the University of Oxford, I supervised five PhD students working in the common project with me, one postdoctoral researcher Dr Steffen Woltering and one undergraduate exchange student. I was advising them on the design of target molecules, retrosynthetic strategies, planning current work and their future career.
- During my PhD studies, I was supervising one MSc student. He started working with me already at the stage of his semester project. His project was very fruitful in novel structures and resulted in a publication. Successful project and good training allowed him to get a PhD position with Prof. Pablo Rivera-Fuentes at ETH Zurich.

**Teaching Activities**

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- Volunteering as a chemistry tutor in The Access Project. I am helping students from disadvantaged backgrounds to prepare for their GCSE and A-level exams.
- Developing the Chemistry Bridging Programme at the University of Oxford. The purpose of this online course is to help new students to refresh chemistry knowledge necessary to efficiently start chemistry studies at the university level.
- Teaching assistant in an organic chemistry practical course for biology and pharmaceutical sciences students at ETH Zurich; responsible for design of experiments, auditing and correcting the experimental design, theoretical understanding and safe laboratory practice of undergraduate students.

## Organisation of Conferences

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- Member of organising committee: CURO-Pi III - The Third International Symposium on the Synthesis and Application of Curved Organic  $\pi$ -Molecules and Materials, 5–7 September 2018, Oxford, United Kingdom.
- Member of organising committee: Summer School “*Organic molecules: experiments and theory meet at the surface*”. 29.06–03.07.2015, Lausanne, Switzerland.
- Organising the Intergroup Meeting with international collaborators of the group of Prof. François Diederich. 17.04.2014, Zurich, Switzerland.

## Prizes, Awards, Fellowships

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- The Lockey Fund travel grant to attend GRC meeting: Electronic Processes in Organic Materials. Lucca, Italy, 21-22.07.2018.
- Awarded with the Advanced Postdoc.Mobility fellowship from the Swiss National Science Foundation for the continuation of postdoctoral research in the group of Prof. Harry Anderson at the University of Oxford. 02.2018–08.2019.
- Awarded with the Early Postdoc.Mobility fellowship from the Swiss National Science Foundation for postdoctoral research in the group of Prof. Harry Anderson at the University of Oxford. 10.2015–04.2017.
- Best Poster Prize at the 16th International Symposium on Novel Aromatic Compounds (ISNA16). Madrid, July 5–10, 2015.

## Technical Skills

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- Experimental Experience in the handling and use of chemical reagents in multi-step syntheses, including toxic and air-sensitive compounds on milli- to multigram scales. COSHH experience.
- Analytical NMR experience with Varian and Bruker Machines (VT NMR, NMR titrations, 2D NMR). HPLC with Chiracel columns, GPC, SEC, and flash chromatographies. MS, IR, UV-vis, Fluorescence Spectroscopy analysis and interpretation experience. Determination of kinetic and thermodynamic parameters by NMR, UV/Vis, Fluorescence, and ITC.
- IT Working proficiency in Windows, MacOSX and Linux environment, MS Office, ChemOffice, Mestrenova, iNMR, EndNote, Adobe Photoshop, Adobe InDesign, Origin, PyMol, Mercury, SciFinder, Reaxys.
- Computing Gaussian 09, Spartan, Schrödinger Suite (Macromodel), Hyperchem.
- Driving Full car and motorcycle driving license.

## Language Skills

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- Polish Native speaker.
- English Proficient in reading, writing and speaking.
- German Communicative in reading, writing and speaking.
- Russian Basic in reading and speaking.

## Trainings and Workshops

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- Technical Leadership Training by Development Group International. 01-12.2020
- *ACS on Campus*. 27.02.2018, Oxford, United Kingdom
- *Organic molecules: experiments and theory meet at the surface*. 29.06–03.07.2015, Lausanne, Switzerland.
- *ChemDraw Wizard Workshop*. 05.02.2015, Zurich, Switzerland.
- *ACS on Campus*. 09–10.06.2014, Zurich, Switzerland.
- *Introduction to Gaussian: Theory and Practice by Gaussian Inc.* 24–28.06.2013, Wroclaw, Poland.

