Workshop attendees suggest methods to improve the number and advancement of women scientists in NanoScience/NanoTechnology

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Women are underrepresented in the new field of nanoscience and nanotechnology (NS/NT). They comprise only 14% of the faculty members at the 62 federally funded centers for NS/NT at higher education institutions in the USA, but make up 25% of the faculty in other STEM disciplines (1). Increasing the participation of women and minorities in NS/NT research is important for the relatively new field of NS/NT to reach its full potential. A workshop was held to gather information about the challenges and opportunities academic work in NS/NT offers to women and minorities and to identify differences between NS/NT and other STEM disciplines (2). The workshop, titled ‘Toward Increasing Diversity in STEM Faculty: A Workshop Addressing Underrepresentation of Women of all Ethnicities in Nanoscience Fields,’ was cohosted by the American Association for the Advancement of Science (AAAS) and supported by the National Science Foundation (NSF, USA). The two-day workshop included forty researchers in NS/NT and in the social sciences. In this news item, I will summarize some of the key findings and suggestions that are described in a published monograph about the workshop written by Vivien Savath and Suzanne Brainard at the University of Washington (2).

Overall, the participants of the workshop agreed that NS/NT research is an exciting and enjoyable career. Participants identified several challenges for women and made suggestions as to how to address those challenges. Many of these suggested improvements would be of value to both women and men in NS/NT, especially at the early stages in their careers.

One of the differences identified between NS/NT and other STEM disciplines is that NS/NT is interdisciplinary and collaborative across disciplines, industry, and universities. Unfortunately, participation in large collaborative projects is not always valued in academic departments, in part because it does not involve many small grants to individual faculty, which could cause problems for young faculty members in obtaining tenure. It was suggested that it is important that when women and minorities are asked to join in these big collaborative projects, they make sure they receive the money to support their students as well as being given appropriate authorship of papers and credit for their ideas. In addition, the interdisciplinary and interdepartmental nature of the research might lead to a faculty member being isolated in her home department, so it is important that methods are found to make sure that the young faculty member and her research are strongly valued by her home department.

The availability of appropriate mentors also can be improved. In previous studies of women STEM scientists, women identified mentoring as very important in their career, but they received less mentoring than male colleagues (3). The postdoctoral training period is a critical time in a person’s career to receive mentoring, but many in the workshop indicated that they did not receive it. Another issue was the choice of mentor; a department chair or very senior faculty member is not always a good match for junior faculty. The junior faculty member needs to be able to ask questions and get assistance without appearing weak. (In the opinion of this author, there also can be a very large difference between what was needed for tenure, career advancement, and obtaining funding by an assistant professor years ago, when the senior faculty member obtained tenure, and what is needed now.)

Several suggestions were made during the workshop that would improve mentoring. Departments should select faculty mentors who are only a few years older than the junior faculty, and the junior faculty member can find mentors in other departments as well. In fact,
it can be valuable to have multiple mentors and/or a mentoring committee. Training for the mentor about what is involved in effective mentoring, and finding mentors in the same or a similar scientific discipline could improve the effectiveness of mentoring. Also, mentoring could be reframed as ‘leadership development,’ so the mentee does not appear weak in asking for and receiving guidance. It was suggested that mentoring should continue even after the faculty members gain tenure to aid in later advancement in their careers and for applying for senior scientist grants.

Critical to any research career is the ability to obtain funding. Workshops and networking events with the agencies that fund NS/NT research are needed to clarify federal funding mechanisms, especially to provide more information about how to obtain funding from the Department of Defense (DOD). Specific suggestions in the monograph include:

Representatives from the NSF, NIH, DOD and other major federal agencies funding nanoscience should offer professional development seminars to present funding solicitations. These seminars should have time available to schedule one-on-one meetings with program officers. The NSF, NIH, DOD and other major federal agencies funding nanoscience should collect data and statistics on funding and workforce, disaggregated by gender, race and discipline. These data should be made publicly available to encourage transparency in funding procedures and patterns.

In addition, academic departments should make sure that they do not give female faculty more teaching and departmental service demands than the male faculty because teaching and service are not valued as highly as research by granting agencies (or by departments when a faculty member is up for tenure).

Both men and women in science careers would benefit for the availability of daycare for children at work and at conferences. This is especially important for enabling young faculty members to attend meetings and present their work because it is becoming more and more common that scientists and faculty members are married to other scientists or faculty members.

To follow up from the workshop, an informal network of women professionals in NS/NT is being organized to help women identify mentors, obtain professional development training, receive information about awards and funding, and other support. Additional steps might include an informal gathering every other year and additional workshops, possibly one that includes graduate students and postdocs to obtain information about their needs and suggestions as well as workshops to address specific challenges facing women and minorities in NS/NT.

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There is no conflict of interest in the present study for the author.

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**References**

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