



TABLE OF CONTENTS

●	Description	p.1
●	Audience	p.2
●	Impact Factor	p.2
●	Abstracting and Indexing	p.2
●	Editorial Board	p.3
●	Guide for Authors	p.5



ISSN: 0009-2509

DESCRIPTION

Chemical Engineering Science publishes papers on the fundamentals of **chemical engineering**, including the development of chemical engineering knowledge and process into and from other disciplines including biology, chemistry, physics, and applied mathematics. We welcome manuscripts describing original research, with significant results based on experiments and/or developments in theory. Such results may be the outcome of studies that range from the molecular level to the plant level. Increasingly, published research addresses and impacts global issues. We also will consider critical reviews of cutting-edge developments, and prospective authors are encouraged to contact an Executive Editor prior to [submission](#).

Industrial areas covered by the journal include **biotechnology, chemicals, energy, food, materials, microelectronics, nanotechnology, specialty chemicals** and **pharmaceuticals**.

The journal classifies research into the following main fields within chemical engineering:

Biomolecular and biological engineering - the chemical engineering of molecular and cellular products or systems, including through the use of modern tools such as protein and enzyme engineering and directed evolution; all fields at the intersection of chemical engineering and biology, including systems biotechnology, tissue engineering, drug and therapeutic delivery and bioassay development;

Biochemical and bioprocess engineering - the chemical engineering of (bio-)processes where biology or biochemical approaches are used to effect a transformation of material including, but not limited to, studies in waste treatment, bioreaction engineering, high-throughput process development, molecular simulation of process performance, downstream processing and bioreactor modeling;

Energy, water, environment, and sustainability - chemical energy generation, conversion, storage, distribution and utilisation; water quality, water treatment and water analysis; green processes, waste minimization, environmental remediation and environmental impact;

Materials engineering - chemical engineering of materials synthesis, characterization, design and scale up of nanomaterials synthesis, multiphase phenomena, reverse materials engineering (i.e. process-informed definition of materials properties); materials including particles, thin films, membranes, multifunctional materials, hierarchical porous structures etc.; synthesis methods

including chemical vapor deposition, atomic layer deposition, hydrothermal synthesis, colloidal synthesis, etc; nucleation and growth mechanisms and control for nanomaterials;

Particle technology - the chemical engineering of particulate systems, including studies on the fundamental phenomena of nucleation, growth, breakage, and aggregation; modeling of particle population dynamics; fluid dynamics of particulate systems in chemical processes; all process steps to manipulate the properties of particulate systems;

Process systems engineering - simulation, analysis, synthesis, optimization, and control of (bio-)chemical production systems based on mathematical modeling approaches; advanced modeling strategies for all process levels (molecular level, phase level, process unit level, plant level); advanced methods for model parameter identification and design of experiments;

Reaction engineering and catalysis - simulation and experiments on reaction kinetics, catalyst synthesis and characterization, reactor design, process intensification, multifunctional reactors, microreactors, multiphase reactors, molecular and quantum scale phenomena, density functional theory, multiscale modeling, transport phenomena related to multiphase reactors;

Separations science and technology - general principles: phase equilibria, mass transfer, mixing and phase segregation; processes and unit operations: distillation, absorption, liquid-liquid extraction, membrane processes, adsorption separation processes, ion-exchange, preparative chromatography, crystallization and precipitation, supercritical fluid separation processes, biochemical separation processes; equipment design.

Submissions from other fields of chemical engineering, and from other areas within the fields above, are welcome. Papers are assessed only with regard to quality and their potential for fundamental and generic contribution to chemical engineering.

For a list of Journal keywords, please click [here](#).

AUDIENCE

Industrial and academic researchers in chemical and process engineering.

