

CHEMICAL ENGINEERING SCIENCE

AUTHOR INFORMATION PACK

TABLE OF CONTENTS

- Description • p.1 **Audience** p.1 • **Impact Factor** p.1 Abstracting and Indexing p.2 **Editorial Board** p.2 • p.5
- **Guide for Authors**



ISSN: 0009-2509

DESCRIPTION

Chemical Engineering Science (CES) has been publishing papers on the fundamentals of chemical engineering since 1951. CES is the platform where the most significant advances in the discipline have ever since been published. Chemical Engineering Science has accompanied and sustained chemical engineering through its development into the vibrant and broad scientific discipline it is today.

We welcome manuscripts presenting cutting-edge research, of either an experimental or a theoretical nature. While centered in chemical engineering, manuscripts will often have scope that cuts across disciplines, ranges across scales, from the molecular level to the plant level, with impact not only on specific research questions but also in global issues. Critical reviews of cutting-edge developments are also considered. Papers submitted to Chemical Engineering Science are assessed by the editorial board via a thorough peer-review process only with regard to their quality and potential for fundamental and long-lasting contribution to chemical engineering.

Chemical Engineering Science classifies research into the following main fields: Biochemical engineering, Materials synthesis and processing, Particle technology, Process systems engineering, Reaction engineering and catalysis, Separation processes, Thermodynamics and Soft Matter, and Transport Phenomena including Fluid Mechanics. Application areas covered by the journal include Chemicals, Minerals, Energy and Fuels, Water, Environment, Sustainability, Food, Medicine including Pharmaceuticals, and other areas to which chemical engineering applies.

AUDIENCE

Industrial and academic researchers in chemical and process engineering.

IMPACT FACTOR

2021: 4.889 © Clarivate Analytics Journal Citation Reports 2022

ABSTRACTING AND INDEXING

Current Biotechnology Abstracts Current Contents - Engineering, Computing & Technology Chemical Engineering Abstracts Pascal Francis BIOSIS Citation Index Petroleum Abstracts INSPEC Aqualine Abstracts Chemical Abstracts Current Technology Index FLUIDEX TCEA Scopus Ei Compendex

EDITORIAL BOARD

Editor-in-Chief

Anton P. J. Middelberg, University of Adelaide School of Chemical Engineering and Advanced Materials, Adelaide, Australia

Executive Editors

David Bogle, University College London, London, United Kingdom

Niels Deen, University of Technology Eindhoven, Department of Mechanical Engineering, Eindhoven, Netherlands

Anthony Dixon, Worcester Polytechnic Institute, Department of Chemical Engineering, Worcester, Massachusetts, United States of America

Marco Mazzotti, ETH Zürich, Zurich, Switzerland

Sankar Nair, Georgia Institute of Technology School of Chemical and Biomolecular Engineering, Atlanta, Georgia, United States of America

Chi-Hwa Wang, National University of Singapore, Department of Chemical and Biomolecular Engineering, Singapore, Singapore

Chun-Xia Zhao, University of Adelaide School of Chemical Engineering and Advanced Materials, Adelaide, Australia

Associate Editors

Joelle Aubin, University of Toulouse, Chemical Engineering Department, Toulouse, France

Wei Ge, Institute of Process Engineering Chinese Academy of Sciences, Beijing, China

Vibha Kalra, Drexel University, Department of Chemical and Biological Engineering, Philadelphia, Pennsylvania, United States of America

Simon Kuhn, KU Leuven, Leuven, Belgium

Susanna Leong, Singapore Institute of Technology, Department of Chemical Engineering, Singapore, Singapore **Zhiwen Qi**, East China University of Science and Technology State Key Laboratory of Chemical Engineering, Shanghai, China

Mikio Sakai, The University of Tokyo Graduate School of Engineering, Faculty of Engineering, Bunkyo-Ku, Japan **Zhi-Jian Zhao**, Tianjin University School of Chemical Engineering and Technology, Tianjin, China

Managing Editor

Rita Middelberg

International Advisory Panel

Claire Adjiman, Imperial College London, London, United Kingdom

Rose Amal, University of New South Wales School of Chemical Engineering, Sydney, New South Wales, Australia **Panagiota Angeli**, University College London, London, United Kingdom

