

The Future of Materials Science in Academia: Landing Your First Faculty Position

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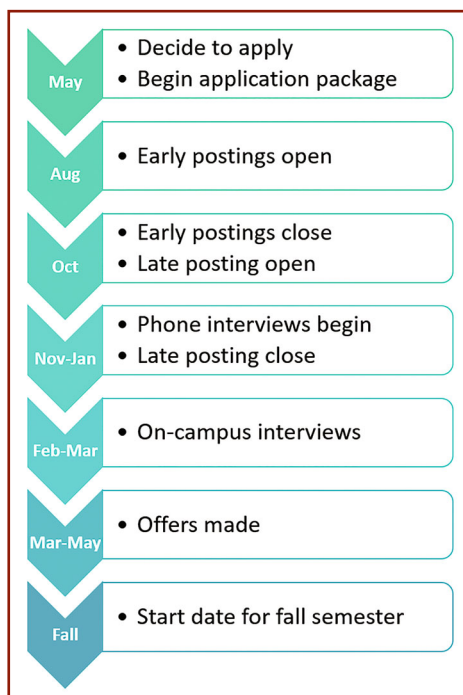
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How to Get Started

Landing a first tenure-track faculty position is a monumental task. Even with strong mentorship, it can seem insurmountable. Universities routinely receive 150 to 500 applications for every open faculty position in materials science and related disciplines. While it would be impossible to put together a fully comprehensive guide, this article serves as an overview and resource for graduate students and postdoctoral researchers looking to apply for tenure-track faculty positions, primarily at research-focused institutions in materials science and engineering.



The application and interview process can take the better part of a year, so perhaps the first question you need to ask yourself is when do you apply? There is no hard and fast rule. A postdoc will almost never hurt and can be helpful in addressing areas of your *curriculum vitae* (CV) where you may be less competitive. However, getting an offer right out of school is not unheard of. The best advice will be to lean on your mentors—they will know if you are ready to apply or not.

The second question is where do you apply? The best option for most applicants is the middle ground. If you are preparing 30+ applications, you are unlikely to have time to customize all of them adequately, so they are not likely to be competitive. On the other hand, only applying to one or two schools *dramatically* reduces your chances.

Relatedly, do you apply solely to materials departments or could you be successful in another department? The answer will depend on your research direction and the research culture of the hiring department.

The path from application to accepting an offer is laid out in Figure 1. At most universities, faculty searches get posted online late in the summer or early in the fall. While there are posted deadlines, some universities start review immediately. As a result, it is better to submit applications early whenever possible.

The Application

The application packet is critical; it needs to be spectacular to make it through the first stage of winnowing the pile of applications down to a manageable volume. At this stage, one of the most important things for a successful application is to follow the format and content directions in the job posting. It is always advisable to mirror the language

Figure 1. This graph depicts the timeline for a typical application and interview process, which begins as hundreds of applications get filtered down to approximately 10 to 15 by the search committee. Applicants are then invited to have a phone (or video conference) interview. The timing for phone interviews varies but is typically between November and February. From the phone interviews, approximately three applicants will be selected for on-campus interviews one to two months later. This sort of timeline would usually correspond to a start date for the following fall semester.

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used in the posting.

For most universities, a complete application packet will have five components: a cover letter, the applicant’s CV, a research statement, a teaching statement, and references to provide letters of recommendation. Each is described below, arguably in decreasing order of importance.

Curriculum Vitae

Having a complete and easy-to-interpret CV is critical. Publications and presentations illustrate at a glance how impactful you have been in your career to date. It is generally good practice to include hyperlinked DOIs whenever possible. While opinions vary on whether “in preparation” and “submitted” manuscripts should be included, one common rule of thumb is that you can include it with the disclaimer that copies are available upon request. For submitted manuscripts, it is inadvisable to list the journal to which it has been submitted before acceptance.

Research Statement

If a CV is a measure of how impactful you have been in the past, the research statement is an indicator of how impactful your research will be in the future. It needs to cover both the next five to ten years but also the arc of your whole career.

The research statement should begin with an over-arching theme of your future research program, followed by a brief description of roughly three research thrusts. One effective strategy is to frame the theme around one of the national or global research priorities to not only motivate your work but highlight which funding agency you would seek out to support this work. Ensure that the research thrusts all contribute to your theme, represent who you are as a researcher, and contain well-articulated research objectives outlining what new knowledge will result from the proposed research and why that is important.

