

1 SPIE journal papers: sample manuscript showing style and 2 formatting specifications

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5 ^bCompany Name, Street Address, City, Country

6 **Abstract.** This document shows the required format and appearance of a manuscript prepared for SPIE journals. It is
7 prepared using LaTeX2e with the class file `spieman.cls`. Please note that the following journals require the use of
8 structured abstracts in manuscript submissions: *Biophotonics Discovery*, *Neurophotonics*, *Journal of Biomedical Op-*
9 *tics*, and *Journal of Medical Imaging*. Structured abstracts are encouraged for the *Journal of Micro/Nanolithography*,
10 *MEMS*, and *MOEMS*. Guidelines are available on the journal website. Whether structured or single-paragraph, the
11 abstract should be a summary of the paper and not an introduction. Because the abstract may be used in abstracting
12 and indexing databases, it should be self-contained (i.e., no numerical references) and substantive in nature, present-
13 ing concisely the objectives, methodology used, results obtained, and their significance. A list of up to six keywords
14 should immediately follow.

15 **Keywords:** optics, photonics, light, lasers, journal manuscripts, LaTeX template.

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17 1 Introduction

18 This document shows the format and appearance of a manuscript prepared for submission to SPIE
19 journals. Note that this template is only intended to be used as a guideline for author convenience.
20 It is designed for optimum clarity and ease of reading for editors and reviewers, but the template
21 does not reflect the final page layout of a published journal paper. Accepted papers are profession-
22 ally typeset in XML according to the layout and design of the journal.

23 1.1 Use of This Document

24 This document is prepared using LaTeX2e^{1,2} with the class file `spieman.cls`. The LaTeX
25 source file used to create this document is `article.tex`, which contains important formatting
26 information embedded in it. Authors may use it as a template to create their own manuscript. While
27 LaTeX properly handles most formatting issues, the author may occasionally need to intervene to
28 obtain a satisfactorily formatted manuscript.

29 *1.2 English*

30 Authors are strongly encouraged to follow the principles of sound technical writing, as found in
31 Refs. 3 and 4, for example. In addition, good English usage is essential. A spell-checker can
32 be helpful to discover misspelled words, but authors should also proofread their papers carefully
33 prior to submission. Manuscripts that do not meet acceptable English standards or lack clarity
34 may be rejected. For authors who want help improving language and grammar, AI tools, such as
35 Grammarly or PaperPal, offer a low-cost editing option. Alternatively, you may wish to have your
36 manuscript professionally edited prior to submission by Editage, our recommended independent
37 editorial service: <https://www.editage.com/spie/>. SPIE authors will receive a 15% discount off
38 their services. Use of Large Language Models (LLMs) and other AI tools to clean up language
39 and grammar must be disclosed in the Acknowledgments section.

40 *1.3 Page Setup and Fonts*

41 All text and figures, including footnotes, must fit inside a text area 6.5 in. wide by 9 in. high (16.51
42 by 22.86 cm). Manuscripts must be formatted for US letter paper, on which the margins should be
43 1 in. (2.54 cm) on the top, 1 in. on the bottom, and 1 in. on the left and right.

44 The Times New Roman font is used throughout the manuscript, in the sizes and styles shown
45 in Table 1. If this font is not available, use a similar serif font. The manuscript should not contain
46 headers or footers. Pages should be numbered.

47 **2 Parts of Manuscript**

48 This section describes the normal structure of a manuscript and how each part should be handled.
49 The appropriate vertical spacing between various parts of this document is achieved in LaTeX

Table 1 Fonts sizes and styles.

Document entity	Brief description
Article title	16 pt., bold, left justified
Author names	12 pt., bold, left justified
Author affiliations	10 pt., left justified
Abstract	10 pt.
Keywords	10 pt.
Section heading	12 pt., bold, left justified
Subsection heading	12 pt., italic, left justified
Sub-subsection heading	11 pt., italic, left justified
Normal text	12 pt.
Figure and table captions	10 pt.

50 through the proper use of defined constructs, such as `\section{}`.

51 *2.1 Title and Author Information*

52 The article title appears left justified at the top of the first page. The title font is 16 pt., bold. The
53 rules for capitalizing the title are the same as for sentences; only the first word, proper nouns,
54 and acronyms should be capitalized. Do not begin titles with articles (for example, a, an, the)
55 or prepositions (for example, on, by, etc.). The word “novel” should not appear in the title, as
56 publication will imply novelty. Avoid the use of acronyms in the title, unless they are widely
57 understood.