## Personal Interests

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- My scientific interests are: strained hydrocarbons, novel aromatic compounds, organic electronics, materials science, supramolecular chemistry, intermolecular interactions, molecular machines, genetics and molecular engineering.
- As a qualified motorcyclist I organised and participated in two motorbike expeditions: navigating my way around the Black Sea and to Mongolia.
- I am a passionate sailor and have achieved an Island Skipper sailing licence.

## Publications

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1. **P. Gawel**, S. Woltering, Y. Xiong, K. Christensen, H. L. Anderson, *Angew. Chem. Int. Edi.*, **2020** <https://doi.org/10.1002/anie.202013623>. Masked Alkyne Equivalents for the Synthesis of Mechanically Interlocked Polyynes.
2. S. L. Woltering, **P. Gawel**, K. E. Christensen, A. L. Thompson, H. L. Anderson, *J. Am. Chem. Soc.* **2020**, *142*, 13523-13532. Photochemical Unmasking of Polyene Rotaxanes.
3. L. M. Scriven, K. Kaiser, F. Schulz, A. J. Sterling, S. L. Woltering, **P. Gawel**, K. E. Christensen, H. L. Anderson, L. Gross, *J. Am. Chem. Soc.* **2020**, *142*, 12921-12924. Synthesis of Cyclo[18]carbon via Debromination of C<sub>18</sub>Br<sub>6</sub>.
4. K. Kaiser, L. M. Scriven, F. Schulz, P. Gawel,\* L. Gross,\* H. L. Anderson,\* *Science*, **2019**, *365*, 1299-1301. An sp-hybridized molecular carbon allotrope, cyclo[18]carbon. \*Corresponding authors. **Highlighted in:** *Science* (15 Aug. 2019), DOI:10.1126/science.aaz1461:"Carbon atoms marry to form first-ever ring"; *Nature* 2019, *572*, 426: "Chemists make first-ever ring of pure carbon"; *C&EN* (21 Aug. 2019): "Chemists use atomic manipulation to nudge cyclo[18]carbon into being"; *Chemistry World* (15 Aug. 2019): "New form of pure carbon made by manipulating atoms"; *Physics World* (15 Aug. 2019): "Hotly debated carbon ring allotrope reveals its structure"
5. N. Pavliček, **P. Gawel\***, D. R. Kohn, Z. Majzik, Y. Xiong, G. Meyer, H. L. Anderson\*, L. Gross\*, Polyene formation via skeletal rearrangement induced by atomic manipulation. *Nat. Chem.* **2018** *10*, 853–858. \*Corresponding authors. **Highlighted in:** *Chem. World* **2018**, *8*, 32; *Chem. Unserer Zeit* **2018**, *52*, 211–212
6. D. R. Kohn, **P. Gawel**, Y. Xiong, K. Christensen, H. L. Anderson, *J. Org. Chem.* **2018**, *83*, 2077–2086. Synthesis of Polyynes Using Dicobalt Masking Groups.
7. S. Haberland, A. D. Finke, N. Kerisit, C. Katan, Y. Trolez, **P. Gawel**, I. Leito, M. Lökov, R. Järviste, K. Kaupmees, N. Trapp, L. Ruhlmann, C. Boudon, D. Himmel, F. Diederich, *Eur. J. Org. Chem.* **2018**, 739–749. Enhancement of Push–Pull Properties of Pentafulvene and Pentafulvalene Derivatives by Protonation at Carbon.
8. N. Kerisit, **P. Gawel**, B. Levandowski, Y.-F. Yang, V. García-López, N. Trapp, L. Ruhlmann, C. Boudon, K. N. Houk, F. Diederich, *Chem. Eur. J.* **2018**, *24*, 159–168. A Four-Step Synthesis of Substituted 5,11-Dicyano-6,12-diaryltetracenes with Enhanced Stability and High Fluorescence Emission (Highlighted as a *Hot Paper*).
9. E. A. Margulies, N. Kerisit, **P. Gawel**, C. M. Mauck, L. Ma, C. E. Miller, R. M. Young, N. Trapp, Y.-L. Wu, F. Diederich, M. R. Wasielewski, *J. Phys. Chem. C* **2017**, *121*, 21262–21271. Substituent Effects on Singlet Exciton Fission in Polycrystalline Thin Films of Cyano-Substituted Diaryltetracenes.
10. A. Khadria, Y. de Coene, **P. Gawel**, C. Roche, K. Clays, H. L. Anderson, *Org. Biomol. Chem.* **2017**, *15*, 947–956. Push-pull pyropheophorbides for nonlinear optical imaging.
11. **P. Gawel**, E. A. Halabi, D. Schweinfurth, N. Trapp, L. Ruhlmann, C. Boudon, F. Diederich, *Eur. J. Org. Chem.* **2016**, 2919–2924. Synthesis of Dicyano-Substituted Benzo[c]fluorenes from Tetraaryl[3]cumulenes.
12. C. Dengiz, C. Prange, **P. Gawel**, N. Trapp, L. Ruhlmann, C. Boudon, F. Diederich, *Tetrahedron*, **2016**, *72*, 1213–1224. Push–pull chromophores by reaction of 2,3,5,6-tetrahalo-1,4-benzoquinones with 4-(N,N-dialkylanilino)acetylenes.

