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How to Write a Good Scientific Paper: Acronyms

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This is the third in a planned series of editorials covering all aspects of good science writing.

The term *acronym* is the name for a word made from the first letters of each word in a series of words. Some distinguish an acronym (such as NATO), which is pronounced as a word, from an *initialism* (such as FBI), which is pronounced by saying each letter separately. Most people, however, ignore such distinctions. The more general term *abbreviation* includes acronyms but also abbreviations that use letters other than the first letters of a word (such as nm for “nanometers” or Mr. for “mister”). Here, “acronym” will be used loosely to mean any abbreviation.

Acronyms serve an important purpose in science writing: to speed up the reading and ease the understanding of the content of a paper. Thus, the goal of acronym use generally requires that the abbreviation be familiar, and that its use saves considerable space and/or prevents cumbersome repetition. We should use an acronym only when it will be referred to frequently throughout the text (say, five or more times) or because it is commonly known and understood. There is no requirement for authors to use acronyms—it is their choice if and when to use them. Additionally, authors should avoid uncommon abbreviations (if the reader is not familiar with the acronym, its use will likely detract from the readability of the paper).

To be frank, acronyms are overused in JM³ (though it is certainly not a problem exclusive to our journal). It seems that authors love to use acronyms, especially if they are the ones inventing the acronym. The *Chicago Manual of Style* (which devotes a 35-page chapter to the subject of abbreviations) advises that “readers trying to keep track of a large number of abbreviations, especially unfamiliar ones, will lose their way.”¹ This happens more frequently than authors (who are very familiar with their own acronyms) might think.

To help guide authors in their use of acronyms, I’ve compiled some basic rules about when and how to use acronyms in a scientific publication.

1. Don’t use acronyms in the title unless (a) the subject is almost exclusively known by its acronym or is widely known and used in that form, and (b) the acronym does not commonly have more than one expansion. (Acronyms that can be used in JM³ titles include MEMS, MOEMS, UV, 2-D, 3-D, CMOS, LIGA, and DNA.) An example of a common acronym that should not be used in the title is CD, since though it is widely used for “critical dimension” it can also be used for “compact disk,” “circular dichroism,” and possibly other expansions. Acronyms should not be spelled out in the title—if you are going to spell it out, just leave the acronym off!

2. Standard abbreviations for measurement units and chemical names that are widely known can be used in the title, abstract, and body of the paper and do not need to be spelled out.
3. Always spell out the acronym the first time it is used in the body of the paper.
4. Avoid acronyms in the abstract unless the acronym is commonly understood and used multiple times in the abstract. If an acronym is used in the abstract, it must be spelled out (defined) in the abstract, and then spelled out again the first time it is used in the body of the paper.
5. Once an acronym has been defined in the body of the paper, don’t repeat the definition again. *Exception:* if an acronym is used and spelled out in a figure caption, it should also be defined the first time it is used in the body of the paper. Spelling out an acronym the first time it is used in a figure is useful for those readers who wish to scan the figures before deciding whether to read the full paper. In general, though, figures and their captions are better off without acronyms unless they are commonly understood.
6. Acronyms can be multilayered, but the need for common familiarity is even greater (for example, VHDL = VHSIC hardware description language, where VHSIC stands for very-high-speed integrated circuit).
7. Some acronyms are so commonly used that have become their own words (e.g., laser and sonar), and are listed in common dictionaries as words rather than abbreviations. These terms do not need to be spelled out.

Further, there are some rules about acronym use specific to JM³. In 2008, Burn Lin and the board of editors of JM³ developed a list of acronyms to help authors and improve consistency.² This list has been recently updated (<http://spie.org/Documents/Publications/jmmacronym.pdf>).

1. When using an acronym for a phrase found in the JM³ acronym list, the JM³ acronym must be used. For example, to use an acronym for alternating phase-shifting mask, the author must use AltPSM (and not APSM, A-PSM, AltPS mask, or other variations).
2. Acronyms found in the JM³ acronym list are not necessarily exclusive. Thus, “after strip inspection” can use the acronym ASI, but that doesn’t mean ASI can only stand for “after strip inspection.” ASI can be used for the Italian Space Agency, for example, or some other phrase. Note that some acronyms in the JM³ list already mention more than one expansion: BF is used for both “bright field” and “best focus.”

If the rules and guidelines above are followed, the use of an acronym will help rather than impede your reader's understanding. This, of course, should always be the goal.

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References

1. *Chicago Manual of Style*, 15th ed., p. 558, University of Chicago Press, Chicago (2003).
2. B. J. Lin, "Editorial: implementing JM³ acronyms," *J. Micro/Nanolith. MEMS MOEMS* 7(3), 030101 (2008).