58 The list of authors immediately follows the title, 18 points below. The font is 12 pt., bold
59 and the author names are left justified. The author affiliations and addresses follow the names, in
60 10-pt., normal font and left justified. For multiple affiliations, each affiliation should appear on a
61 separate line. Superscript letters (a, b, c, etc.) should be used to associate multiple authors with
62 their respective affiliations. The corresponding author should be identified with an asterisk, and

63 that person's email address should be provided below the keywords.

64 2.2 *Abstract*

65 The abstract should be a summary of the paper and not an introduction. Because the abstract
66 may be used in abstracting journals, it should be self-contained (i.e., no numerical references)
67 and substantive in nature, presenting concisely the objectives, methodology used, results obtained,
68 and their significance. Please note that the following journals require the use of structured ab-
69 stracts in manuscript submissions: *Biophotonics Discovery*, *Neurophotonics*, *Journal of Biomed-*
70 *ical Optics*, and *Journal of Medical Imaging*. Structured abstracts are encouraged for the *Journal*
71 *of Micro/Nanolithography*, *MEMS*, and *MOEMS*. Helpful guidelines for structured abstracts are
72 available on the website of the journal.

73 2.3 *Subject terms/Keywords*

74 Keywords are required. Please provide 3-6 keywords related to your paper.

75 2.4 *Body of Paper*

76 The body of the paper consists of numbered sections that present the main findings. These sections
77 should be organized to best present the material. Standard parts of a research paper: Introduction,
78 Materials and Methods, Results, Discussion, and Conclusion.

79 To provide transition elements in your paper, it is important to refer back (or forward) to specific
80 sections. Such references are made by indicating the section number, for example, "In Sec. 2 we
81 showed..." or "Section 2.1 contained a description..." If the word Section, Reference, Equation, or
82 Figure starts a sentence, it is spelled out. When occurring in the middle of a sentence, these words
83 are abbreviated Sec., Ref., Eq., and Fig.

84 At the first occurrence of an acronym, spell it out followed by the acronym in parentheses, for
85 example, charge-coupled diode (CCD).

86 2.5 Footnotes

87 Textual footnotes should be used rarely to present important documentary or explanatory material
88 whose inclusion in the text would be distracting.¹ Due to problems with HTML display, use of
89 footnotes should generally be avoided. If absolutely necessary, the footnote mark must come at the
90 end of a sentence. To insert a footnote, use the `\footnote{ }` command.

91 2.6 Appendices

92 Brief appendices may be included when necessary, such as derivations of equations, proofs of the-
93 orems, and details of algorithms. Equations and figures appearing in appendices should continue
94 sequential numbering from earlier in the paper.

95 2.7 Disclosures

96 Use of Large Language Models (LLMs) and other AI tools must be disclosed along with all other
97 tools used in the study. The disclosure should describe which AI tool was used and how it was used.
98 AI tools used in such methodologies as data collection and figure creation should be disclosed in
99 the Materials and Methods section or a similar section of the paper.

100 Conflicts of interest should be declared under a separate header, above Acknowledgments.
101 Conflicts of interest include relationships, affiliations, and financial interests pertinent to the re-
102 search presented in a manuscript. Potential conflicts of interest may include employment, owner-
103 ship of stock or stock options, patents, honoraria, grants, royalties, consultancies, donations, and

¹Example of a footnote.

104 other types of funding. Even the appearance of a conflict can constitute a breach of ethical publish-
105 ing, and therefore situations and activities that may be perceived as conflicts should be reported.
106 Conflict of interest disclosures should cover the past three years. For assistance generating a dis-
107 closure statement, see the form available from the International Committee of Medical Journal
108 Editors website: <http://www.icmje.org/conflicts-of-interest/>

109 If no conflicts of interest exist, a statement confirming “The authors declare that there are no
110 financial interests, commercial affiliations, or other potential conflicts of interest that could have
111 influenced the objectivity of this research or the writing of this paper” is included in a Disclosures
112 section of the manuscript.

113 *2.8 Code, Data, and Materials Availability*

114 In support of open scientific exchange, SPIE journals require Data and Code Availability State-
115 ments in all accepted papers. This requirement went into effect on 1 May 2023. These statements
116 should describe how to access any data that would be required to replicate or interpret the findings
117 reported in the paper.

118 *2.9 Acknowledgments*

119 Acknowledgments and funding information should be added after the conclusion, and before refer-
120 ences. The acknowledgments section does not have a section number. Include grant numbers and
121 the full name of the funding body. Use of large language models and other AI tools for language
122 and grammar clean-up should also be disclosed here.