13. E. A. Margulies, Y.-L. Wu, **P. Gawel**, S. A. Miller, L. E. Shoer, R. D. Schaller, F. Diederich, M. R. Wasielewski, *Angew. Chem.* **2015**, *127*, 8803–8807; *Angew. Chem. Int. Ed.* **2015**, *54*, 8679–8683. Sub-Picosecond Singlet Exciton Fission in Cyano-Substituted Diaryltetracenes.
14. **P. Gawel**, Y.-L. Wu, A. D. Finke, N. Trapp, M. Zalibera, C. Boudon, J.-P. Gisselbrecht, W. B. Schweizer, G. Gescheidt, F. Diederich, *Chem. Eur. J.* **2015**, *21*, 6215–6225. Push-Pull Buta-1,2,3-trienes: Exceptionally Low Rotational Barriers of Cumulenic C=C Bonds and Proacetylenic Reactivity.
15. **P. Gawel**, C. Dengiz, A. D. Finke, N. Trapp, C. Boudon, J.-P. Gisselbrecht, F. Diederich, *Angew. Chem.* **2014**, *126*, 4430–4434; *Angew. Chem. Int. Ed.* **2014**, *53*, 4341–4345. Synthesis of Cyano-Substituted Diaryltetracenes from Tetraaryl[3]cumulenes. (Highlighted in *Synfacts* **2014**; 10(6) 587).
16. H. Dodziuk, V. Vetokhina, H. Hopf, R. Luboradzki, **P. Gawel**, J. Waluk, *J. Chem. Phys.* **2012**, *136*, 074201. Electronic states of cyclophanes with small bridges.
17. T. Bauer, S. Smolinski, **P. Gawel**, J. Jurczak, *Tetrahedron Lett.* **2011**, *52*, 4882–4884. Enantioselective addition of phenylacetylene to aldehydes catalyzed by a D-glucosamine-derived sulfonamide-titanium complex.

## Invited Lectures

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1. *Exploring an sp-Hybridized Carbon*. Institute of Organic Chemistry PAS, Warsaw, Poland, 08.01.2021.
2. *An sp-hybridized molecular carbon allotrope, cyclo[18]carbon*. University of Łódź, Łódź, Poland, 20.12.2019.
3. *Controlling Reactions of Single Molecules to Make New Carbon Allotropes*. Science: Polish Perspectives, Oxford, 16-17. 11. 2018.
4. *Polyynes formation via skeletal rearrangement induced by atomic manipulation*. University of Wrocław, 04 January 2018.
5. *Generation of Scientists 2.0: How to Build Polish Science on Young and Mobile Researchers*. National Science Congress, Cracow, 19-20. 9. 2017. I was invited by the Minister of Science and Higher Education of Poland to present my view on science in Poland. It was a part of my consulting program to recent reforms in Polish Science.

