

Should You Start a Chemistry Podcast?



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Communicating hypotheses, experiments, and conclusions has been an imperative of the scientific enterprise for centuries. However, the preferred mode of communication has barely evolved, with oral presentations and written formats being the two primary modes of disseminating information. The written format, particularly through personal correspondence, books, and the establishment of peer-reviewed journals, has created a permanent record that scientists leverage for precedent and inspiration. Only recently has this mode of operation started to change, driven by the advent of the Internet in the early 1990s, which spurred the democratization of scientific communication through online articles, blogs, and social media for those with an interest and with access. However, the newfound surge of scientific information that is more globally accessible and extends across a new generation of not just scientists but also nonexperts presents formidable challenges to the readership, and this has led to the need for “science communicators” to identify and explain breakthroughs to show how they relate to the broader society. After all, scientific awareness in the general public remains a paramount goal and forms the ideological backdrop for many global challenges of the 21st century—climate change, food insecurity, and the COVID-19 pandemic, for example.



Figure 1.

As a means to stay relevant to their ever-changing audience, many scientists, scientific societies, and journals have begun to embrace and leverage the increasingly popular audio/visual platform known as podcasts.¹ Given that most podcasts are free, this democratization of scientific information is in contrast to scientific journals that require expensive subscription fees or publishing charges, although there is a promising trend toward open access, and moreover eases the burden of searching and interpreting scientific literature for laypersons. Podcasting is also a potential model for public disclosure for researchers in industry and academia alike, which is an aspect that will be

highlighted in case studies below. Furthermore, the popularity of podcasts is increasing on a global scale (Figure 2).² North

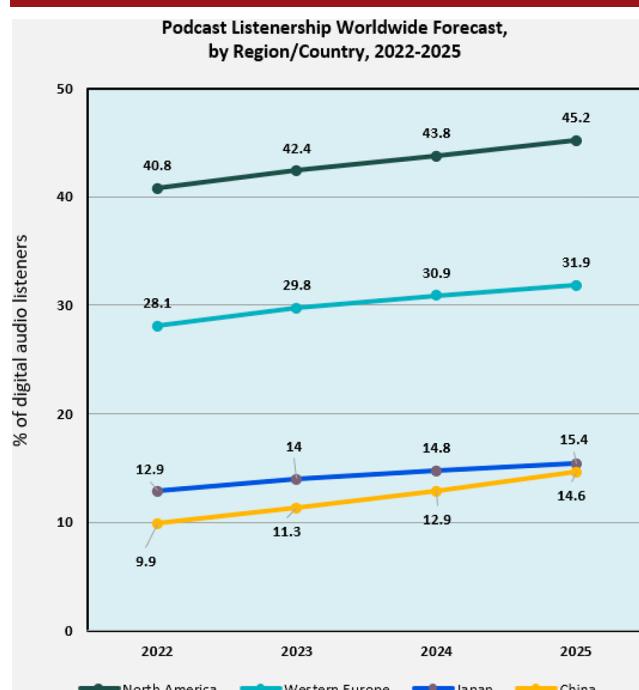


Figure 2. Forecasted Internet users of any age who listen to a podcast via digital stream or direct download on any device at least once per month. Data sourced from eMarketer, August 2022.²

America stands out as the region with the highest percentage of digital audio listeners who subscribe to podcasts, although it should be noted that modalities of science-based public engagement and discussion may vary widely on a country-to-country basis. Following closely behind are Europe, Latin America, Japan, and China, which coincidentally are also leading nations/regions in terms of natural science research.³

While it is unlikely to provide the level of detail that a written publication can, high-altitude podcast content broadens listenership. For example, a recent episode of C&EN’s

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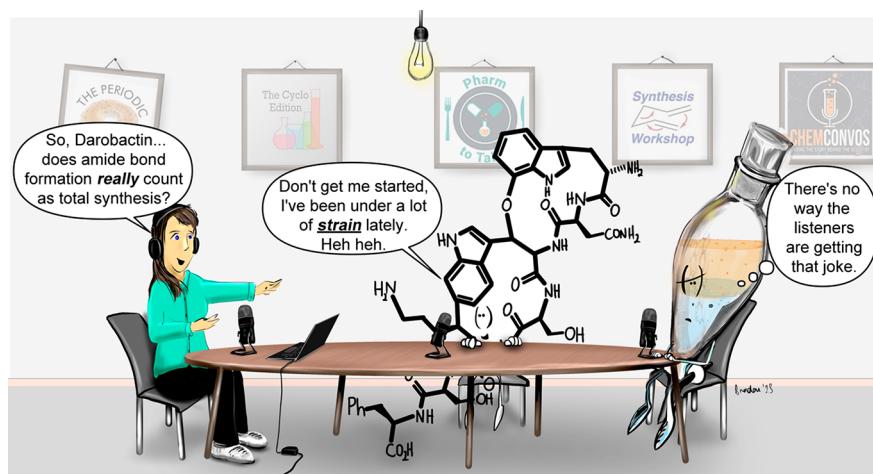


Figure 3. Challenges of discussing organic chemistry without resorting to visual aids. Graphical contribution by Brendan Burkett.