123 2.10 References

124 The References section lists books, articles, and reports that are cited in the paper. This section
125 does not have a section number. The references are numbered in the order in which they are cited.
126 Examples of the format to be followed are given at the end of this document.

127 The reference list at the end of this document is created using BibTeX, which looks through
128 the file `report.bib` for the entries cited in the LaTeX source file. The format of the reference
129 list is determined by the bibliography style file `spiejour.bst`, as specified in the
130 `\bibliographystyle{spiejour}` command. Alternatively, the references may be directly
131 formatted in the LaTeX source file.

132 For books¹⁻³ the listing includes the list of authors (initials plus last name), book title (in italics),
133 page or chapter numbers, publisher, city, and year of publication. Journal-article references^{5,6}
134 include the author list, title of the article (in quotes), journal name (in italics, properly abbreviated),
135 volume number (in bold), inclusive page numbers or citation identifier, and year. A reference to
136 a proceedings paper or a chapter in an edited book⁷ includes the author list, title of the article
137 (in quotes), conference name (in italics), editors (if appropriate), volume title (in italics), volume
138 number if applicable (in bold), inclusive page numbers, publisher, city, and year. References to an
139 article in the SPIE Proceedings may include the conference name, as shown in Ref. 8.

140 The references are numbered in the order of their first citation. Citations to the references are
141 made using superscripts, as demonstrated in the preceding paragraph. One may also directly refer
142 to a reference within the text, for example, “as shown in Ref. 5 ...” Two or more references should
143 be separated by a comma with no space between them. Multiple sequential references should be
144 displayed with a dash between the first and last numbers.¹⁻⁵

145 2.10.1 Reference linking and DOIs

146 A Digital Object Identifier (DOI) is a unique alphanumeric string assigned to a digital object, such
147 as a journal article or a book chapter, that provides a persistent link to its location on the internet.
148 The use of DOIs allows readers to easily access cited articles. Authors should include the DOI
149 at the end of each reference in brackets if a DOI is available. See examples at the end of this
150 manuscript. A free DOI lookup service is available from CrossRef at
151 <http://www.crossref.org/freeTextQuery/>. The inclusion of DOIs will facilitate reference linking
152 and is highly recommended.

153 In the present LaTeX template, the author needs to add the DOI reference by including it in a
154 “note” in the bibliography file, as shown in the file `report.bib`, for example,
155 `note = "[doi:10.1117/12.154577]".` The DOI may be used by the reader to locate that
156 document with the link: `http://dx.doi.org10.1117/12.154577.`

157 2.11 Biographies

158 A brief professional biography of approximately 75 words may be provided for each author, if
159 available. Biographies should be placed at the end of the paper, after the references. Personal
160 information such as hobbies or birthplace/birthdate should not be included. Author photographs
161 are not published.

162 3 Section Formatting

163 In LaTeX, a new section is created with the `\section{}` command, which automatically num-
164 bers the sections. Sections will be numbered sequentially, starting with the first section after the

165 abstract, except for the acknowledgments and references. (Note that numbering of section head-
166 ings is not required, but the numbering must be consistent if used.) All section headings should be
167 left justified.

168 Main section headings are in 12-pt. bold font, left-justified and in title case, where important
169 words are capitalized.

170 Paragraphs that immediately follow a section heading are leading paragraphs and should not
171 be indented, according to standard publishing style. The same goes for leading paragraphs of
172 subsections and sub-subsections. Subsequent paragraphs are standard paragraphs, with 0.2-in (5
173 mm) indentation. There is no additional space between paragraphs. In LaTeX, paragraphs are
174 separated by blank lines in the source file. Indentation of the first line of a paragraph may be
175 avoided by starting it with `\noindent`.

176 *3.1 Subsection Headings*

177 All important words in a subsection (level 1) header are capitalized. Subsection numbers consist of
178 the section number, followed by a period, and the subsection number within that section, without
179 a period at the end. The heading is left justified and its font is 12 pt. italic.

180 *3.1.1 Sub-subsection headings*

181 The first word of a sub-subsection is capitalized. The rest of the text is not capitalized, except for
182 proper names and acronyms (the latter should only be used if well known). The heading is left
183 justified and its font is 11 pt. italic.