IMPACT FACTOR

2013: 2.613 © Thomson Reuters Journal Citation Reports 2014

ABSTRACTING AND INDEXING

Aqualine Abstracts
BIOSIS
Chemical Abstracts
Chemical Engineering Abstracts
Current Biotechnology Abstracts
Current Contents ASCA/Engineering Technology & Applied Science/Science Citation Index/SCISEARCH Data
Current Technology Index
FLUIDEX
INSPEC
PASCAL/CNRS
Petroleum Abstracts
TCEA
Ei Compendex
Scopus

EDITORIAL BOARD

Editor-in-Chief:

A.P.J. Middelberg, Australian Inst. for Bioengineering and Nanotechnology, University of Queensland, Brisbane, Queensland, Australia, Fax: +61-7-3346 3973

Executive Editors:

A.G. Dixon, Dept. of Chemical Engineering, Worcester Polytechnic Institute, 100 Institute Road, Worcester, MA 01609-2280, Massachusetts, USA

M. Mazzotti, Separation Processes Lab., Institute of Process Engineering, ETH Zurich, ML G27, Sonneggstrasse 3, CH-8092, Zurich, Switzerland, Fax: +41-44-6321141

S. Nair, School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, 311 Ferst Drive NW, Atlanta, GA 30332-0100, Georgia, USA, Fax: 404 894 4200

K. Sundmacher, Max Planck Institut (MPI) für Dynamik komplexer technischer Systeme, Sandtorstr 22, 39106, Magdeburg, Germany, Fax: +49 391 6110 353

C.H. Wang, Dept. of Chemical and Biomolecular Engineering, National University of Singapore, 4 Engineering Drive 4, 117576, Singapore, Fax: (+65) 6779-1936

Associate Editorial Board:

C. Adjiman, Dept. of Chemical Engineering, Fac. of Engineering, Imperial College London, South Kensington Campus, London, SW7 2AZ, UK

Mark J. Biggs, School of Chemical Engineering, University of Adelaide, Sch. of Chemical Engineering Uni.of Adelaide, Adelaide, 5005, South Australia, Australia, Fax: +61-8-8303-4373

H. Briesen, Chair for Process Systems Engineering, Center for Life and Food Sciences Weihenstephan, Technische Universität München, Weihenstephaner Steig 23, 85350, Freising, Germany, Fax: +49 8161 714510

P. Dauenhauer, Dept of Chemical Engineering, University of Minnesota, 421 Washington Ave. SE, Minneapolis, 55455, Minnesota, USA

N.G. Deen, Dept. of Chemical Engineering, Multiphase Reactors Group, Technische Universiteit Eindhoven, PO Box 513, 5600 MB, Eindhoven, Netherlands, Fax: +31 40 247 5833

W. Ge, Inst. of Process Engineering (IPE), Chinese Academy of Sciences (CAS), 100190, Beijing, China

J.L. Gong, School of Chemical Engineering and Technology, Tianjin University, 92 Weijin Road, Nankai District, 300072, Tianjin, China

V. Kalra, Dept. of Chemical & Biological Engineering, Drexel University, 3141 Chestnut Street, Philadelphia, PA 19104, Pennsylvania, USA, Fax: 215-895-5837

S. Leong, Department of Chemical Engineering, Singapore Institute of Technology, Singapore, Fax: +65 6592 1190

A. Park, Department of Chemical Engineering, Department of Earth and Environmental Engineering, Columbia University, 500 W. 120th Street, New York, NY 10027 USA

M.S. Sakai, Resilience Engineering Research Center, School of Engineering, The University of Tokyo, 7-3-1, Hongo, Bunkyo-ku, 113-8656, Tokyo, Japan

Managing Editor:

R.P.S. Middelberg

International Advisory Panel

F.H. Arnold, Pasadena, California, USA

A.T. Bell, Berkeley, California, USA

B. Biscans, Toulouse, France

A. Bommarius, Atlanta, Georgia, USA

K. Carpenter, Singapore, Singapore

M.O. Coppens, London, England, UK

L. Gladden, Cambridge, UK

R.J. Gorte, Philadelphia, Pennsylvania, USA

Y. Kevrekidis, Princeton, New Jersey, USA

D.-J. Lee, Taipei, Taiwan, ROC

S.Y. Lee, Daejeon, South Korea

J. Li, Beijing, China

M.L. Lu, Brisbane, Queensland, Australia

W. Marquardt, Aachen, Germany

I.S. Metcalfe, Newcastle Upon Tyne, England, UK

F.J. Muzzio, Piscataway, New Jersey, USA

K.D.P. Nigam, Kanpur, India

R.W. Rousseau, Atlanta, Georgia, USA

S. Skogestad, Trondheim, Norway

D.N. Theodorou, Athens, Greece

M. Tirrell, Chicago, Illinois, USA

L.A.M. van der Wielen, Delft, Netherlands

R.T. Yang, Ann Arbor, Michigan, USA
W. Zimmerman, Sheffield, UK

GUIDE FOR AUTHORS

Your Paper Your Way

We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a 'correct format' for acceptance and provide the items required for the publication of your article.

