Open-Shell Nanocarbons
Organic Materials and Synthetic Tools

Principal Investigator: Marcin Stępień, Faculty of Chemistry, University of Wrocław, Poland

In this project, we propose to make new classes of carbon-rich organic oligoradicals and oligoradicaloids (open-shell nanocarbons) and explore their physical properties and reactivity. We will design and synthesize new open-shell coronoids, indenoarenes, arenoquinodimethanes, and other systems, containing previously unexplored carbo-and heterocyclic motifs and diversely functionalized. These systems will be tailored to control their fundamental characteristics, such as ambient stability, electronic bandgaps, singlet–triplet equilibria, electrochemical activity, as well as their non-covalent and covalent self assembly. In the latter context, we will use the principles of dynamic covalent chemistry to develop complex molecules and materials with a high degree of intrinsic porosity and long-range order. Further applications of the new oligoradicaloids and their assembly products may include thermochromic and electrochromic materials, organic semiconductors, and non-linear optics materials.

LEAD PAPERS

[1] M. A. Majewski, P. J. Chmielewski, A. Chien, Y. Hong, T. Lis, M. Witwicki, D. Kim, P. M. Zimmerman, M. Stępień, *Chem. Sci.* **2019**, *10*, 3413–3420.

[2] H. Gregolińska, M. Majewski, P. J. Chmielewski, J. Gregoliński, A. Chien, J. Zhou, Y.-L. Wu, Y. J. Bae, M. R. Wasielewski, P. M. Zimmerman, M. Stępień, *J. Am. Chem. Soc.* **2018**, *140*, 14474–14480.

UP TO TWO UNDERGRADUATE STUDENT POSITIONS

Up to 8 months each, scholarship 1 400 PLN/month (tax-exempt). Start date: November 2023.
Requirements:

1. Multistep organic synthesis, including microscale work, and inert-atmosphere procedures.
2. Experience with aromatic/functional dye chemistry
3. Experience with spectroscopic methods, in particular NMR spectroscopy
4. Fluency in English
5. Enrolled in the M.Sc. program at the Faculty of Chemistry UWr

Please apply online at https://forms.gle/SRmaD1Tad1TUFPhD7
Deadline: 2023-10-25 23:59

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