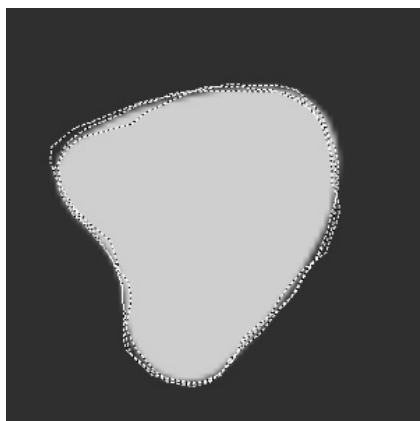


Fig 1 Example of a figure caption.

184 **4 Figures and Tables**

185 *4.1 Figures*

186 Figures are numbered in the order in which they are called out in the text. They should appear in
187 the document in numerical order and as close as possible to their first reference in the text. It may
188 be necessary to move figures or tables around to enhance readability. LaTeX will attempt to place
189 figures at the top or bottom of a page in which they are first referenced.

190 Figures, along with their captions, should be separated from the main text by 0.2 in. or 5 mm
191 and centered. Figure captions are centered below the figure or graph. Figure captions start with the
192 abbreviation “Fig” in front of the figure number, followed by a period, and the text in 10-pt. font.
193 See Fig. 1 for an example.

194 Authors may wish to create figures consisting of two or more images, in which case, they
195 should be neatly arranged in a rectangular array. In no case, should the article’s text be wrapped
196 around a figure. Figure 2 shows two side-by-side images. When a figure contains more than one
197 image, the author must submit them as a single image file. Further details about figure formatting
198 can be found in the author guidelines for each specific SPIE journal:

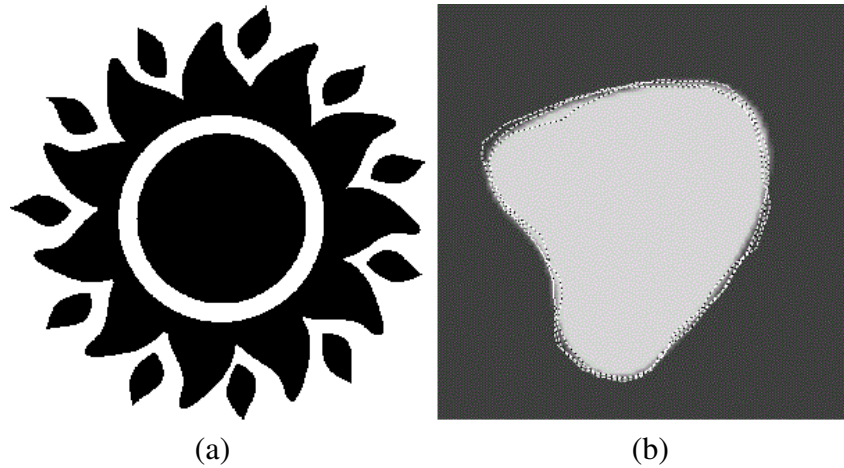


Fig 2 Example of a figure containing multiple images: (a) sun and (b) blob. Figures containing multiple images must be submitted to SPIE as a single image file.

199 <https://www.spiedigitallibrary.org/journals/journal-authors>.

200 4.2 Tables

201 Tables are numbered in the order in which they are referenced. They should appear in the document
202 in numerical order and as close as possible to their first reference in the text. It is preferable to have
203 tables appear at the top or bottom of the page, if possible. Table captions are handled identically
204 to those for figures, except that they appear above the table. See Table 1 for an example.

205 4.3 Video

206 Acceptable file formats, including MOV (.mov), MPEG (.mpg), and MP4 (.mp4), are playable us-
207 ing standard media players, such as VLC or Windows Media Player. The recommended maximum
208 size for each video file is 10-12 MB. Authors may insert a representative still image from the video
209 file in the manuscript as a figure. The caption label will be linked by the publisher to the actual
210 video file. The video may also be mentioned in an existing figure caption. Multimedia files are
211 treated in the same manner as figures and they will be numbered sequentially with normal figures.

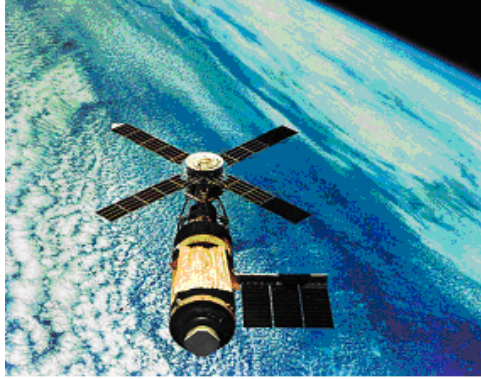


Fig 3 This satellite is a still image from Video 1 (Video 1, MPEG, 2.5 MB).