Recommendation Letters

Recommendation letters for a faculty application have the same caveats as any other career stage: it is important to balance “name recognition” versus the quality of the letter that a person will write. Also, some people simply write better

letters than others. To get perspective on this, it is important to lean on advisors and senior mentors. Think about which positive attributes about yourself that you want your letter writers to highlight. Make sure that your letter writers know and understand your goals and aspirations as a potential assistant professor.

Teaching Statement

For many research-intensive universities, the teaching statement will be significantly shorter than the research statement—a department’s priorities can often be observed in the page limits for each component of the application. An excellent teaching statement cannot outweigh a subpar research statement; however, a bad teaching statement can ruin an otherwise good application.

This teaching statement should cover the broad theme of your teaching philosophy. This is an opportunity to reflect on issues you may have seen during your own coursework and propose solutions in a positive way, or perhaps to draw from peer-reviewed literature on effective pedagogy in engineering education. It also presents an opportunity to show interest in a particular department by referencing the course catalog to demonstrate how you might fit in with or help expand the existing curriculum.

Cover Letter

Like the teaching statement, it is important that a subpar cover letter does not deflate the rest of the application. This piece will be most heavily tailored to a given school; it *absolutely* should not read as a generic letter. Reference particular facilities or centers, what attracted you to the department, how you heard about the posting, or other non-generic information. How will your presence help to grow the department? How will this specific department improve your career? It is critical to cover both sides of the question to illustrate that the fit is correct.

Phone Interview

The next stage of the process is a phone or videoconference interview. These tend to be brief, but it is always advantageous to know in advance how long the interviewer(s) anticipate this will take—it can help to tune the length of verbal answers. The phone interview is typically

with part or all of the search committee. It is absolutely fine to ask who is expected to be in attendance, though last-minute changes are often inevitable.

One of the main objectives of the phone interview is to ensure that you can answer questions articulately when put on the spot. Written statements can be heavily coached or partially written by others; it is much harder to fake a phone interview.

The level of preparation expected on a phone interview is highly variable. In general, schools that provide a list of questions in advance tend to expect more preparation than schools that do not. Because of the variability, it is always important to prepare as much as reasonably possible. Ask a trusted friend or colleague to practice this portion with the same media that will be used for the interview to test your video or phone connection. Take your time and answer questions with a clear ending to avoid giving long-winded answers.

In-Person Interview

Regardless of career stage, these interviews are mentally, emotionally, and physically exhausting. However, if the school is a good fit, interviews are often fun! You get to spend one to two days talking about your past and future research with a group of people that hopes to work with you for the coming decades. One of the most important pieces of advice for this stage is to be yourself. You want a department to choose you based on your true qualities, rather than forcing yourself to fit into what you think they are looking for.

The interview has three primary components: the research talk, the vision talk, and individual or small group meetings with faculty. Additionally, there are nearly always meetings with the department head and the dean or another college-level administrator. You will typically get your itinerary a few days in advance—use this advance warning to thoroughly prepare and research the people you will be talking to.

Research Talk

Typically the first of the two presentations during an interview, the research talk is usually openly advertised to the department/center in which you are interviewing. This talk should be quite heavy on background and motivation;

materials departments are especially diverse, so you do not want to lose the faculty who are in a different specialization area within the first few slides. The “pyramid theory” of giving a talk is helpful, as illustrated in Figure 2. The peak allows you to show that you are fully competent on the topic; if they want to push you further, they will have time in the question and answer section. And, by keeping the bulk of the talk broad enough that the majority of the audience understands, you can simultaneously demonstrate that you will be an effective teacher.

Additionally, this research talk is an opportunity to illustrate how you think about problems as a scientist. You can motivate a problem showing the impact it will have on society, frame scientific objectives such that you show the impact it will have materials research, and illustrate that you can translate that opportunity into an effective research plan.

Vision Talk

Fundamentally, the vision talk speaks to who you are as researcher, as a teacher, and as a member of your scientific community. In the vision talk, you will address each of those three pillars in proportions that correspond to the priorities of the department. For a research-intensive university, this means you should spend 60 to 70% of the talk on research, roughly 20% on teaching, and roughly 10% on service.

One effective layout is to start with motivation for that research theme, segue to a brief five-minute summary of how your research to date fits that theme, then finally build to how that has prepared you to take on the new research programs that you propose. The longest portion of the talk will be a description of new research programs. The proposed research is in the near-term (the first proposal you would write or tasks for the first student), but it should be clear how this connects to your 30-year vision for your career.

