Young Career Focus: Dr. Florian Mulks (RWTH Aachen University, Germany)

Background and Purpose. SYNFORM regularly meets young up-and-coming researchers who are performing exceptionally well in the arena of organic chemistry and related fields of research, in order to introduce them to the readership. This Young Career Focus presents Dr. Florian Mulks (RWTH Aachen University, Germany).

Biographical Sketch

Dr. F. Mulks

Florian F. Mulks studied chemistry at the University of Heidelberg (Germany), where he received his doctorate in 2018 under the supervision of Stephen Hashmi. He spent postdoctoral periods in the groups of Prof. Faraji at RUG Groningen (the Netherlands), Eva Hevia at the University of Strathclyde, Glasgow (UK), and at the University of Bern (Switzerland). He then received a Feodor Lynen Fellowship from the Alexander von Humboldt Foundation for research with Mookie Baik and Guy Bertrand at KAIST, Daejeon (South Korea) and UC San Diego (USA). In early 2022, he returned to Germany to begin his independent research associated with the chair of Carsten Bolm at the RWTH Aachen University, supported by the Alexander von Humboldt Foundation through a Feodor Lynen Return Fellowship. Later in 2022, the Fonds der Chemischen Industrie began supporting his group with a Liebig Fellowship. His group currently studies dicationic organic and main group Lewis acids, their coordination chemistry, and concepts for rationalising organic and main group chemistry.

INTERVIEW

SYNFORM *Which field of organic chemistry are you interested in the most and why?*

Dr. F. Mulks I am very interested in new types of organic compounds to gain a deeper understanding of the underlying design principles and to explore their potential applications. This involves exploring the chemical limits of carbon, determining the properties of such compounds, and establishing general concepts from observations. Research that expands our knowledge of the fundamental properties and reactivity of carbon in molecules, such as creating unusual charge and valency situations, has the potential to push the research frontier into unknown territory. Such work creates metaphorical outposts that serve as starting points for deeper exploration of new and exciting areas. The potential applications of organic compounds in surprising domains are vast and unknown. For example, they can replace metals in high-performance semiconductors and OLEDs. Such research is ultimately driving the replacement of finite and hazardous materials with renewable organic compounds in a wide range of applications.

SYNFORM *Following that, what is the focus of your current research activity?*

Dr. F. Mulks Our current research activities are two-fold: Our group studies supercharged carbon compounds to open new perspectives in organic chemistry. We borrow strategies from coordination chemistry to stabilise highly charged carbon centres in unusual coordination geometries. Such compounds push the boundaries of carbon chemistry. We tweak the valence and electronic structure of carbon compounds to replace toxic and rare elements in catalysis. We are excited to see what we will find as we delve deeper into the realm of highly charged, unusual valence compounds of carbon. In our second major research stream, we use electronic struc-

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ture theory and statistical tools to analyse and conceptualise chemical reactivity. The concepts we use to understand and teach chemistry need to keep pace with our deepening understanding of the matter to fuel our progress and keep us human chemists competitive with machine tools. Our multifaceted research philosophy enhances our comprehension of fundamental chemical processes and propels us towards pioneering solutions with tangible applications.

SYNFORM *What do you think about the modern role and prospects of organic chemistry?*

Dr. F. Mulks Organic chemistry is at a pivotal point in its history. Organic chemistry as a traditional, hands-on field is being reinvented in the context of the era of artificial intelligence and high-end machines that can provide tremendous assistance in both planning and carrying out syntheses. Chemists of the future will work even more closely with machines than they do today. We will find ways to follow our passion that work efficiently with the coming technological advances and ensure that our progress stays on track. We will find ways to create and store our data that empower both humans and machines. We will find ways to identify and correct rogue data. The organic chemists of the future will feed research ideas to machines and work closely with them to solve problems. I am confident that a vibrant and creative future awaits the field. If we can delegate more and more mundane tasks to our electronic helpers, we can focus on what really matters: awesome ideas and experiments.

