

Organic Chemistry

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Plugging the Leak: Empowering Women in Organic Chemistry

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The third annual Empowering Women in Organic Chemistry^[1] conference was held June 24–25, 2021. EWOC was founded to empower and support women pursuing organic chemistry careers in the academic and industrial workforce. In effect, the conference seeks to plug the so-called “leaky pipeline,” a phrase used to describe the poor retention rate across the career pipeline of female members of the organic chemistry community. While women constitute 49 % of all undergraduate chemistry degree awardees, they receive only 37 % of chemistry doctorates.^[2] Of post-graduate organic chemists, just 20 % are women. This low percentage is reflected in other subfields of chemistry^[3] and is consistent among tenure/tenure-track positions^[4] and medicinal^[5]/process^[6] chemistry jobs. In biotech^[7] and healthcare^[8] companies, the pipeline efflux sharply increases. The percentage of women in C-suite (upper management) roles is less than half of that for entry level positions.

The striking statistics lead one to wonder: why aren’t more women staying in organic chemistry careers? A possible cause is lack of professional support and encouragement. As one solution, EWOC aims to build support networks in order to mentor and sponsor women entering the workforce. This network is rapidly expanding, testified by growing levels of participation in the EWOC conferences. Since the inaugural conference in 2019, the number of registered participants has increased by 600 %. This is in no small part due to the lack of geographical and/or financial barriers made possible by the virtual-only format of the 2020 and 2021 meetings (due to the COVID-19 pandemic). Another reason for this surge in attendance could be the recognition among a broader community of allies of the need to diversify the organic chemistry workforce, both within the chemical industry^[9] and academy.^[10,11] Indeed, 35 % of the 1000 participants registered in 2021 were able to attend at no cost due to the generous sponsorships by over 35 industrial and publishing companies,

and 16 % of participants self-identified as male. This level of financial support extended conference access to women of all career levels, including undergraduate students just joining the career pipeline (12 % of registered attendees).

“*I’m glad that I could recommend my undergraduate research students attend and that doing so was not cost prohibitive.*”

Not only did EWOC 2021 progress toward the objective of creating a community for women in organic chemistry, the conference also advanced the equally important mission of giving such individuals tools to succeed. The confluence of established and aspiring female chemists was guided by several themes intended to celebrate and motivate each participant, whether researcher, teacher, mentor, or leader. Below we provide an overview of the conference, highlighting each thematic goal in bold text. Selected quotes from a diverse range of participants speak to the successful execution of these goals.^[12]

Each component of the conference was designed to help participants **enter and lead successful careers in organic chemistry**. A full schedule of “Meet the Sponsors” sessions served to introduce attendees to several important employers of organic chemists. Structured as interactive conversations, these sessions encouraged participants to ask candid questions about work culture and company values and to clarify the often-obfuscated hiring processes. Many of these conversations were seamlessly continued in later job-specific networking sessions, which further solidified the face-to-face connections that facilitate entry into the workforce.

“*...it was invaluable to be able to freely speak to the industry workers/academics in [an] open forum/throw questions out there.*”

In subsequent sessions, participants had the opportunity to learn and practice the professional skills required to become leaders in the workforce. The “Leading Through Influence” workshop introduced established tactics for persuading others; although tailored to early-career chemists aiming to lead without formal authority, breakout rooms allowed the interchange of sage advice from veteran academic and industrial leaders (who comprised 45 % of registered participants). The “Take Control of Your Time” workshop focused on improving time management via strategies for

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negotiating, delegating, and effective decision-making. To hone scientific communication skills, participants were invited to present their research at a virtual poster symposium, which hosted 114 posters over two sessions. These virtual poster sessions featured not only impressive quality of work but also wide variety in the chemistry represented; topics ranged from the development of novel methods of small-molecule stereochemical control to the nascent field of polymer mechanochemistry.