To find out more, please visit the Preparation section below.

INTRODUCTION

Chemical Engineering Science publishes papers on the fundamentals of **chemical engineering**, including the development of chemical engineering knowledge and process into and from other disciplines including **biology, chemistry, physics, and applied mathematics**. We welcome manuscripts describing original research, with significant results based on experiments and/or developments in theory. Such results may be the outcome of studies that range from the **molecular level** to the **plant level**. Increasingly, published research addresses and impacts global issues. We also will consider critical reviews of cutting-edge developments, and prospective authors are encouraged to contact an Executive Editor prior to submission.

Industrial areas covered by the journal include **biotechnology, chemicals, energy, food, materials, microelectronics, nanotechnology, specialty chemicals** and **pharmaceuticals**.

The journal classifies research into the following main fields within chemical engineering:

biomolecular and biological engineering
biochemical and bioprocess engineering
energy, water, environment, and sustainability
materials engineering
particle technology
process systems engineering
reaction engineering and catalysis
separations science and technology

For a full description of each field of chemical engineering listed above, please visit the [Journal homepage](#)

Submissions from other fields of chemical engineering, and from other areas within the fields above, are welcome. Papers are assessed only with regard to quality and their potential for fundamental and generic contribution to chemical engineering.

Types of paper

Full Length Papers should be complete and authoritative accounts of work which have special significance, general interest and which are presented clearly and concisely.

Short Communications deal with new ideas and specific points rather than developing a theme, and should not exceed the equivalent of 2000 words including illustrations and tables.

Review Articles are considered by the full Executive team with input as necessary. Proposals for a review article should be sent to the Editor-in-Chief or an Executive Editor.

Letters to the Editors are of two kinds: (i) letters commenting on work published in this journal, and; (ii) letters reporting novel and particularly interesting concepts or giving advanced and timely results to be subsequently reported fully in a paper. Letters to the Editor should be sent to the Editor-in-Chief.

BEFORE YOU BEGIN

Ethics in publishing

For information on Ethics in publishing and Ethical guidelines for journal publication see <http://www.elsevier.com/publishingethics> and <http://www.elsevier.com/journal-authors/ethics>.

Policy and ethics

The work described in your article must have been carried out in accordance with *The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans* <http://www.wma.net/en/30publications/10policies/b3/index.html> and *EU Directive 2010/63/EU for animal experiments* http://ec.europa.eu/environment/chemicals/lab_animals/legislation_en.htm. This must be stated at an appropriate point in the article.

Conflict of interest

All authors are requested to disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence, or be perceived to influence, their work. See also <http://www.elsevier.com/conflictsofinterest>. Further information and an example of a Conflict of Interest form can be found at: http://help.elsevier.com/app/answers/detail/a_id/286/p/7923.

Submission declaration and verification

Submission of an article implies that the work described has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see <http://www.elsevier.com/postingpolicy>), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service CrossCheck <http://www.elsevier.com/editors/plagdetect>.

Contributors

Each author is required to declare his or her individual contribution to the article: all authors must have materially participated in the research and/or article preparation, so roles for all authors should be described. The statement that all authors have approved the final article should be true and included in the disclosure.

Changes to authorship

This policy concerns the addition, deletion, or rearrangement of author names in the authorship of accepted manuscripts:

Before the accepted manuscript is published in an online issue: Requests to add or remove an author, or to rearrange the author names, must be sent to the Journal Manager from the corresponding author of the accepted manuscript and must include: (a) the reason the name should be added or removed, or the author names rearranged and (b) written confirmation (e-mail, fax, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed. Requests that are not sent by the corresponding author will be forwarded by the Journal Manager to the corresponding author, who must follow the procedure as described above. Note that: (1) Journal Managers will inform the Journal Editors of any such requests and (2) publication of the accepted manuscript in an online issue is suspended until authorship has been agreed.

