5. Davor Balzar

Assistant Professor of Physics,
Department of
Physics and Astronomy, University of Denver,
2112 E Wesley Ave, Denver, CO 80208–0202,
Colorado, and National Institute of Standards
and Technology (NIST), Materials Science
and Engineering Laboratory, Div. 853,
325 Broadway, Boulder, CO 80305, Boulder,
Colorado, USA
balzar@du.edu, balzar@boulder.nist.gov
www.du.edu/~balzar, www.boulder.nist.gov/div853/balzar

Crystal defects / Strain / Diffraction line broadening / Microstructural properties

Statement

I couldn't agree more with the editor's statement in his invitation letter that most of us prefer not to be called "crystallographers". I think that this fact answers many of the questions asked here. Although we use crystallography in essence as a tool, crystallography is much more than a simple "suite of methods" or a "toolbox", as much as any other mature field of scientific research. However, the maturity also implies that any open questions of crystallography nowadays are not its basic questions. Here are just a few thoughts on several questions posed by the editor:

On Crystallography as a Discipline and Its Teaching

Deciding whether crystallography is a discipline or something else is not fruitful. A rationalization of the fact that one cannot earn a degree in crystallography is that crystallography is a basic field and as such is used in very different scientific disciplines. One can easily draw a comparison with quantum mechanics, for instance; I am not aware that any university would today award a degree in quantum mechanics (physics). At the same time, quantum mechanics is indispensable for not only physics but chemistry, materials science, and other fields. This also answers the question on the future of crystallography. A different question, of course, is how much of a thorough understanding will be required from the future students in order to grasp the crystallography basics needed for their topic of interest. Nowadays, there is a trend to supply everything in a way of "smart user-friendly" software in a "black-box" type of approach. Crystallography may end up being reduced to a mere set of recipes and procedures toward a particular application without deeper understanding of the interplay of crystallography and physical properties. Therefore, we should insist that the teaching of crystallography be done by either trained crystallographers or "crystallographers" like ourselves, who made research contributions not only to the applications but also to the crystallographic methods.

On Funding

A common knowledge is that it is more difficult to get funding for development of methods than for the research in new materials. This has heavy implications on funding a crystallography-focused research. However, there is no doubt that crystallography will play an important role in cutting-edge research; today, proteins and nanotechnology are a good example. Therefore, we have to constantly emphasize both to the public and to politicians the importance of crystallography for the advances in new fields of research. However, how to do it in a most effective way is a different question. There is an ever more increasing pressure to write letters to our elected officials in regard to the scientific funding. I sincerely doubt this to be effective, as we are not a large enough constituency. The fact is that the lobbying is proven as a much more effective way of influencing politicians by small groups, at least in the U.S. It might sound cynical and perhaps inappropriate to some, but I would support a motion that a certain part of the dues to our professional organizations be used for this purpose.

On the Present and Future of Crystallography and Crystallographers

Many of us can probably testify from a personal experience that finding a tenure-track university position with a crystallography (or diffraction) background is difficult. Perhaps the only exception today is the life sciences. However, in the long-term, if one sees crystallography moving first from physics to chemistry and now to biology, there is a question if this is finally a dead end. After we solve the most basic questions of life, will that spell an end to the notion of crystallography as a principal research vehicle? Will all of crystallography after then be classified as a "service" rather than a research field? Many universities already have a central crystallographic facility designed to handle all crystallographic-related needs. Beyond that, should crystallographers be employed only at big facilities, such as synchrotron and neutron sources, where there is a need to develop instruments and characterization methods and skills? Fortunately, the future is much more imaginative than we suspect. One thing is for certain: crystallography will always have a special position as a basic discipline for studies of materials. It is up to us to educate young researchers to recognize its importance. However, it is up to our students to find new challenges and yet again revive the field that we now call crystallography.