Meet Prof. Ashlee J. Howarth, Thieme Chemistry Journals Awardee 2025!

Prof. Ashlee J. Howarth *is an Associate Professor and Concordia University Research Chair at Concordia University in Montréal, Canada. She obtained her undergraduate degree from the University of Western Ontario in 2009, and then went on to do her PhD in inorganic materials chemistry at the University of British Columbia. Before joining the faculty at Concordia, she completed an NSERC Postdoctoral Fellowship at Northwestern University (USA).*

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

Prof. Howarth: I work with metal–organic frameworks (MOFs), so I look at organic molecules as important building blocks to design unique and intricate porous networks. The size, shape, and connectivity of the organic linkers that we use to make MOFs can have a significant impact on the final topology, pore size, and chemical properties. As one example, we are very interested in using organic linkers, in MOFs, that can act as photosensitizers for the generation of singlet oxygen. By arranging the photosensitizers in different arrays in 3D space, through MOF synthesis, we can improve the efficiency of singlet oxygen generation. We then use the singlet oxygen produced to selectively oxidize and detoxify a mustard gas simulant, for defense applications.

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

Prof. Howarth: Our primary research focus is on the design and synthesis of new rare-earth cluster-based MOFs. By coupling the high and variable coordination number of rare-earth elements with the large library of organic linkers that we have to choose from, we can make a nearly endless variety of 3D porous networks. Although a lot of the work we do is fundamental chemistry, we also study these rare-earth MOFs for X-ray detection, sensing, and the detoxification of chemical warfare agents. A secondary focus in my group is studying known zirconium cluster-based MOFs for new or niche applications. This includes carbon capture, nuclear wastewater treatment, CO_2 methanation, and the selective separation of rare-earth elements from complex matrices.

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

Prof. Howarth: As a materials chemist, my research group and training is very multi-disciplinary. I think most modern chemistry is multidisciplinary, which is great, but can also be very challenging for junior scientists as they have to master many diverse topics to succeed. I think it's important to never lose sight of the importance of having a solid fundamental understanding of the 'traditional' disciplines of chemistry, including organic chemistry. If we forget to take time to learn the fundamentals, we will never truly succeed as multidisciplinary chemists and scientists! Organic chemistry will always play a foundational role in modern chemistry.

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

Prof. Howarth: I think one of the main challenges for upcoming chemists in my field, or any field really, is scientific communication. Communication is critical not only between scientists, but also between scientists and the general public. Without clear communication, we end up with distrust in scientists and among scientists, including the spreading of harmful misinformation and disinformation. Unfortunately, this is also leading to uncertainty in scientific funding and careers for young upcoming chemists and scientists. My tips are to practice your scientific communication skills just as much as any other academic or laboratory skill. This includes attending conferences, putting significant effort into your presentations, practicing communicating with non-scientists about scientific topics, talking to the media, volunteering in public outreach, and even talking to your friends and family about your research and the importance of science.

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

Prof. Howarth: It's hard to choose just one, as I'm proud of all the work that my students are doing at Concordia, as well as the work I did during my postdoc and PhD studies. But I think my (and our) most significant achievement is discovering MOFs capable of removing oxyanion contaminants from recirculating cooling water, and waste, at nuclear power plants. This research has been performed in collaboration with the Electric Power Research Institute for 11 years now, and we are close to being able to conduct pilot testing with our MOFs at nuclear power plant sites in North America. The idea of translating fundamental research from the laboratory to a real-world application is very exciting to me, so I can't wait to see where that goes!

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

Prof. Howarth: Outside of the lab, I love to travel, learn about different cultures, and try new cuisines! I also love hiking, canoeing, and being outdoors. Whether it's camping in Québec, hiking in British Columbia, exploring the Andes in Chile, or Mount Mitsutoge in Japan – I love a good outdoor adventure, with scenic views, calm and quiet surroundings, and fresh clean air.