## Conference Presentations

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1. L. Scriven, A. Sterling, **P. Gawel**, N. Pavliček, D. R. Kohn, Y. Xiong, L. Gross, H. L. Anderson, *Synthesis of polyynes molecular wires by atom manipulation on surface*. The Third International Symposium on the Synthesis and Application of Curved Organic  $\pi$ -Molecules & Materials. Oxford, UK, 5-7.09.2018. (Awarded with Poster Prize).
2. **P. Gawel**, N. Pavliček, D. R. Kohn, Y. Xiong, L. Gross, H. L. Anderson, *Synthesis of polyynes molecular wires by atom manipulation on surface*. Development of New Materials, Fundamental Processes, Device Physics and Emerging Applications of Organic Electronics (Gordon Research Seminar). Lucca, Italy, 21-22.07.2018. (Selected for Discussion Leader)
3. **P. Gawel**, N. Pavliček, D. R. Kohn, Y. Xiong, L. Gross, H. L. Anderson, *Synthesis of polyynes molecular wires by atom manipulation on surface*. Electronic Processes in Organic Materials: From Spin Physics to Bioelectronics and Novel Approaches to Doping in Organic Materials (Gordon Research Conference). Lucca, Italy, 22-27.07.2018. (Poster)
4. **P. Gawel**, N. Pavliček, D. R. Kohn, Y. Xiong, L. Gross, H. L. Anderson, *Atomic Manipulation and Observation of a Rearrangement on Single Molecules on a Surface*. 17<sup>th</sup> International Symposium on Novel Aromatic Compounds, 23-28.08.2016. (Poster)  
**P. Gawel**, L. D. Movsisyan, M. Franz, F. Hampel, A. L. Thompson, R. R. Tykwinski, H. L. Anderson, *Polyynes Rotaxanes: Stabilization by Encapsulation*. 8<sup>th</sup> International Conference on Molecular Electronics ElecMol, Paris, France, 22-26.08.2016. (Poster)
5. **P. Gawel**, F. Diederich, *Functional Cumulene-Based Molecular Materials*. Swiss Chemical Society Fall Meeting. Lausanne, Switzerland, 04.09.2015. (Poster)

6. **P. Gawel**, Y.-L. Wu, A. D. Finke, N. Trapp, C. Boudon, J.-P. Gisselbrecht, F. Diederich, *Proacetylenic Character of Cumulenes*, 6<sup>th</sup> International Symposium on Novel Aromatic Compounds (ISNA-16). Madrid, Spain, 5–10.07.2015. (Awarded with Poster Prize).
7. **P. Gawel**, C. Dengiz, A. D. Finke, N. Trapp, C. Boudon, J.-P. Gisselbrecht, F. Diederich, *Synthesis of Cyano-Substituted Diaryltetracenes from Tetraaryl[3]cumulenes*. Swiss Chemical Society Fall Meeting. Zurich, Switzerland, 11.09.2014. (Poster)
8. **P. Gawel**, C. Dengiz, A. D. Finke, N. Trapp, C. Boudon, J.-P. Gisselbrecht, F. Diederich, *Synthesis of Cyano-Substituted Diaryltetracenes from Tetraaryl[3]cumulenes*. 5<sup>th</sup> EuCheMS Chemistry Congress. Istanbul, Turkey, 31.08–04.09.2014. (Poster)
9. **P. Gawel**, Y.-L. Wu, A. D. Finke, N. Trapp, M. Zalibera, C. Boudon, J.-P. Gisselbrecht, W. B. Schweizer, G. Gescheidt, F. Diederich, *Push-Pull Buta-1,2,3-trienes: Exceptionally Low Rotational Barriers of Cumulenic C=C Bonds and Their Proacetylenic Reactivity*. 6<sup>th</sup> Symposium of the Scholarship Fund of the Swiss Chemical Industry. Zurich, Switzerland, 17.12.2013. (Poster)
10. **P. Gawel**, Y.-L. Wu, A. D. Finke, N. Trapp, M. Zalibera, C. Boudon, J.-P. Gisselbrecht, W. B. Schweizer, G. Gescheidt, F. Diederich, *Push–Pull Buta-1,2,3-trienes: Exceptionally Low Rotational Barriers of Cumulenic C=C Bonds and Their Proacetylenic Reactivity*. Swiss Chemical Society Fall Meeting. Lausanne, Switzerland, 06.09.2013. (Poster)