

# Manuscript Preparation Guidelines and Template for the 7th World Conference on Photovoltaic Energy Conversion (Title in 18-point Times font)

William Shockley, Hans Queisser, and William R. Cherry (List authors on this line using 12 point Times font – use a second line if necessary)

Institute Name, City, State/Region, Mail/Zip Code, Country (authors' affiliation(s) listed here in 12 point Times font use a second line if necessary)

**Abstract** — An abstract in the two-column format is required for the manuscript. Use 9 point Times New Roman Bold font for the abstract. Set your line spacing to be 10 points rather than single space. Indent the first line by 0.125 inches and type the word “Abstract” in 9 point Times New Roman Bold Italic. This should be followed by two spaces, a long dash (option / shift / minus), two spaces, and then the first word of your abstract (as shown above). Please try to keep the length of your abstract to 100 words or less. Times font is an acceptable substitute for Times New Roman font.

**Index Terms** — amorphous materials, charge carrier lifetime, photovoltaic cells, silicon.

## I. INTRODUCTION

Please follow these instructions carefully. Papers not meeting these guidelines may be excluded from the conference proceedings. These instructions have been formatted in the manner in which you should prepare your manuscript; you may use this TeX document as a template. Please use this as an example. For details or clarification, please contact the Publications Chair at [Publications@ieee-pvsc.org](mailto:Publications@ieee-pvsc.org).

Please read through this entire template before you start using it to create your paper! This will save you and the PVSC considerable time. A contributor should remember that:

- 1) Deadlines to submit this paper is **May 21, 2018!**
- 2) Manuscripts must be submitted electronically to the conference website (<http://www.ieee-pvsc.org>). Manuscripts must be submitted in either Microsoft Word or PDF format. No hardcopy is required. If you submit a Microsoft Word document, it will be converted to PDF format. Be sure to download and view this PDF document to ensure proper conversion.
- 3) If the manuscript is not submitted by the **May 21, 2018!** deadline, presentation and publication will not be permitted. In addition, no manuscript will be published without presentation at the conference. PVSC FOLLOWS A STRICT NO PAPER-NO PODIUM AND NO PODIUM-NO PAPER RULE. Should you have any difficulty with the electronic submission process, please contact SPLTrak at [help@SPLTrak.com](mailto:help@SPLTrak.com).
- 4) Oral and poster papers are limited to **six (6) pages**

(including all figures) and 1 MB file size; plenary and invited papers are also limited to **six (6) pages (including all figures) and 1 MB file size**. Manuscripts exceeding page limits will be truncated at the limit. **If authors wish to retain extra pages in a manuscript, a charge of \$500 per page, payable at the on-site registration desk, must be paid.** Note that it is helpful to compress all figures and graphics to reduce the file size. This can be done by converting all graphics to jpg image file format. If using Word, use the Compress function under Format Picture.

5) You should employ this format. This document is being made available as a template for your convenience. If you elect not to use this template, please remember that you must still adhere to the general guidelines embodied in this document concerning, but not limited to, font size, margin size, page limits, file size, etc.

## II. DETAILED TEXT FORMATTING

Use a two column format. All paragraphs of text, including the abstract, figure captions, and references, should be justified at the left and the right edges.

Please do not include page numbers, headers or footers. Company logos should not be inserted into a header or footer. **YOUR MANUSCRIPT WILL BE REJECTED IF THERE ARE PAGE NUMBERS, HEADERS OR FOOTERS.** This is to allow IEEE to add their official footer information and allow for IEEE to determine page numbering if appropriate.

For the Title, use 18-point Times (Roman) font. Its paragraph description should be set so that the line spacing is single with 6-point spacing before and 6-point spacing after. The font description for the Author List and Authors' Affiliation(s) should be 12-point Times. The paragraph descriptions should be set so that the line spacing is single with 6-point spacings before and after. Use an additional line spacing of 12 points before the beginning of the double column section, as shown above.