212 The video number, file type, and file size should be included in parentheses at the end of the figure
213 caption. See Figure 3 for an example.

214 **Appendix A: Miscellaneous Formatting Details**

215 At times it may be desired, for formatting reasons, to break a line without starting a new paragraph.

216 In a LaTeX source file, a linebreak is created with `\\`.

217 *A.1 Formatting Equations*

218 Equations may appear inline with the text, if they are simple, short, and not of major importance;

219 for example, $\beta = b/r$. Important equations appear on their own line. Such equations are centered.

220 For example, “The expression for the field of view is

$$2a = \frac{(b + 1)}{3c}, \quad (1)$$

221 where a is the ...” Principal equations are numbered, with the equation number placed within
222 parentheses and right justified.

223 Equations are considered to be part of a sentence and should be punctuated accordingly. In the

224 above example, a comma appears after the equation because the next line is a subordinate clause. If
225 the equation ends the sentence, a period should follow the equation. The line following an equation
226 should not be indented unless it is meant to start a new paragraph. Indentation after an equation is
227 avoided in LaTeX by not leaving a blank line between the equation and the subsequent text.

228 References to equations include the equation number in parentheses, for example, “Equa-
229 tion (1) shows ...” or “Combining Eqs. (2) and (3), we obtain...” Note that the word “Equation” is
230 spelled out if it begins a sentence, but is abbreviated as “Eq.” otherwise. Using a tilde in the LaTeX
231 source file between two characters avoids unwanted line breaks, for example between “Eq.” and
232 the following equation number..

233 *A.2 Formatting Theorems*

234 To include theorems in a formal way, the theorem identification should appear in a 10-point, bold
235 font, left justified, and followed by a period. The text of the theorem continues on the same line in
236 normal, 10-pt. font, achieved in LaTeX using `\footnotesize`. For example,

237 **Theorem 1.** For any unbiased estimator...

238 *Disclosures*

239 Conflicts of interest include relationships, affiliations, and financial interests pertinent to the re-
240 search presented in a manuscript. Potential conflicts of interest may include employment, owner-
241 ship of stock or stock options, patents, honoraria, grants, royalties, consultancies, donations, and
242 other types of funding. Even the appearance of a conflict can constitute a breach of ethical publish-
243 ing, and therefore situations and activities that may be perceived as conflicts should be reported.

244 Conflict of interest disclosures should cover the past three years.

245 If no conflicts of interest exist, a statement confirming “The authors declare that there are no
246 financial interests, commercial affiliations, or other potential conflicts of interest that could have
247 influenced the objectivity of this research or the writing of this paper” is included in a Disclosures
248 section of the manuscript.

249 *Code, Data, and Materials Availability*

250 In support of open scientific exchange, SPIE journals require Code, Data, and Materials Availabil-
251 ity Statements in all accepted papers. This requirement went into effect on 1 May 2023. These
252 statements should describe how to access any data that would be required to replicate or interpret
253 the findings reported in the paper. Authors are encouraged to make the data and code related to
254 the manuscript publicly available whenever possible, and utilize repositories that are well-known
255 to the field (FigShare, Github, CodeOcean, etc.). If the data or code cannot be made publicly
256 available, the authors should state the reason and explain how it can be obtained. Likewise, if
257 data sharing is not applicable, the statement must say so. Example statements may be found in the
258 Author Guidelines for the journal.

259 *Acknowledgments*

260 This unnumbered section is used to identify those who have aided the authors in understanding or
261 accomplishing the work presented and to acknowledge sources of funding. Use of large language
262 models and other AI tools for language and grammar clean-up should be disclosed here.

263 *References*

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281 **First Author** is an assistant professor at the University of Optical Engineering. He received his BS
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283 PhD degree in optics from the Institute of Technology in 1991. He is the author of more than 50
284 journal papers and has written three book chapters. His current research interests include optical
285 interconnects, holography, and optoelectronic systems. He is a member of SPIE.

286 Biographies and photographs of the other authors are not available.

287 **List of Figures**

- 288 1 Example of a figure caption.
- 289 2 Example of a figure containing multiple images: (a) sun and (b) blob. Figures
290 containing multiple images must be submitted to SPIE as a single image file.
- 291 3 This satellite is a still image from Video 1 (Video 1, MPEG, 2.5 MB).

292 **List of Tables**

- 293 1 Fonts sizes and styles.