Complementing the diversity of organic chemistry research topics, both traditional and alternative chemistry careers were highlighted in a panel featuring highly accomplished female role models. The varied selection of career end-points, which included jobs in academia, industry, and publishing, was matched by the breadth of the women's career journeys. While questions from the audience revealed trepidations common to all trajectories—transitioning to the workforce, work-life balance, motherhood, and navigating difficult choices as a minority—each panelist shared her distinct and inspiring path as a chemist to resonate with the audience. The message that **no woman is alone in chemistry** was reinforced in the networking speed rounds. These curated discussions in randomly populated breakout rooms gave ample opportunity for participants to interact with someone new, allowing them to expand their network and develop new personal connections. Together with the earlier sessions targeting groups of women with common interests or identities, the conference's many networking opportunities aimed to **build a sense of belonging** for participants, regardless of career stage, aspiration, or identity.

“I loved the feeling of support I got from this conference. There were so many people being very affirming of my own experiences and I loved hearing about what others are interested in/struggling with. This felt like it was possible because there were workshops and networking sessions that were smaller in size, allowing for more personal connections.”

With the goal of **making everyone feel welcome**, the conference encouraged frank conversations, including open discussion of the challenges that face women and how these can be more pronounced for women of color and those of other marginalized groups. Diversity, equity, and inclusion (DEI) were at the forefront of two workshops. The first consisted of a moderated discussion of “Organic Chemistry: A Retrosynthetic Approach to a Diverse Field” with the aim of brainstorming actions one can take to promote DEI in the laboratory and workspace.^[13] The second workshop equipped participants with tools to **address the issue of racism and its intersection with female identity**. “Allies Help Turn the Tide” was geared specifically toward those not part of a given marginalized group. Participants were encouraged to reflect on the various identities they hold and consider how they might leverage their positions at work to amplify voices that may otherwise go unheard.

In addition to career and community building, EWOC also provided several opportunities to **celebrate the profound**

scientific achievements and impact of women in organic chemistry. Keynote speakers across industry and academia shared stories of their personal and scientific accomplishments. Prof. Anne McNeil from the University of Michigan presented her analysis of polymer sustainability and efforts toward designing an effective recycling process for diapers.^[14] Prof. Shanina Sanders-Johnson of Spelman College reflected on her position at a primarily undergraduate institution (PUI), relaying strategies she has developed to teach chemistry in a culturally relevant way and design reactions that were amenable to the time and space constraints of an undergraduate research group. Prof. Sarah Reisman from Caltech described late-breaking results from a total synthesis of the lupin alkaloids matrine, allomatrine, and isomatrine. Dr. Margaret Chu-Moyer of Amgen told a tale of various covalent inhibitors: myrocin C, the target of her graduate work, as well as compounds she has developed in her industrial career.^[15] Finally, Prof. Alanna Schepartz of UC Berkeley described her work detecting and promoting transport of cargo to the cytosol. Notably, each speaker included aspects of their personal journeys alongside their scientific results.

“Thank you for providing an avenue for my students to see how women enhance the field of organic chemistry. More than 60% of my research undergrads are women and I know they benefit from seeing this representation (which is hard to find on a small liberal arts college campus).”

The Empowering Women in Organic Chemistry (EWOC) conference was a celebration of female organic chemists and their accomplishments in research, teaching, mentorship, and leadership. Though the COVID-19 pandemic precluded an in-person gathering, the organizers **demonstrated persistence in the face of obstacles**, crafting a virtual conference that promoted genuine connection despite physical distancing. Ultimately, the virtual format proved beneficial in that chemists from a broad variety of locations could participate in the conference from their home cities and the conference was not bound by same space and occupancy constraints as an in-person event. We look forward to gathering in a hybrid format for next year's conference and empowering the next generation of rising female organic chemists.

Conflict of Interest

The authors declare no conflict of interest.

Keywords: diversity and inclusion · organic chemistry · women in chemistry

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