After the accepted manuscript is published in an online issue: Any requests to add, delete, or rearrange author names in an article published in an online issue will follow the same policies as noted above and result in a corrigendum.

Copyright

This journal offers authors a choice in publishing their research: Open access and Subscription.

For subscription articles

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (for more information on this and copyright, see <http://www.elsevier.com/copyright>). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations (please consult <http://www.elsevier.com/permissions>). If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases: please consult <http://www.elsevier.com/permissions>.

For open access articles

Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (for more information see <http://www.elsevier.com/OAauthoragreement>). Permitted reuse of open access articles is determined by the author's choice of user license (see <http://www.elsevier.com/openaccesslicenses>).

Retained author rights

As an author you (or your employer or institution) retain certain rights. For more information on author rights for:

Subscription articles please see <http://www.elsevier.com/journal-authors/author-rights-and-responsibilities>.
Open access articles please see <http://www.elsevier.com/OAauthoragreement>.

Role of the funding source

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

Funding body agreements and policies

Elsevier has established agreements and developed policies to allow authors whose articles appear in journals published by Elsevier, to comply with potential manuscript archiving requirements as specified as conditions of their grant awards. To learn more about existing agreements and policies please visit <http://www.elsevier.com/fundingbodies>.

Open access

This journal offers authors a choice in publishing their research:

Open access

- Articles are freely available to both subscribers and the wider public with permitted reuse
- An open access publication fee is payable by authors or their research funder

Subscription

- Articles are made available to subscribers as well as developing countries and patient groups through our access programs (<http://www.elsevier.com/access>)
- No open access publication fee

All articles published open access will be immediately and permanently free for everyone to read and download. Permitted reuse is defined by your choice of one of the following Creative Commons user licenses:

Creative Commons Attribution (CC BY): lets others distribute and copy the article, to create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), to include in a collective work (such as an anthology), to text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

Creative Commons Attribution-NonCommercial-ShareAlike (CC BY-NC-SA): for non-commercial purposes, lets others distribute and copy the article, to create extracts, abstracts and other revised versions, adaptations or derivative works of or from an article (such as a translation), to include in a collective work (such as an anthology), to text and data mine the article, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, do not modify the article in such a way as to damage the author's honor or reputation, and license their new adaptations or creations under identical terms (CC BY-NC-SA).

Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND): for non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

To provide open access, this journal has a publication fee which needs to be met by the authors or their research funders for each article published open access.

Your publication choice will have no effect on the peer review process or acceptance of submitted articles.

The open access publication fee for this journal is **\$3300**, excluding taxes. Learn more about Elsevier's pricing policy: <http://www.elsevier.com/openaccesspricing>.

Language (usage and editing services)

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's WebShop (<http://webshop.elsevier.com/languageediting/>) or visit our customer support site (<http://support.elsevier.com>) for more information.

Submission

Submission to this journal proceeds totally online. Use the following guidelines to prepare your article. Via the homepage of this journal (<http://www.ees.elsevier.com/ces/>) you will be guided stepwise through the creation and uploading of the various files. The system automatically converts source files to a single Adobe Acrobat PDF version of the article, which is used in the peer-review process. Please note that even though manuscript source files are converted to PDF at submission for the review process, these source files are needed for further processing after acceptance. All correspondence, including notification of the Editor's decision and requests for revision, takes place by e-mail and via the author's homepage, removing the need for a hard-copy paper trail.

We request that you select and submit your article to the appropriate *Research Field*: Biomolecular and Biological Engineering; Biochemical and Bioprocess Engineering; Energy, Water and Environment; Materials Engineering; Particle Technology; Process Systems Engineering; Reaction Engineering and Catalysis; Separations Science and Technology; and Other. CES will continue to publish high-quality scientific research from all Chemical Engineering fields; if your particular field is not listed explicitly, then please choose Other. Special Issues will continue to be denoted as such. If you experience any trouble submitting your manuscript, please contact [Elsevier Support](#).

Referees

All papers will be independently refereed. When submitting a paper authors are requested to suggest 6 international referees, supplying the **full name, full address and e-mail address** in each case. Authors may also suggest reviewers they do not want to review their manuscript, but the reasons for doing so should be stated. In either case, the final choice of referees will remain entirely with the Editor.

