Young Career Focus: Professor Zuxiao Zhang (University of Hawai'i at Mānoa, USA)

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 Professor Zuxiao Zhang (University of Hawai'i at Mānoa, USA).

Biographical Sketch

Prof. Z. Zhang

Zuxiao Zhang earned his Master of Science in organic chemistry from the Shanghai Institute of Organic Chemistry (P. R. of China), under the mentorship of Professor Guosheng Liu. Subsequently, he pursued his Ph.D. at the University of Florida, Gainesville, FL (USA), under the guidance of Professor William R. Dolbier Jr. In 2017, Zuxiao started a new chapter in his career as a postdoctoral research associate in the Nagib group at the Ohio State University, Columbus, OH (USA).

In 2021, Zuxiao returned to his homeland, joining the faculty at Zhejiang Normal University, Jinhua (P. R. of China) to start his independent research journey. Then he transitioned to the Chemistry Department at the University of Hawai'i at Mānoa (USA) in September 2023.

Zuxiao's research vision is anchored in three key directions: fluorine chemistry, radical chemistry, and asymmetric catalysis. His overarching objective is to develop innovative catalytic systems that harness both radical and polar reactivity, thereby enabling the selective functionalization of inert chemical bonds through multicomponent reactions. This endeavor not only facilitates the efficient synthesis of bio-relevant molecules, but also offers a robust platform for the late-stage functionalization of complex drug molecules.

INTERVIEW

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

Prof. Z. Zhang I'm most passionate about catalysis in organic chemistry. Catalysis holds a special place in my heart because it has the remarkable ability to transform seemingly impossible reactions into reality, and even convert waste into valuable products. Among the various forms of catalysis, I find photocatalysis particularly fascinating. It harnesses light as an external energy source, unlocking a whole new realm of possibilities for organic transformations. The idea of utilizing photons to drive chemical reactions is not only scientifically intriguing but also holds immense potential for sustainable and green chemistry practices. So, catalysis, especially photocatalysis, captivates me with its power to make transformative changes in organic synthesis while contributing to environmental sustainability.

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

Prof. Z. Zhang My current research activity primarily revolves around the selective functionalization of inner chemical bonds, such as C–H, C–X, and C–O bonds. We're particularly interested in applying this selective functionalization approach within multicomponent reactions. By doing so, we aim to efficiently assemble complex molecules from simple starting materials. Additionally, we're exploring the application of these methodologies in the late-stage functionalization of drugs. This entails introducing specific functional groups into drug molecules at advanced stages of synthesis, which can significantly enhance their properties and efficacy. Overall, our focus lies in developing innovative strategies for targeted bond activation and functionalization to streamline the synthesis of complex molecules and facilitate drug development processes.

 Synform **2024/06**, A92–A94 • Published online: May 14, 2024 • DOI: 10.1055/s-0040-1720633

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

Prof. Z. Zhang In my perspective, organic chemistry maintains its pivotal role as the central science in modern times. The significance of organic chemistry stems from its profound impact on various aspects of life. Firstly, organic chemistry plays a crucial role in drug discovery and development. By harnessing the principles of organic synthesis, scientists can synthesize novel pharmaceutical compounds and optimize the efficiency of existing drugs, ultimately advancing healthcare and improving quality of life.

Furthermore, organic chemistry offers promising solutions to environmental challenges. Through innovative research and sustainable practices, organic chemists are devising methods to mitigate pollution, reduce waste, and develop eco-friendly alternatives to traditional chemical processes. By embracing green chemistry principles, organic chemists are pioneering pathways towards a more sustainable and environmentally conscious future.

In essence, the prospects of organic chemistry remain bright and multifaceted. Its applications extend far beyond the laboratory, impacting areas ranging from healthcare to environmental protection. As we continue to delve deeper into the intricacies of organic molecules and refine our synthetic methodologies, organic chemistry will undoubtedly continue to drive innovation and shape the world we live in.