Using 8.5 x 11-inch paper, the top margin is 0.75 inch, the bottom margin is 1 inch, and the left and right margins are

TABLE 1  
SUMMARY OF TYPOGRAPHICAL SETTINGS

Section	Font Specifics (Times Roman unless specified)			Paragraph Description				
	style	size	special	line	spacing (in points) before after		alignment	indent (in inches)
Title	plain	18	none	single	6	6	centered	none
Author List	plain	12	none	single	6	6	centered	none
Affiliations	plain	12	none	single	6	6	centered	none
Abstract	bold	9	none	exactly 10	0	0	justified	0.125 1 <sup>st</sup> line
Headings	plain	10	small caps	exactly 12	18	6	centered	none
Subheadings	italic	10	none	exactly 12	6	6	left	none
Body Paragraphs	plain	10	none	exactly 12	0	0	justified	0.125 1 <sup>st</sup> line
Equations	Symbol font for special characters			single	6	6	centered	none
Figures	8 to 10 point sans serif (Helvetica)			single	0	0	centered	none
Figure Captions	plain	9	none	10	0	0	justified	none, tab at 0.5
References	plain	9	none	10	0	0	justified	0.25 hanging

0.625 inch. Except for Title, Authors and Affiliations, use a double column format. The column width is 3.5 inches and the column spacing is 0.25 inch.

Each major section begins with a Heading in 10 point Times font centered within the column and numbered using Roman numerals (except for ACKNOWLEDGMENT and REFERENCES), followed by a period, a single space, and the title using an initial capital letter for each word. The remaining letters are in SMALL CAPITALS. The paragraph description of the section heading line should be set for 18 points before, 6 points after, and the line spacing should be set to exactly 12 points.

For the body of your paper, use 10-point Times font and set your line spacing at “exactly 12 points” with 0 points before and after. Indent each paragraph by 0.125 inches.

Further details are provided in the remainder of this paper for specific situations.

#### A. Major Subsections

As shown, denote subsections with left justified 10-point Times Italic. Order them with capitalized alphabetic characters (*A, B, ...*). Follow the letter designation with a period, a single space, and then the subsection title capitalizing the first letter of each word. The paragraph description of the subsection heading is set to “exactly 12-point” line spacing with 6 points before and after.

#### B. Equations

Equations should be centered in the column and numbered sequentially. Place the equation number to the right of the equation within a parenthesis, with right justification within its column. An example would be

$$V_{OC} = \frac{1}{\beta} \ln \left( \frac{I_L}{I_S} + 1 \right) \quad (1)$$

*Make sure that any subscripts in your equations are legible and are not too small to read!* When referring to an equation, use the number within parenthesis. For example, you would usually refer to the first equation as (1) rather than equation (1). If possible, use the Symbol font for all special characters. The paragraph description of the line containing the equation should be set for 6 points before and 6 points

after. The paragraph spacing will need to be set to “single” rather than “exactly 12 point” so that the height will autoscale to fit the equation.

### III. FIGURES AND TABLES

The use of color in figures and photos is recommended. Keep in mind that the proceedings will only be produced in electronic format (DVD). There will not be a hardbound version of the proceedings. Please consider the use of different line styles (dashes, dots, etc.) in plots to ensure clarity. See example. Please use jpg or png format for all images and compress the size.

Most of the following applies to Microsoft Word. Figures should utilize as much of the column width as possible in order to maximize legibility. Use a sans serif font, such as Helvetica. Helvetica is larger and much easier to read than Times. Using 8- to 10-point Helvetica usually results in a legible figure. *Do not use any font smaller than 8-point!* It must be legible. When referring to a figure, use the abbreviation Fig. followed by its number. Place figure captions directly below each figure. Use 9-point Times with the paragraph spacing set at “exactly 10 points.” Set a tab at 0.5 inch. Type “Fig. #.” (# is the numeral) then tab over to the 0.5 inch mark before beginning the text of the figure caption. Note that figure captions are always (left and right) justified, rather than centered, even if they are less than a single full line in length. See the caption for Fig. 1.

Within L<sup>A</sup>T<sub>E</sub>X, there is basically only one option for placing figures within your paper. Often the easiest way is to insert them into the top of the next column. Do not lump all figures at the end of the paper! If you have difficulties with the titles on your figures, you can always elect to add in the titles as separate text boxes, rather than importing the titles with the graph. This is sometimes helpful in getting a lengthy vertically-oriented title to display correctly.