Stereo Chemistry podcast on monitoring microplastics showcased an intersection of science and public policy and raised awareness of how crucial analytical chemistry can be for maintaining safe drinking water. A central theme to *Stereo Chemistry*, and other science-themed podcasts, is conversations between scientists from academia and industry, which create a collaboration hub for scientists of all ages and backgrounds to connect on myriad topics. Interestingly, podcasting has already been successfully leveraged by the medical community to increase communication and education, which gives chemists a roadmap for applying a similar model.⁴

Within the realm of organic chemistry, blogs and recorded lectures from courses or conferences have complemented the written form, with pioneers in organic chemistry science communication including Carmen Drahl, Chemjobber, Derek Lowe, and Stuart Cantrill. Nevertheless, organic chemistry has gained notoriety as one of the most demanding subjects in college and is often called a “weed-out class,” despite efforts to combat this reputation.⁵ Communication in the subject often relies on visual aids such as chemical structures, which presents a significant hurdle in creating podcast content if there is no accompanying video (Figure 3). During the past 10 years, we have seen tremendous inroads in progressing organic chemistry literacy; of note are the efforts of chemistry professor Neil Garg at UCLA, who has married organic chemistry to medicine and pop culture through interactive tools and techniques.⁶ With that said, organic-chemistry-themed podcasts are scarce,⁷ leaving on the table important dialogues between chemists on problem selection, reaction optimization, and collaboration to overcome challenges. This Editorial will reflect on podcasting as a medium to engage and bring together the academic and industrial organic chemistry communities by sharing our experiences with the *Pharm-To-Table* and the *Synthesis Workshop* podcasts. While these experiences have primarily focused on scientific outreach with Western audiences, the models discussed here may serve as the foundation for future efforts on a global scale by adapting the approach on a regional basis.

Podcasting 101 – The Basics

So, you think you want to start a chemistry podcast? A good place to start on the journey to creating a chemistry podcast is to decide what type of content to cover and who would be the target audience, always asking the question, “Why should they

listen?” Determining whether the content is more suited for an audio and/or video podcast is also critical, as some technical topics could not be adequately explained without video, while other storytelling or interview-style podcasts may be much more well-suited for an audio-only format. Once a podcast theme is selected, you should settle on a podcast name and overall format. In the case of *Pharm-to-Table*, the name is used to convey that pharma-relevant content will be delivered in a fun and accessible way while also playing homage to the cohosts’ love of food. *Synthesis Workshop*, on the other hand, uses its title to succinctly define the target subfield and content presentation style.

A misconception is that high-end microphones and mixing software are required; however, we have found that good quality recordings can be achieved with inexpensive microphones and with common applications such as PowerPoint. With visual podcasts, quality of graphics is important for audience retention as well as branding—for example, this can determine whether the podcast feels more like a coffee table discussion or a professional seminar. In video podcasts, the possibility to include attention-catching graphics such as reactions in progress, images of isolated products, or annotated raw data are all opportunities for audience engagement as well.

In terms of audience retention, several reports and our own internal data reflect that concise blocks of content of 10–20 min maintain listener attention throughout the episode.^{8,9} Metadata from the *Pharm-To-Table* podcast has shown that listenership drops off after 30 min, spurring the creation of shorter episodes called “snacks” that are <10 min and cover a range of topics. More broadly, new listeners are much more likely to join if they see the content as being part of a growing, regular content stream than if the content appears to arrive in irregular intervals. To ensure continuity in the content stream in this type of effort, it is necessary to plan the future content well in advance and to be actively networking with the people that you want to be involved as interview guests or presenters, through LinkedIn, for example. The process of identifying potential guest speakers is also an important opportunity to champion diversity, equity, and inclusion principles.^{10,11} Once a potential guest speaker has been identified, they can be provided with more procedural information and in some cases presentation templates in order to ensure a certain level of consistency across the series.