PREPARATION

NEW SUBMISSIONS

Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process.

As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or layout that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

References

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

Formatting requirements

There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions.

If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes.

Divide the article into clearly defined sections.

Figures and tables embedded in text

Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file.

REVISED SUBMISSIONS

Language

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Use decimal points (not commas); use a space for thousands (10 000 and above).

Authors for whom English is not their native language are encouraged to have their paper checked for grammar and clarity before submitting to ensure a high standard of written English. Papers written with a low standard of English may not be accepted for publication.

Use of word processing software

Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier: <http://www.elsevier.com/guidepublication>). See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

LaTeX

You are recommended to use the Elsevier article class *elsarticle.cls* (<http://www.ctan.org/tex-archive/macros/latex/contrib/elsarticle>) to prepare your manuscript and BibTeX (<http://www.bibtex.org>) to generate your bibliography.

For detailed submission instructions, templates and other information on LaTeX, see <http://www.elsevier.com/latex>.

Article structure

General formatting

Number all pages sequentially and add line numbers to facilitate review feedback. The text should be in single-column format and be double spaced to facilitate review.

Subdivision - numbered sections

Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods

Provide sufficient detail to allow the work to be reproduced. Methods already published should be indicated by a reference: only relevant modifications should be described.

Results

Results should be clear and concise.

Discussion

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information

- **Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
- **Author names and affiliations.** Where the family name may be ambiguous (e.g., a double name), please indicate this clearly. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
- **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication.
- **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Abstract

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Graphical abstract

Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. See <http://www.elsevier.com/graphicalabstracts> for examples.

Authors can make use of Elsevier's Illustration and Enhancement service to ensure the best presentation of their images and in accordance with all technical requirements: [Illustration Service](#).

Highlights

Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). See <http://www.elsevier.com/highlights> for examples.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using British or American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, "and", "of"). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Abbreviations

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

Acknowledgements

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Nomenclature and Units

Follow internationally accepted rules and conventions: use the international system of units (SI). If other quantities are mentioned, give their equivalent in SI. You are urged to consult the International Union of Pure and Applied Chemistry (IUPAC) <http://www.iupac.org/> for further information.

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Artwork

Electronic artwork

General points

- Make sure you use uniform lettering and sizing of your original artwork.
 - Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
 - Number the illustrations according to their sequence in the text.
 - Use a logical naming convention for your artwork files.
 - Indicate per figure if it is a single, 1.5 or 2-column fitting image.
 - For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
 - Please note that individual figure files larger than 10 MB must be provided in separate source files.
- A detailed guide on electronic artwork is available on our website:

<http://www.elsevier.com/artworkinstructions>.

You are urged to visit this site; some excerpts from the detailed information are given here.

Formats

Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.

TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.

TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.

TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

Please do not:

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
- Supply files that are too low in resolution.
- Submit graphics that are disproportionately large for the content.

Color artwork

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. For further information on the preparation of electronic artwork, please see <http://www.elsevier.com/artworkinstructions>.

Please note: Because of technical complications that can arise by converting color figures to 'gray scale' (for the printed version should you not opt for color in print) please submit in addition usable black and white versions of all the color illustrations.

Figure captions

Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules.

References

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

References in a special issue

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software

This journal has standard templates available in key reference management packages EndNote (<http://www.endnote.com/support/enstyles.asp>) and Reference Manager (<http://refman.com/support/rmstyles.asp>). Using plug-ins to wordprocessing packages, authors only need to select the appropriate journal template when preparing their article and the list of references and citations to these will be formatted according to the journal style which is described below.

Reference formatting

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style

Text: All citations in the text should refer to:

1. *Single author:* the author's name (without initials, unless there is ambiguity) and the year of publication;
2. *Two authors:* both authors' names and the year of publication;
3. *Three or more authors:* first author's name followed by "et al." and the year of publication.

Citations may be made directly (or parenthetically). Groups of references should be listed first alphabetically, then chronologically.

Examples: "as demonstrated (Allan, 1996a, 1996b, 1999; Allan and Jones, 1995). Kramer et al. (2000) have recently shown"

List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters "a", "b", "c", etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Van der Geer, J., Hanraads, J.A.J., Lupton, R.A., 2000. The art of writing a scientific article. *Journal of Scientific Communication* 163, 51-59.

