

Understanding and supporting the needs of early-career materials scientists

Thomas G. Folland, Mayra R.S. Castro, Isabel Gessner, Maria A. Philip, and Babak Anasori

When PhD students choose to continue their career in science, they often undertake one or more short-term positions to help establish their careers as independent researchers. Crucial to a successful outcome in these temporary “early-career” positions are appropriate training and support to enable the next career step. However, there is a wide range of such “early-career” positions, and the expectations of these positions have changed over time.

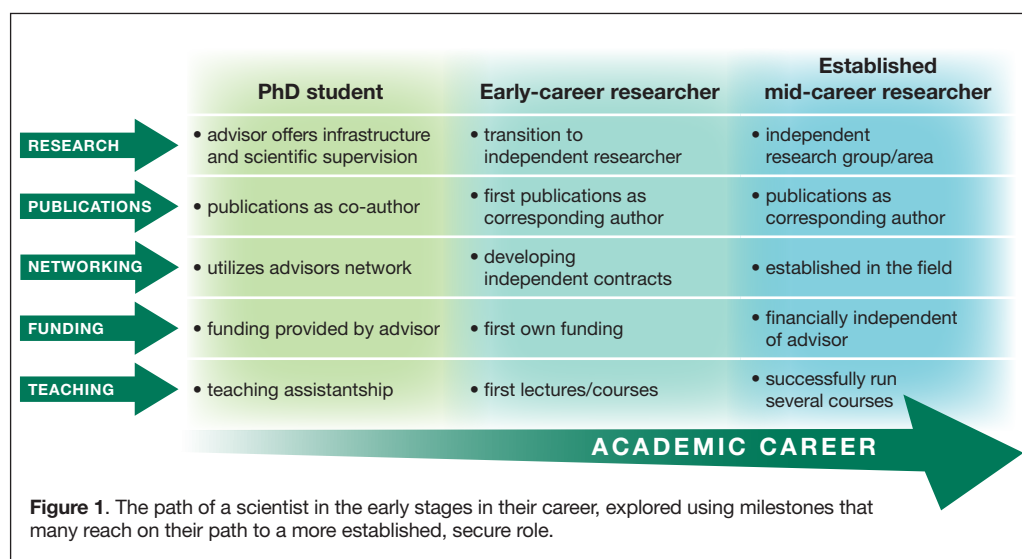
Toward the end of their graduate studies, PhD students are expected to begin showing independence in terms of their professional life. This independence indicates the start of their “early-career” phase, which can be loosely described as being “no longer fully dependent on their advisor but not yet fully established in their chosen career.” As the number of PhD graduates has grown over the years, more time is being spent in this early-career phase until a permanent position is obtained. The unique needs and challenges arising in this par-

ticular group are some of the reasons that the Materials Research Society (MRS) founded the Early Career Professionals Subcommittee (ECPSC).

However, while the term “early career” is widely used, a hard definition (e.g., the number of years post-PhD) is difficult to prescribe across differing academic and industrial systems, being often exclusionary. The eligibility criteria of early-career grants illustrates this; the European Research Council specifies 2 to 7 years post-PhD,¹ the US Department of Energy specifies under 10 years post-PhD,² and The Royal Society in the UK specifies the “first five years of a tenure track position.”³ In **Figure 1**, we explore the stages of an academic career path using descriptive terms, from student, to early career, to established mid-career. Note that we choose to present this as a spectrum, as the transition to an established scientist is often not a hard line, especially given that reaching mid-career is not a straight path for many.

As a committee, we are focused on improving outcomes for early-career professionals, supporting them as they work toward their ideal career path. Scientists meet several general challenges in this phase. Perhaps first and foremost is the lack of security in early-career positions, especially in challenging situations such as the current economic downturn. Effective mentorship (typically from a group leader) can significantly enhance a scientist’s career.^{4,5} In particular, structured mentoring has been shown to be highly effective in creating more diverse and equitable scientific communities.⁶ However, not all mentors possess the relevant experience or skills to support their mentees on the range of career paths available. Professional societies, such as MRS, can provide an independent bridge of support and knowledge for those who cannot obtain it otherwise.

To explore some personal experiences, we spoke to several members of the ECPSC. One of the major advantages of early-career positions is that they offer significant flexibility to explore different cultures and working environments. Katherine Mazzio, a scientist at Helmholtz-Zentrum Berlin (Germany), told us that “experienc[ing] different cultures and working environments has been really great and has helped her [*sic*] grow as both an individual and a scientist.” In addition to the flexibility to explore



Thomas G. Folland, Department of Physics and Astronomy, The University of Iowa, USA

Mayra R.S. Castro, Springer Nature, Heidelberg, Germany

Isabel Gessner, Institute of Inorganic Chemistry, University of Cologne, Germany

Maria A. Philip, Department of Chemistry, University of Illinois at Urbana-Champaign, USA

Babak Anasori, Department of Mechanical and Energy Engineering, Purdue School of Engineering and Technology, Indiana University–Purdue University Indianapolis, USA

different technical skills, early-career positions offer “the freedom to collaborate on intriguing projects,” said Zachary Hood, Argonne Scholar at Argonne National Laboratory (USA). Further, “the challenges you must take to build your way, receiv[ing] other professionals’ advice, and ... networking locally and internationally” can itself be its own reward, said Maria Eugenia Perez, adjunct professor at the Universidad de la República (Uruguay).