In order to ensure maximum visibility for the podcast content, social media is a logical promotional tool, although the specific outlets that should be targeted may vary by country. Specifically, leveraging the social media accounts of guest speakers, their company/university, and the journal where any associated work was published all provide opportunities to expand the audience, not only for the episodes being released but also the initiative more generally. To further increase the reach of such an initiative, posting additional content on social media through graphical research highlights, announcements about recent publications, and information about upcoming events also allows the audience to remain engaged in periods in between episode releases.

Pharm-To-Table Podcast

The origins of the Pharm-To-Table podcast were rooted in Merck's passion for developing cutting-edge and innovative chemistry coupled with our chemists being highly engaged in the scientific community through publications and external presentations. In an effort to further expand and democratize access to our stories, about 10 years ago, several of our scientists active on social media began to leverage the #MerckChemistry hashtag on publicly available content to broaden awareness. Nonetheless, in early 2020, the COVID pandemic posed significant challenges in our desire to remain connected to the external scientific community. As a result, we set out to develop an approachable podcast that would dive into the stories about the people behind the innovative chemistry and science that happens in our laboratories, with the added benefit of "pulling back the curtain" on industrial research for curious students and PIs.

Enabled by our company's corporate internship program, we recruited Jimmy Olsen, a recent graduate of Grove City College at the time, to serve as our producer by scheduling and preparing future guests and editing audio. We opted for a cohost model to maintain a conversational style. Having interactions between hosts and/or guests can break up the auditory monotony as well as bring in diverse perspectives. Our target audience was graduate and postdoctoral students along with young professionals in the field, given the obvious link to cultivating a potential talent pool to recruit from. After experimenting, we adopted a format for Pharm-to-Table that involved choosing a recent publication, inviting 1–2 contributors, and using a concise slide deck of questions as conversation prompts. These questions were shared with guests beforehand and displayed during the interview as a script if necessary. The interviews have focused on introducing the scientist(s) to the listeners, contextualizing their work, highlighting key findings, and sharing unpublished anecdotes. Because we are not an audiovisual podcast that is enabled by images, we try to limit deep technical discussions; however, this remains a challenge.

Audience involvement through social media has been an integral aspect from the beginning, with the Pharm-to-Table podcast name and dinner plate logo being suggested by friends in the #ChemTwitter community. Throughout the tenure of the podcast, which operates primarily on Apple Podcasts and Spotify, social media continues to serve as a lifeline to poll our listenership for episode ideas, answer audience questions—which in turn have become episodes, and drive anticipation for upcoming episodes. We have also directed conference attendees to specific podcast episodes during scientific

presentations if they are inclined to hear more behind the scenes information.

Synthesis Workshop Podcast

The Synthesis Workshop video podcast started with the aspiration to understand and explain the most exciting new advances in organic synthesis to a worldwide audience. As lockdowns began in early 2020, it was no longer possible to go to lab and get new results, and suddenly, the idea of spending time to condense and discuss literature became more appealing. Furthermore, it became clear that there was a real need in the chemistry community for a way to share scientific developments and remain connected throughout the pandemic. With this backdrop, the Synthesis Workshop podcast started as a one-person effort providing condensed coverage of advances in organic chemistry through short YouTube videos. Similar to the Pharm-To-Table podcast, the initial workload was significant. The initiative built upward from a modest initial following with regular releases, which generally lasted between 5 and 15 min, with intro and outro music composed by Zijun Chen, a former labmate from Oxford, and a logo referencing the iconic Cope rearrangement. While the early content focused on total syntheses and named reactions, Noam Saper took the initiative to join as the podcast's first guest speaker, and the podcast quickly evolved toward "Research Spotlights," where researchers would join to share their recently published work. As more researchers from well-known academic laboratories around the world began to step up to present their published work on the channel, a positive feedback loop began, and identification of new guests became increasingly easy. An important lesson learned since the beginning of the podcast is that there is enormous value in making such an initiative community-based, and this is for three reasons: (1) with a community-based effort, it is possible to hear from a diverse range of voices, (2) a much wider range of topics can be discussed, and (3) there is a much lower workload on the host, making it feasible to continue for much longer than would be otherwise possible; this is particularly relevant for video podcasts, where both audio and video tracks are involved and editorial time is much higher.