SYNFORM *Which difficulties are there for young upcoming chemists in your field? Do you have any tips?*

Dr. F. Mulks It can be difficult to pursue important ideas if they stray far from current trends. The temptations of an easier peer-review process and quick citations encourage a focus on fashionable research topics. Younger scientists, in particular, may prioritize safe successes over following original ideas. However, it is important to persevere with these ideas as they are necessary for progress. You will eventually discover ways to position your work within contemporary literature. We have a unique opportunity to make a lasting impact on the world. Although other options may seem safer for our careers, we owe it to humanity and our idealistic past selves to take risks and pursue our best ideas.

SYNFORM *What is your most important scientific achievement to date and why?*

Dr. F. Mulks The launch of the independent group in 2022 was my career highlight. Initially, I enjoyed developing my ideas independently, but I am very pleased to see the group growing. As it does, so does our research and the scope of our interests through the added interests of new members. Regarding our research, our exploration of highly charged carbon molecules began with base-stabilised diaminocarbodications (Figure 1). We discovered that these compounds are easy to handle and can be synthesised on a large scale, making them promising as Lewis acids and organocatalysts (refer to: *Chem. Eur. J.* **2023**, *29*, e202302089 and *Molbank* **2023**, *2023*, M1710). This marks the turning point where our research transitions from basic science to practical application. I cannot wait to see where the journey of these acids and the journey of our group takes us.

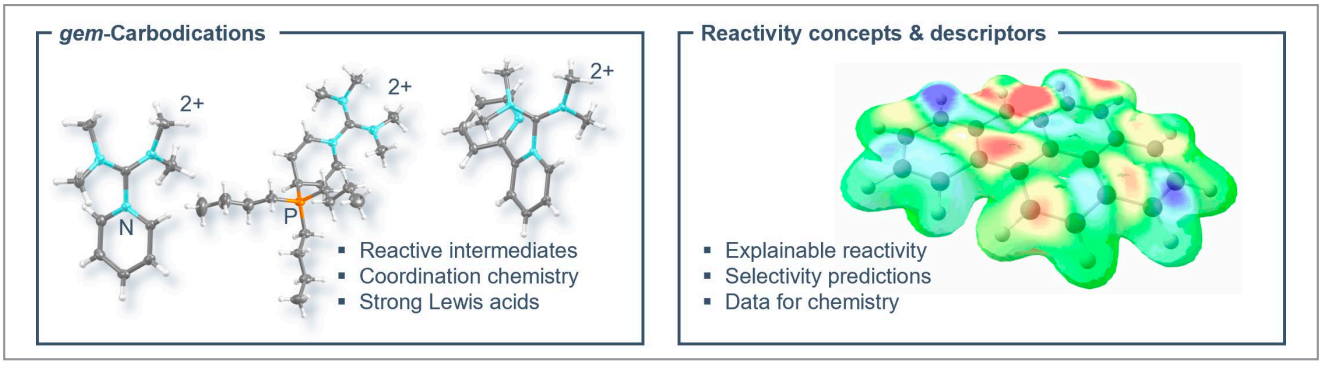

Figure 1 Schematic overview of the main research interests of F. Mulks' research group. Figures are in part used from the following Open Access (CC BY) publications [*Chem. Eur. J.* **2023**, *29*, e202302089; *Molbank* **2023**, *2023*, M1710].

SYNFORM *Could you tell us something about yourself outside the lab, such as your hobbies or extra-work interests?*

Dr. F. Mulks My brain enjoys painting very much. It induces a meditative state of deep focus. Spending a longer evening in a creative flow-state provides an incomparable feeling of transcendent light-heartedness and contentment. Despite their differences, creative arts and chemistry are both amazing retreats and great teachers. Working in research labs for a long time can make us cautious perfectionists. Safety is often prioritised when conducting experiments, which is important. However, this mindset can lead to procrastination when it comes to creative tasks such as writing. Engaging in activities such as painting can help break down some of the mental barriers that years of research may have established. Working with paints requires unrestricted experimentation. If the first attempt does not work, simply paint over it and try again. Rinse and repeat.

Note: DeepL was used in editing this document.

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