However, early-career life can be quite challenging. This starts before the end of the PhD, where one needs to both concentrate on writing a thesis while also wondering about the next career step. Even after you find a position, you will “face the pressures of finding your next position, publishing in high-impact journals, and finding time to balance personal/professional life,” said Hood. Indeed, finding your next position can be especially problematic, as you are no longer a student or yet an established researcher. For Perez, in Uruguay, there are mainly “grants (projects) for students and established researchers, meaning that there is a gap in getting funds” for early-career scientists. Finally, given the insecurities of early-career positions, you are vulnerable to your hard work being exploited. Mazzio told us that “understanding when I am being scientifically exploited and how to navigate these types of situations” has been a particular challenge. It is worth noting that this can be especially problematic for international researchers, as their ability to stay in the country is often tied to the satisfaction of their academic advisor.

MRS and the ECPSC members have all made a commitment to improve outcomes for early careers through various initiatives. For example, Hood believes “MRS and mentors can improve the outcomes for early-career researchers (ECRs) by providing tools and experiences that help ECRs overcome the challenges they face.”



Figure 2. Two successful ECPSC events at the 2019 MRS Fall Meeting.

Further, “MRS is a crucial point for networking, as the limited number of researchers in Uruguay makes it difficult to find appropriate collaborators on a related topic,” said Perez. The subcommittee itself provides an opportunity to “contribute to the direction of some of the broader impacts programming that the MRS puts on,” said Mazzio. An important part of this programming is ensuring our committee represents a wide range of career trajectories and directions. We hope that this will lead us to produce more effective programming for the broader MRS membership.

Despite being a relatively young committee (our first events took place at the 2019 MRS Fall Meeting), we have had the opportunity to run a number of events to improve early-career outcomes. These have spanned from poster sessions to interactive webinars. Two events organized at the 2019 MRS Fall Meeting were the “Meet Your New Faculty Candidate—Poster Session” and the “Careers at Government Laboratories and User Facilities—Panel Discussion” (Figure 2), which were highly successful, as demonstrated by the large number of participants. Both events provided a platform for young researchers to get in contact with potential employers from academia and industry. Hood, who was involved in organizing both, said that “the participation of MRS members in each of the events brought new insights in the form of deep questions, new perspectives, revitalized vision, and revised value propositions for the events.” For

the 2020 MRS Fall Meeting, we are expanding this event into a dedicated early-career symposium (Symposium BI01: “Early-Career Development—Insights from Academia and Industry”) in a fully virtual format, with talks and panel discussions aiming to elucidate career paths.

We are also starting to explore organizing events that cater to a wider audience. One recent event, the “How to Land a Faculty Position” webinar series, included sessions on research-intensive schools in the United States, undergraduate institutions in the United States, and positions at European institutions. Two of the three sessions maxed out registration, and Mazzio, who was heavily involved in this program, noted that “the extension of the initial idea to include a more international scope really went over well with the audience. Information related to faculty application processes and funding doesn’t seem to be as easily accessible or consistent across institutions in Europe as it tends to be in the United States.”

These sentiments were mirrored by Perez, who has been involved in earlier events, such as the 2018 MRS Fall Meeting “Career Development Summit” of the MRS University Chapters. Regarding that event, Perez said, “It exceeded our expectations in terms of audience and audience active participation.” These experiences highlight both the importance and the strong desire for these events in ongoing MRS programming. Indeed, online events also allow a broader participation compared to in-person meetings.

Looking forward, the committee is keen to continue developing their programming to better serve early-career researchers. One opportunity might be a networking session with research program managers in order to learn current and future research directions and funding priorities. Mazzio highlighted two further possibilities: First, “it will be interesting to take a quantitative approach to understanding how these programs have impacted ECRs in the future.” In particular, the subcommittee is working on surveys to gain a better glimpse into the faculty hiring process, which, if successful, could be expanded to other career routes. Second is the possibility to improve outcomes by “leadership training and certification for mentors with an emphasis on ECR outcomes.” This reflects that in any mentoring relationship, both the men-

tee and mentor need to work together to ensure success.

“It is essential to set your goals in the short and long term[s]. Failure is inherent to the career, but you should try to enjoy the path and take advantage of your strengths; opportunities will come,” said Perez. Hood advised people to “get involved in committees or subcommittees at your institution or within your professional organization(s). This involvement will connect you with a community that can help turn small ideas into bigger possibilities.”

The ECPSC seeks to provide an alternative source of support for early-career professionals. As we continue to develop our programs, we hope that both mentors and mentees will join us in working on our mission. If you would like to get involved (or have any thoughts for future directions), please

get in touch directly with the authors or via info@mrs.org.

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MRS responds to Executive Order on race and sex stereotyping

mrs.org/advocacy-policy/policy-issues

On September 22, 2020, the US president signed an Executive Order on race and sex stereotyping, specifically identifying programs at Argonne National Laboratory (ANL) and Sandia National Laboratories (SNL). In response, the Materials Research Society (MRS) issued the following statement:

Diversity, Egalitarianism and Inclusion are fundamental values of the Materials Research Society. As an organization, we also stand firm against racism, discrimination and inequality. Because

of these beliefs, we are opposed to the Administration's recently released Executive Order on Race and Sex Stereotyping that would ban the very type of diversity and equality training needed to value the contributions of everyone in the scientific community and to engage all talent to improve the quality of life through scientific discovery.

As part of ANL's commitment to diversity and inclusion, the Lab offers resources to managers about unconscious biases in hiring “so these perceptions can be iden-

tified and countered,” according to their diversity statement on the Lab's website.

Similarly, SNL values diversity and inclusion, and has recently received recognition from the *Profiles in Diversity Journal* for its efforts in inclusive leadership and transformative change. “Leaders who attended the training report a change in attitude and behaviors,” according to the journal, a quarterly publication dedicated to promoting and advancing diversity and inclusion in the corporate, government, nonprofit, STEM, and higher education sectors. □

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