Meet Prof. Courtney C. Roberts, Thieme Chemistry Journals Awardee 2024!

Prof. Courtney C. Roberts *obtained her B.S. in chemistry from Pepperdine University in Los Angeles (USA), and her Ph.D. at the University of North Carolina at Chapel Hill (USA). In 2016, she became a postdoctoral research fellow at the University of Michigan (USA), then began her career as an Assistant Professor at the University of Minnesota in late 2019 (USA).*

Thieme: Which field of organic chemistry are you interested in the most and why?

Prof. Roberts: Organometallic chemistry is the most fascinating field of organic chemistry to me. Working with the entire d- and f-blocks opens up new avenues for organic transformations that cannot be realized without metals.

Thieme: Following that, what is the focus of your current research activity?

Prof. Roberts: Research in the Roberts group involves looking at unsolved problems in organic synthesis through the perspective of organometallic/inorganic chemistry. One main area of interest for the group is the synthesis of heterocycles through aryne intermediates. Despite their useful reactivity, a number of challenges still remain in the use of arynes, including problems with regioselectivity and the synthesis of N-heterocyclic arynes. Using fundamental principles of nickel chemistry, our group is the first to be able to access previously “inaccessible” five-membered heterocyclic arynes for the first time since they were hypothesized to exist 120 years ago. We are also the first group to demonstrate catalyst-controlled regioselectivity in arynes, where all previous examples operated under substrate control. Another challenge in organic synthesis lies in alkyl–alkyl cross-coupling. This is due to challenges with oxidative addition and off-cycle pathways such as β-hydride elimination. Our group has pioneered the use of Group 3 metal catalysts supported by redox-active ligands to overcome some of these challenges. Using 10 mol% of a scandium, ytterbium, or lutetium tris(amido) catalyst, coupling partners that both have β-hydrogens can be successfully cross-coupled for the first time using early transition metals. These improvements related to organic synthesis can only be accessed using inorganic/organometallic chemistry.

Thieme: What do you think about the modern role and prospects of organic chemistry?

Prof. Roberts: I think organic chemistry continues to enable solutions for the many big-picture challenges facing the world in drug development, sustainable energy, and upcycling/recycling of plastics. I don't see this role changing and I think organic chemistry will continue to be vital to modern society.

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

Prof. Roberts: I think making big leaps in organic synthesis has always been difficult and will continue to be. I encourage upcoming chemists to look at the big picture and tackle hard challenges, rather than taking the incremental approach. High risk, high reward projects, when balanced with a lower risk research portfolio, are worth it!

Thieme: What is your most important scientific achievement to date and why?

Prof. Roberts: I'm quite proud to have been part of three tenure-track journeys – my undergraduate advisor's, my PhD advisor's, and now my own group's. I enjoy starting new things and I think being a part of getting three labs up and running has been a huge achievement both personally and scientifically.

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

Prof. Roberts: While I get to travel a lot for work, I do also really enjoy traveling for fun! I love exploring new places and learning about new cultures.