Notice that prior to the graph, a single 12-point line is used to separate the preceding text from the graph. The equivalent of a blank line should exist between the bottom of the graph (the x-axis caption) and the figure caption. (In this particular case, there was no need to add a blank line between the x-axis label and the figure caption, because there was already

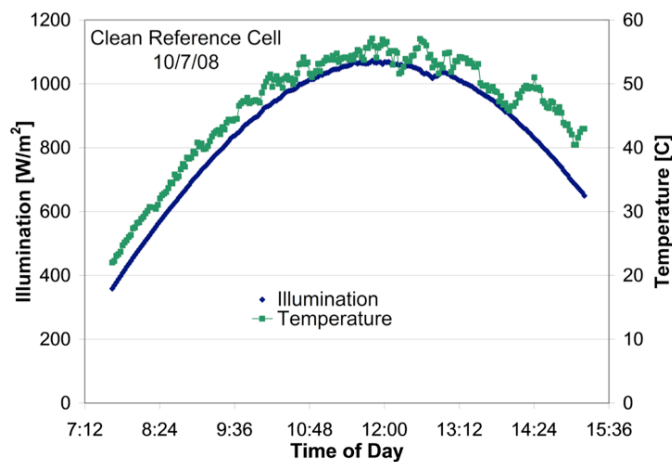


Fig. 1. Example of readable plot using different colors and line styles for clarity.

adequate spacing provided by the image border.) After the figure caption, there should be a single 12-point blank line before the text resumes. If you decide to use color traces in your graphical data, be absolutely certain that there is no ambiguity about your graphical information when printed on a B&W printer.

Table I on the second page was inserted using “Insert”, “Text Box”, creating the text contained in Table I, and then formatting the text box using all the settings available under “Format”, “Text Box...”. Table I also serves as an illustration of one of the rare instances when the double column format requirement can be violated. Certain figures and tables will require the full-page width to display. It is usually best to place these figures and tables at the top, rather than in the middle or bottom of a page. Tables should be entered within a single column if this can be done cleanly, without the entry becoming too crowded.

#### IV. CITING PREVIOUS WORK

When referencing a journal article [1], a conference digest article [2] or a book [3], place the reference numbers within square brackets. To simultaneously cite these references [1] - [3] use the format just demonstrated. The reference list is the last section and references are listed in the order cited. Use 9 point Times. The paragraph description is set for a line spacing of exactly 10 points with 0 point spacing before and after. A 0.25 inch hanging indentation should be specified.

Generally speaking, references should be very detailed. For journal articles, list all authors by initials and last name, the title of the paper in quotations (capitalizing only the first letter of the first word, unless it would be capitalized in a sentence, e.g., a proper noun), the journal name in italics, the volume number, the issue number, the page numbers, and the date. Use the examples provided [1] - [3] as a guide.

#### V. COPYRIGHT AND REPRINT INFORMATION

The IEEE copyright form will be electronically submitted for this conference. On the conference web site, follow the link in the manuscript submission area.

Reprints may be ordered by checking the appropriate box on the conference registration form. The reprints will be mailed to you at the address listed on the registration form approximately 3 months after the conference.

#### VI. CONCLUSION

Following these instructions will improve the quality of your paper and the PVSC Proceedings. If you have comments, please contact Publications@ieee-pvsc.org. Please direct questions regarding the electronic submission process to help@SPLTrak.com.

#### ACKNOWLEDGMENT

The organizers have fully implemented an electronic abstract and manuscript submission process to make your participation simpler while improving timeliness and quality of the conference products. Each author plays an important role in the overall quality of the Proceedings for this Conference. I am sure you will take the time and effort to make your submission a quality one, and will comply with the instructions included here. Thank you in advance for your attention to manuscript details and for helping make this a successful conference.

#### REFERENCES

- [1] M. Yamaguchi, A. Khan, S.J. Taylor, M. Imaizumi, T. Hisamatsu, and S. Matsuda, “A detailed model to improve the radiation-resistance of Si space solar cells,” *Fundamentals of Solar Cells* vol. 46, pp. 2133-2138, 1999.
- [2] H. J. Hovel and J. M. Woodall, “The effect of depletion region recombination currents on the efficiencies of Si and GaAs solar cells”, in *10th IEEE Photovoltaic Specialist Conference*, p. 25, 1973.
- [3] A. L. Fahrenbruch and R. H. Bube, *Fundamentals of Solar Cells*, New York: Academic Press, 1983.