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

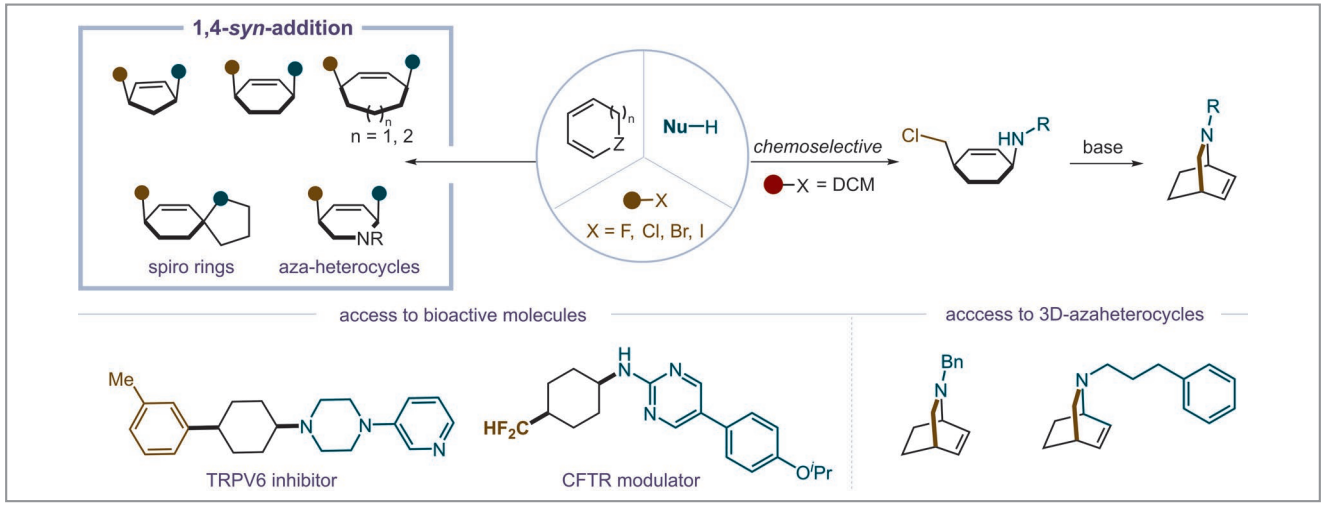
Prof. Z. Zhang In my field, young upcoming chemists often encounter challenges related to securing funding and grants to support their research endeavors. Additionally, identifying the specific problems they wish to solve within the vast landscape of chemistry can be daunting. However, there are several tips that can help navigate these difficulties.

Firstly, immersing oneself in the existing literature is crucial. By thoroughly digging into the literature within their area of interest, young chemists can gain valuable insights into current research trends, ongoing challenges, and potential gaps in knowledge. This knowledge serves as a foundation for identifying promising research directions.

Once a problem or area of focus has been chosen, perseverance is key. Research in chemistry, particularly when addressing complex problems, often involves trial and error. Young chemists should be prepared to encounter setbacks and obstacles along the way. However, maintaining persistence and resilience in the face of challenges is essential. Every failure provides an opportunity to learn and refine one's approach.

Furthermore, networking with peers, mentors, and established researchers can provide valuable support and guidance. Seeking out opportunities for collaboration and mentorship can help young chemists navigate the intricacies of their field and gain access to resources and funding opportunities.

In summary, while young chemists may face difficulties in securing funding and defining their research focus, dedication, perseverance, and a proactive approach to learning and networking can help overcome these challenges and pave the way for success in the field of chemistry.



Scheme 1 Synthesis of 1,4-*cis*-disubstituted rings for the construction of complex bioactive molecules

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

Prof. Z. Zhang Our most significant achievement is the development of a robust protocol for 1,4-*syn*-addition of cyclic dienes, achieved through a hybrid palladium-catalyzed multicomponent reaction. Our mechanistic studies uncovered a crucial stepwise *anti*-alkene migration insertion, leading to exclusive formation of 1,4-*syn*-addition products (Scheme 1). This innovative approach allows for the efficient synthesis of diverse 1,4-*cis*-disubstituted ring systems, facilitating the construction of complex bioactive molecules. With its modularity and mild reaction conditions, this protocol holds great promise for organic synthesis and drug discovery.

  • Published online: May 14, 2024 • DOI: 10.1055/s-0040-1720633