Alexis T. Bell, University of California Berkeley, Department of Chemical and Biomolecular Engineering, Berkeley, California, United States of America

Xiaotao (Tony) Bi, The University of British Columbia, Department of Chemical and Biological Engineering, Vancouver, Canada

Beatrice Biscans, Chemical Engineering Laboratory, Toulouse, France

Silvana Cardoso, University of Cambridge, Department of Chemical Engineering and Biotechnology, Cambridge, United Kingdom

Keith Carpenter, Institute of Sustainability for Chemicals Energy and Environment, Singapore, Singapore

Jennifer Sinclair Curtis, University of California Davis, Davis, California, United States of America

Michael Doherty, University of California Santa Barbara, Department of Chemical Engineering, Santa Barbara, California, United States of America

Lynn Gladden, University of Cambridge, Department of Chemical Engineering and Biotechnology, Cambridge, United Kingdom

Jinlong Gong, Tianjin University School of Chemical Engineering and Technology, Tianjin, China

Ji-Sook Hahn, Seoul National University, Gwanak-gu, South Korea

Yurong He, Harbin Institute of Technology, Haerbin, China

Gabriela Henning, National University of the Littoral, Santa Fe, Argentina

Volker Hessel, The University of Adelaide, Faculty of Engineering Computer and Mathematical Sciences School of Chemical Engineering and Advanced Materials, Adelaide, South Australia, Australia

Diane Hildebrandt, University of the Witwatersrand Johannesburg, Johannesburg, South Africa Paul Kohl

Hans Kuipers, University of Technology Eindhoven, Department of Chemical Engineering and Chemistry, Eindhoven, Netherlands

Duu-Jong Lee, City University of Hong Kong, Department of Mechanical Engineering, Hong Kong, Hong Kong **Sang Yup Lee**, Korea Advanced Institute of Science and Technology, Daejeon, South Korea

Jinghai Li, Chinese Academy of Sciences, Beijing, China

G.Q. Max Lu, University of Surrey, Guildford, United Kingdom

Arturo Macchi, University of Ottawa, Department of Chemical and Biological Engineering, Ottawa, Ontario, Canada

Davide Manca, Polytechnic of Milan, Milano, Italy

Krishna Nigam, Indian Institute of Technology Delhi, New Delhi, India

Todd Przybycien, Rensselaer Polytechnic Institute, Troy, New York, United States of America

Jieshan Qiu, Beijing University of Chemical Technology College of Chemical Engineering, Beijing, China

Clayton Radke, University of California Berkeley, Berkeley, California, United States of America

Marco Reis, University of Coimbra, Coimbra, Portugal

Carolyn Ren, University of Waterloo, Department of Mechanical and Mechatronics Engineering, Waterloo, Ontario, Canada

Ronald Rousseau, Georgia Institute of Technology School of Chemical and Biomolecular Engineering, Atlanta, Georgia, United States of America

Jürgen Schmidt, CSE Center of Safety Excellence gGmbH, Pfinztal, Germany

Kai Sundmacher, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany **He Tian**, East China University of Science and Technology, Shanghai, China

Atsushi Tsutsumi, The University of Tokyo Graduate School of Engineering, Faculty of Engineering, Department of Chemical System Engineering, Bunkyo-Ku, Japan

Luuk van der Wielen, Delft University of Technology, Department of Biotechnology, Delft, Netherlands **Ralph Yang**, University of Michigan, Department of Chemical Engineering, Ann Arbor, Michigan, United States of America

Suojiang Zhang, Institute of Process Engineering Chinese Academy of Sciences, Beijing, China

Jingxu Zhu, The University of Western Ontario, London, Ontario, Canada

Will Zimmerman, The University of Sheffield, Department of Chemical and Biological Engineering, Sheffield, United Kingdom

Early Career Editorial Board

Vasileios Charitopoulos, London, United Kingdom

Process Systems Engineering, Computational Optimization, Optimization under uncertainty, multiparametric programming, Robust Optimization, Energy Systems Planning

Jingjing Duan, Nanjing University of Science and Technology, Nanjing, China

Electrocatalysis, Materials Science and Engineering, Energy Conversion and Storage, Electrochemical CO2 reduction, Electrochemical Nitrogen reduction, Electrochemical Oxygen reduction