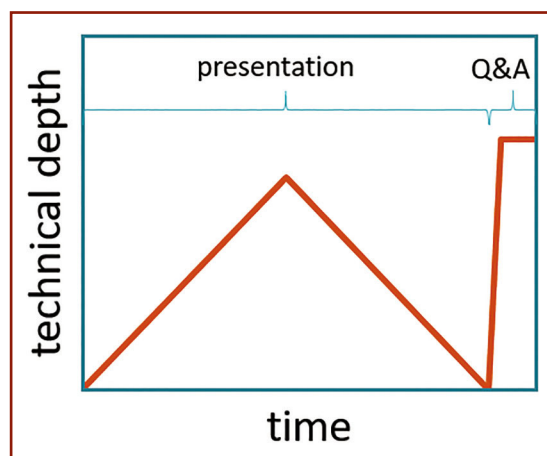


Figure 2. The “pyramid” structure of a technical talk starts with information so broad that anyone can understand it, builds to a peak of technical complexity that appeals to the subject matter experts briefly in the middle, then closes by generalizing your results back out to be broadly understood again.

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Meetings with Faculty and Administrators

Outside of the two seminars, the rest of the interview will be filled with back-to-back ~30-minute meetings. Like the rest of the application process, appropriate preparation is key (flashcards are a great way to study). During these meetings, you want to leave the impression that you are both a competent scientist with the ability to have a successful career *and* a pleasant person with whom to work.

Let the person you are meeting with lead the conversation if they want to but have a few planned points to prod them with if conversation is slow to start naturally. For someone in a research area close to yours, this is a good opportunity to demonstrate what you bring to the table as a future collaborator. Do not feel like each of these conversations needs to be perfectly unique; you will likely end up covering similar topics with a number of different people. This allows you to leave the department with a consistent message.

All meals during your interview are also likely to be with small groups of department faculty. There may also be social events in your schedule. It's important to be yourself and be friendly, but to remain professional. While it's reasonable to have an alcoholic beverage with dinner (or not!), absolutely do not over-indulge.

Meetings with administrators are slightly different. This is a unique opportunity to talk about the “big picture” vision for the department and the college. Based on these conversations, you can see if your vision for your own career is complementary to that of the institution. Most departments wrap up this interview with another meeting with the department head or a similar administrator to talk specifically about what would be needed in a competitive offer. Be prepared to talk about what research resources you need, including equipment and computational infrastructure. At this stage you probably do not need quotes, but it is helpful to have a ballpark price; the main goal is to convey that you have completed the forethought necessary to administer your research program. Additionally, be ready to talk about other concerns you have that might come up during the hiring process, such as a two-body problem if you are relocating with spouse or partner that also has a professional career.

Second Visit and Negotiation

More and more commonly, an applicant is offered a second visit to work out the details of what needs to be included in a competitive offer. The layout of a second visit varies, but it typically contains visits with faculty that you did not get to meet previously, laboratory tours, and often a real estate tour. While the second visit is typically less formal than the first, make no mistake: this is still an interview! Dress nicely, if less formally, and be professional to everyone that you meet with.

Discussion and negotiation of an offer takes place with the department head or department chair. The guiding principle is to ask for what you need to be successful. Do not tie your ego to inflating the number as much as possible, but also do not leave out equipment that you need because you are afraid of asking for too much. However, do build in some extra resources; budget for the full price of brand-new equipment, then get discounts from the manufacturer when you actually purchase it.

At this stage, everything is on the table: starting date, salary, years of student support, staff support, extra teaching relief, equipment, usage hours of shared equipment, etc. You have negotiating power for each of these things, but you need to decide which are most important to you. As with all negotiations, get the important commitments in writing; verbal agreements are subject to change if there is a shift in department priorities or the global economy. Get the negotiating done *before* you sign your offer; once you have signed, you have lost your negotiation power. Asking for more time (e.g., if you have an interview with another school scheduled) is fair but should be done carefully. While you can use competing offers as a point of negotiation, remember that the materials community is small; you do not want to develop a reputation for playing political games or leading schools on.

Once you have signed, celebrate! You are excited, the department is excited to have you, and an awful lot of stress evaporates!

Acknowledgments

V.M. Miller would like to thank L. Rueschoff for substantial inspiration in writing this article.

V.M. Miller is an assistant professor in materials science and engineering at the University of Florida. She is an active member of several TMS technical and functional committees and received the 2018 TMS Light Metals Division Young Leaders Professional Development Award.