Reference to a book:

Strunk Jr, W., White, E.B., 1979. *The Elements of Style*, third ed. Macmillan, New York.

Reference to a chapter in an edited book:

Mettam, G.R., Adams, L.B., 1999. How to prepare an electronic version of your article, in: Jones, B.S., Smith, R.Z. (Eds.), *Introduction to the Electronic Age*. E-Publishing Inc., New York, pp. 281-304.

Video data

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body

text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the files in one of our recommended file formats with a preferred maximum size of 50 MB. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect: <http://www.sciencedirect.com>. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages at <http://www.elsevier.com/artworkinstructions>. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

AudioSlides

The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. More information and examples are available at <http://www.elsevier.com/audioslides>. Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

Supplementary data

Elsevier accepts electronic supplementary material to support and enhance your scientific research. Supplementary files offer the author additional possibilities to publish supporting applications, high-resolution images, background datasets, sound clips and more. Supplementary files supplied will be published online alongside the electronic version of your article in Elsevier Web products, including ScienceDirect: <http://www.sciencedirect.com>. In order to ensure that your submitted material is directly usable, please provide the data in one of our recommended file formats. Authors should submit the material in electronic format together with the article and supply a concise and descriptive caption for each file. For more detailed instructions please visit our artwork instruction pages at <http://www.elsevier.com/artworkinstructions>.

MATLAB FIG files

MATLAB FIG files (optional): You can enrich your online articles by providing supplementary MATLAB figure files with the .FIG file extension. These files will be visualized using an interactive viewer that allows readers to explore your figures within the article. The FIG files can be uploaded in our online submission system, and will be made available to download from your online article on ScienceDirect. For more information, please see <http://www.elsevier.com/matlab>.

Interactive plots

This journal encourages you to include data and quantitative results as interactive plots with your publication. To make use of this feature, please include your data as a CSV (comma-separated values) file when you submit your manuscript. Please refer to <http://www.elsevier.com/interactiveplots> for further details and formatting instructions.

Submission checklist

The following list will be useful during the final checking of an article prior to sending it to the journal for review. Please consult this Guide for Authors for further details of any item.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:

- E-mail address
- Full postal address
- Telephone

All necessary files have been uploaded, and contain:

- Keywords
- All figure captions
- All tables (including title, description, footnotes)

Further considerations

- Manuscript has been 'spell-checked' and 'grammar-checked'
- All references mentioned in the Reference list are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)

Printed version of figures (if applicable) in color or black-and-white

- Indicate clearly whether or not color or black-and-white in print is required.
- For reproduction in black-and-white, please supply black-and-white versions of the figures for printing purposes.

For any further information please visit our customer support site at <http://support.elsevier.com>.

AFTER ACCEPTANCE

Use of the Digital Object Identifier

The Digital Object Identifier (DOI) may be used to cite and link to electronic documents. The DOI consists of a unique alpha-numeric character string which is assigned to a document by the publisher upon the initial electronic publication. The assigned DOI never changes. Therefore, it is an ideal medium for citing a document, particularly 'Articles in press' because they have not yet received their full bibliographic information. Example of a correctly given DOI (in URL format; here an article in the journal *Physics Letters B*):

<http://dx.doi.org/10.1016/j.physletb.2010.09.059>

When you use a DOI to create links to documents on the web, the DOIs are guaranteed never to change.

Online proof correction

Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.

If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.

We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

Offprints

The corresponding author, at no cost, will be provided with a personalized link providing 50 days free access to the final published version of the article on [ScienceDirect](#). This link can also be used for sharing via email and social networks. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's WebShop (<http://webshop.elsevier.com/myarticleservices/offprints>). Authors requiring printed copies of multiple articles may use Elsevier WebShop's 'Create Your Own Book' service to collate multiple articles within a single cover (<http://webshop.elsevier.com/myarticleservices/booklets>).

AUTHOR INQUIRIES

You can track your submitted article at http://help.elsevier.com/app/answers/detail/a_id/89/p/8045/. You can track your accepted article at <http://www.elsevier.com/trackarticle>. You are also welcome to contact Customer Support via <http://support.elsevier.com>.

© Copyright 2014 Elsevier | <http://www.elsevier.com>