Alessio Fuoco, National Research Council of Italy, Institute on Membrane Technology (CNR-ITM), Rende, Italy Membranes, Polymers, Gas separation, Modelling

Sarish Rehman, Université McGill, Montréal, Quebec, Canada

Francesco Rossi, Purdue University Davidson School of Chemical Engineering, Lafayette, Indiana, United States of America

Alexander Russell, AbbVie Inc, North Chicago, Illinois, United States of America

Yali Tang, Eindhoven University of Technology, Eindhoven, Netherlands

Particle-laden flows, bubbly flows, computational dynamics modelling, direct numerical simulations **Wenjie Tian**, The University of Adelaide, Adelaide, Australia

Dr Wenjie Tian is an innovative early career researcher in the fields of nanomaterials, catalysis, and environmental science. She has abundant experience in the design of functional nanostructured materials for applications in green catalysis, environmental purifications, oxygen reduction reaction, CO2 capture, and solar energy conversion applications

Sergio Vernuccio, The University of Sheffield, Department of Chemical and Biological Engineering, Sheffield, United Kingdom

Reaction Engineering, Catalysis, Kinetic Mechanisms, Microkinetic Modeling, Process Intensification **Wei Wei**, University of Technology Sydney School of Civil and Environmental Engineering, Broadway, New South Wales, Australia

Waste-to-energy, Anaerobic digestion, Anaerobic fermentation, Microplastic/nanoplastic toxicology, Resource recovery, Sludge dewatering, Environmental biotechnologies **Aijuan Zhou**, Taiyuan University of Technology, Taiyuan, China

Environmental Biotechnology, Bioelectrochemistry, Fermentation Technologies, Renewable Bioenergy, Bioprocesses and Biorefineries, Biofuels and Green Chemicals recovery

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 that are authoritative and show a high degree of critical analysis of the literature are welcome. It is expected that the authors of the review are themselves expert in the field as evidenced by a track record of relevant published research. Review articles have a recommended structure and must be accompanied by a comprehensive Cover Letter that addresses specific points of interest to the Editors. Authors should download the **Review Guidance** document to ensure their Review Article confirms with Editorial expectations.

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. *Board Perspectives* are invited contributions from Chemical Engineering Leaders who are members of the journal's International Advisory Board. These perspectives present personal opinions of the Board members, and are intended to stimulate debate to advance our discipline.

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

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

All necessary files have been uploaded: *Manuscript*:

- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print
- Graphical Abstracts / Highlights files (where applicable)

Supplemental files (where applicable)

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)

• A competing interests statement is provided, even if the authors have no competing interests to declare

- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

BEFORE YOU BEGIN

Ethics in publishing

Please see our information on Ethics in publishing.

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.

Declaration of competing interest

Corresponding authors, on behalf of all the authors of a submission, must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. All authors, including those *without* competing interests to declare, should provide the relevant information to the corresponding author (which, where relevant, may specify they have nothing to declare). Corresponding authors should then use this tool to create a shared statement and upload to the submission system at the Attach Files step. **Please do not convert the .docx template to another file type. Author signatures are not required.**

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, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), 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 compliance, your article may be checked by Crossref Similarity Check and other originality or duplicate checking software.

Preprints

Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Content should make no assumptions about the beliefs or commitments of any reader; contain nothing which might imply that one individual is superior to another on the grounds of age, gender, race, ethnicity, culture, sexual orientation, disability or health condition; and use inclusive language throughout. Authors should ensure that writing is free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions. We advise to seek gender neutrality by using plural nouns ("clinicians, patients/clients") as default/wherever possible to avoid using "he, she," or "he/she." We recommend avoiding the use of descriptors that refer to personal attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health condition unless they are relevant and valid. When coding terminology is used, we recommend to avoid offensive or exclusionary terms such as "master", "slave", "blacklist" and "whitelist". We suggest using alternatives that are more appropriate and (self-) explanatory such as "primary", "secondary", "blocklist" and "allowlist". These guidelines are meant as a point of reference to help identify appropriate language but are by no means exhaustive or definitive.

