Writing a Good Paper

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Soon after becoming editor-in-chief for JM^3 (then titled *Journal of Micro/Nanolithography, MEMS, and MOEMS*) Dr. Chris Mack began a series of editorials on how to write a good scientific paper. These editorials were collected, and they are available here from SPIE as a single, open access download in PDF format. I strongly recommend that this compendium be read by anyone planning to submit a paper to JM^3, as it provides excellent guidance for writing a technical paper.

One often hears comments about certain authors being good writers. Unfortunately, it is often perceived that the ability to write well is a matter of innate talent and not a skill that can be and must be developed. Indeed, Chris Mack himself is often recognized for writing excellent papers that not only contain important technical content but are written clearly and concisely. As evinced by the level of detail in *How to Write a Good Scientific Paper*, quality writing is a subject about which Dr. Mack has given conscious thought, from abstracts to references. Paying attention to details similarly will improve the quality of anyone's paper.

In addition to following the guidance in *How to Write a Good Scientific Paper*, it is important to proofread one's paper before submitting it for publication. Even the best writers often find that sentences or entire paragraphs don't make sense the day after they were written. Proofreading on a day other than when the material was written is a good practice. For papers with multiple authors, it is usually the lead author who does most of the writing, while the other authors typically contribute technical content. In these situations, it is good for lead authors specifically to request critical reviews by coauthors, as colleagues are sometimes reluctant to be critical; such hesitancy can be overcome by inviting criticism. Associates who are not coauthors can be even better reviewers, since they will read papers with truly fresh eyes. Papers may have submission deadlines, in which case authors need to schedule time for proofreading and review.

There are a number of forces working against good writing in contemporary, post-modern society. The widespread use of abbreviations in text messages seems to have led to an increased use of acronyms and initialisms in technical papers. Unfortunately, what might be adequate for communications between adolescents may be counterproductive for technical papers, where the intention is to convey new and novel information. While authors will be familiar with the acronyms that they use, it is a bad assumption to think that most readers will be similarly familiar, except for a small number of ones used commonly throughout the semiconductor industry. Minimizing the use of acronyms is a good practice when writing technical papers.

The software used by engineers and scientists to graph data can be quite useful tools but frequently contribute to poor readability. All too often, graphs appear in submitted manuscripts where axes labels are too small to be readable by those with normal eyesight, because authors did not change the font size from the default settings. Moreover, picture resolution is often reduced to low quality by the default settings in some word processors. For some organizations, marketing or information technology departments may have selected software settings that reduce readability. Changing the settings for fonts and resolution can often make papers more readable.

The benefits to authors of writing good papers are not always appreciated. For submissions to peer-reviewed journals, reviewers are more likely to accept papers that are well-written. Authors often find that they have to spend more time addressing the concerns of reviewers than they would have spent if a small amount of effort had been invested initially in writing a good quality paper. Moreover, well-written papers are more likely to be cited.

It is clear that something that is not well-understood cannot be explained clearly. What is less evident in reading a poorly written paper is whether a lack of clarity is due to bad writing or is a

true lack of understanding by the authors. For students and early career professionals, writing with clarity can contribute significantly to career success.

Engineers and scientists who intend to submit manuscripts to the *Journal of Micro/Nanopatterning, Materials, and Metrology* are encouraged to avail themselves of Dr. Mack's booklet, *How to Write a Good Scientific Paper*, as well as follow the additional recommendations in this editorial.