One positive side effect of the podcast has been the growth of a broad professional network of people who are willing to work together. To fully leverage this network, one of the long-term aims of the podcast has become to produce a full-length Advanced Organic Chemistry course, which is currently being released, with each class taught by a different guest speaker from industry or academia. A further benefit of this network has been the successful recruitment of an Editorial Board and Associate Editors to support the main content stream as well as new ones, such as problem sets. As the initiative has become increasingly community-based and self-sustaining, avenues are also being pursued to apply a similar model in fields beyond organic synthesis and identify partners who are willing to manage a "companion podcast" that would operate in a similar way.

Demographics

One interesting aspect of podcasting is the ability to obtain listener demographic data, which provides valuable insight into audience composition, allowing for more informed decisions about content customization or potential shifts in direction. According to the available data from our podcasting platforms and casual encounters,¹² it is evident that both Pharm-to-Table and Synthesis Workshop are reaching a significant audience of

young researchers in the West, with more than 60% of the listeners falling within the 23–34 age range, which aligns well with the demographic profile of graduate and early career chemists. However, divergence in the gender demographics and country of audience have varied significantly. At the time of this writing, Pharm-to-Table has drawn >19K plays overall, with about 65% of the audience in the U.S., with our second largest audience in Canada with 11%, likely the result of the country proximity but also owing to L.C. Campeau being Canadian. For Pharm-to-Table, the gender metrics reflect 72% male and 26% female (2% unspecified), close to the distribution one would expect for practicing synthetic organic chemists in this age group (Figure 4).¹³

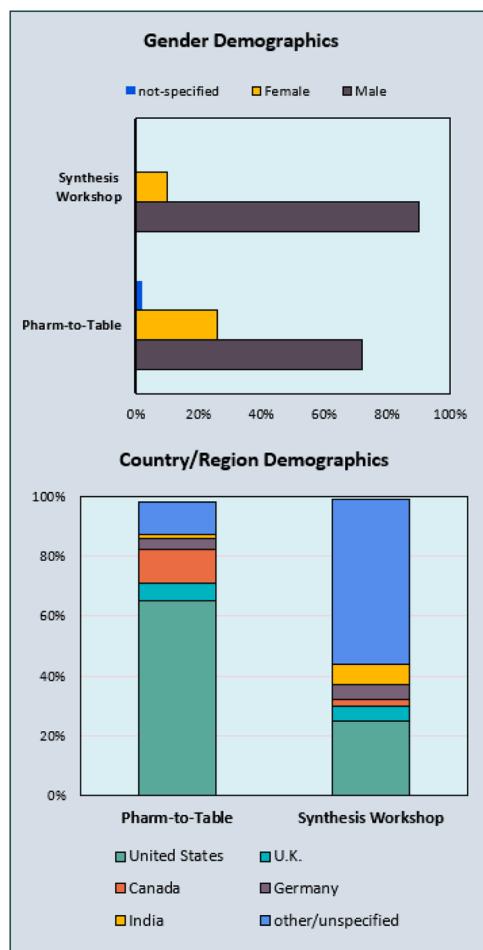


Figure 4. Demographic data for the Pharm-to-Table and Synthesis Workshop podcasts.

The Synthesis Workshop podcast so far has gained more than 280,000 views with about 17,000 h of watch time according to data from YouTube. Averaged over the full length of the initiative, the audience is 90% male and 10% female. However, some female speakers have been able to dramatically shift the composition of the audience, up to a 71/29 male/female split (!), mirroring the observed effect of representation observed with Pharm-to-Table. Data obtained from YouTube Analytics indicate that on average 25% of the audience comes from the U.S., 7% from India, 5% from the UK, and 5% from Germany, with the remainder from other countries or having unknown geography because of privacy settings of users. Interestingly, Canadian listenership for Synthesis Workshop

pales in comparison to Pharm-to-Table, again highlighting how representation can have a large effect on audience demographics. Overall, these data show that the initiative is reaching a strong base of international professionals, but there is still much room to grow in terms of outreach in China and other Asian countries. Learning from past experiences, the key to reaching a more diverse audience will likely be to further diversify the speakers.

Conclusions

The emergence of digital platforms such as podcasts has broadened the opportunities that are available to scientists for communication and outreach. Increasing awareness of scientific advances—both among academic and industrial specialists and members of the general public—remains a challenge, which podcasting and other innovations in communication seek to confront. Through the case studies presented above, we have found that podcasting is a promising avenue for amplifying the voices of researchers and providing a “behind the scenes” look at breakthroughs in the lab. It is anticipated that communication in organic chemistry and beyond will continue to evolve toward increasingly accessible channels, offering further paths to making the field more diverse and collaborative.

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Notes

Views expressed in this editorial are those of the authors and not necessarily the views of the ACS.

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