Author contributions

For transparency, we encourage authors to submit an author statement file outlining their individual contributions to the paper using the relevant CRediT roles: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing. Authorship statements should be formatted with the names of authors first and CRediT role(s) following. More details and an example.

Changes to authorship

Authors are expected to consider carefully the list and order of authors **before** submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only **before** the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the **corresponding author**: (a) the reason for the change in author list and (b) written confirmation (e-mail, 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.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Article transfer service

This journal uses the Elsevier Article Transfer Service to find the best home for your manuscript. This means that if an editor feels your manuscript is more suitable for an alternative journal, you might be asked to consider transferring the manuscript to such a journal. The recommendation might be provided by a Journal Editor, a dedicated Scientific Managing Editor, a tool assisted recommendation, or a combination. If you agree, your manuscript will be transferred, though you will have the opportunity to make changes to the manuscript before the submission is complete. Please note that your manuscript will be independently reviewed by the new journal. More information.

Copyright

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). 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. 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.

Elsevier supports responsible sharing Find out how you can share your research published in Elsevier journals.

Open access

Please visit our Open Access page for more information.

Elsevier Researcher Academy

Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

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 Author Services.

Submission

Submission to this journal proceeds totally online. Use the following guidelines to prepare your article. Via the homepage of this journal (https://www.editorialmanager.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.

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.

Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our Support site. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

Suggested reviewers must be supplied with complete contact details and e-mail addresses. Reviewers should be knowledgeable of the research area and must not have a conflict of interest. Do not list collaborators, colleagues, researchers at your institution, former advisors or advisees.

PREPARATION

Queries

For questions about the editorial process (including the status of manuscripts under review) or for technical support on submissions, please visit our Support Center.

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 article

number or 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. The corresponding caption should be placed directly below the figure or table.

Peer review

This journal operates a single anonymized review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. Editors are not involved in decisions about papers which they have written themselves or have been written by family members or colleagues or which relate to products or services in which the editor has an interest. Any such submission is subject to all of the journal's usual procedures, with peer review handled independently of the relevant editor and their research groups. More information on types of peer review.

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). 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 to prepare your manuscript and BibTeX to generate your bibliography.

Our LaTeX site has detailed submission instructions, templates and other information.

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 details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also 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.

Highlights

Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights.

Highlights 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).

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. You can view Example Graphical Abstracts on our information site.

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.).

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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.

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. Further information on the preparation of electronic artwork.

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 and shading in table cells.

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.

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

Preprint references

Where a preprint has subsequently become available as a peer-reviewed publication, the formal publication should be used as the reference. If there are preprints that are central to your work or that cover crucial developments in the topic, but are not yet formally published, these may be referenced. Preprints should be clearly marked as such, for example by including the word preprint, or the name of the preprint server, as part of the reference. The preprint DOI should also be provided.

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

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

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 article number or 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:

Oguro, M., Imahiro, S., Saito, S., Nakashizuka, T., 2015. Mortality data for Japanese oak wilt disease and surrounding forest compositions. Mendeley Data, v1. http://dx.doi.org/10.17632/xwj98nb39r.1. 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

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 file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. 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. 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 of the article that refer to this content.

Data visualization

Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data

This journal requires and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. When sharing data in one of these ways, you are expected to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

Data linking

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Research Elements

This journal enables you to publish research objects related to your original research – such as data, methods, protocols, software and hardware – as an additional paper in Research Elements.

Research Elements is a suite of peer-reviewed, open access journals which make your research objects findable, accessible and reusable. Articles place research objects into context by providing detailed descriptions of objects and their application, and linking to the associated original research articles. Research Elements articles can be prepared by you, or by one of your collaborators.

During submission, you will be alerted to the opportunity to prepare and submit a Research Elements article.

More information can be found on the Research Elements page.

Data statement

To foster transparency, we require you to state the availability of your data in your submission if your data is unavailable to access or unsuitable to post. This may also be a requirement of your funding body or institution. You will have the opportunity to provide a data statement during the submission process. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page..

AFTER ACCEPTANCE

Online proof correction

To ensure a fast publication process of the article, we kindly ask authors to provide us with their proof corrections within two days. 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 will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. 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 Author Services. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

AUTHOR INQUIRIES

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.

You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com