MATERIALS LETTERS
An interdisciplinary journal devoted to rapid communications on the science, applications, and processing of materials.

TABLE OF CONTENTS

- Description p.1
- Audience p.1
- Impact Factor p.2
- Abstracting and Indexing p.2
- Editorial Board p.2
- Guide for Authors p.4

DESCRIPTION

Materials Letters is an interdisciplinary journal devoted to rapid communications on the science, applications, and processing of materials.


Materials Letters is dedicated to publishing novel, cutting edge reports of broad interest to the materials community. The journal provides a forum for materials scientists and engineers, physicists, and chemists to rapidly communicate on the most important topics in the field of materials.

Contributions include, but are not limited to, a variety of topics such as: Materials - Metals and alloys, amorphous solids, ceramics, composites, polymers, semiconductors, biomaterials and biological materials, advanced materials, metamaterials, high-entropy alloys. Applications - Structural, opto-electronic, magnetic, medical, MEMS, sensors, smart materials, additive manufacturing, membranes, materials for energy systems. Characterization - Analytical, microscopy, scanning probes, nanoscopic, optical, electrical, magnetic, acoustic, spectroscopic, diffraction. Novel Materials - Micro and nanostructures (nanowires, nanotubes, nanoparticles), nanocomposites, thin films, superlattices, quantum dots. Processing - Crystal growth, thin film processing, sol-gel processing, mechanical processing, assembly, nanocrystalline processing. Properties - Mechanical, magnetic, optical, electrical, ferroelectric, thermal, interfacial, transport, thermodynamic, photoelectrochemical, photocatalytic, thermoelectric, biological. Synthesis - Quenching, solid state, solidification, solution synthesis, vapor deposition, high pressure, explosive, MOVPE and LPE epitaxial processes, single crystal growth. Machine Learning/Artificial Intelligence - Applied to the discovery and design of materials.

AUDIENCE

Materials scientists, metallurgists, solid state chemists and physicists
IMPACT FACTOR

2019: 3.204 © Clarivate Analytics Journal Citation Reports 2020

ABSTRACTING AND INDEXING

El Compendex Plus
Engineering Index
Chemical Abstracts
INSPEC
Metal Abstracts (ASM International – Materials Information
Ceramic Abstracts
Materials Science Citation Index
Science Citation Index
FIZ Karlsruhe
Current Contents - Engineering, Computing & Technology
Current Contents - Physical, Chemical & Earth Sciences
Scopus

EDITORIAL BOARD

Editor-in-Chief
A.R. Boccaccini, Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany

Editors
R. Arroyave, Texas A&M University Department of Materials Science and Engineering, 119 Mechanical Engineering Office Bldg, 77843-3123, College Station, Texas, United States of America
M. Carboni, Institute of Separative Chemistry Marcoule Laboratory of Hybrid System of Separation, Bât. 426 – L1-21 – BP 17171, F-30207, Bagnols sur Ceze, France
O.A. Graeve, University of California San Diego Department of Mechanical and Aerospace Engineering, 9500 Gilman Drive, CA 92093-0411. La Jolla, California, United States of America
J. Hojo, Kyushu University Faculty of Engineering, Kasuga, 816-8580, Fukuoka, Japan
V.V. Kharton, Institute of Solid State Physics Russian Academy of Sciences, 142432, Chernogolovka, Russian Federation
S.E. Rodil, Autonomous National University of Mexico Materials Research Institute, Postal 70 360 cd, 04510, Ciudad de México, Mexico
F. L. de Souza, Federal University of the ABC Centre for Natural Sciences and Humanities, Av.dos Estados, 5001-Santa Terezinha, Santo Andre, 09210-580, SANTO ANDRE, Brazil
B. Straumal, Institute of Solid State Physics Russian Academy of Sciences, 142432, Chernogolovka, Russian Federation
G Webber, Friedrich-Alexander-University Erlangen-Nurnberg Department of Materials Science and Engineering, Martensstr. 5, 91058, Erlangen, Germany
A.F.W. Willoughby, University of Southampton Engineering Materials Research Group, University Road, SO17 1BJ, Highfield, Southampton, United Kingdom
J-M. Yang, University of California Los Angeles Department of Materials Science and Engineering, CA 90095-1595, Los Angeles, California, United States of America
Y.F. Zheng, Peking University Department of Material Science and Engineering, No.5 Yi-He-Yuan Road, Hai-Dian District, 100871, Beijing, China

Managing Editors
Alessandro Polini, Institute of Nanotechnology National Research Council, Monteroni di Lecce, Italy
Laura Ciammaruchi, Institute of Materials Science of Barcelona, Barcelona, Spain

Associate Editorial Board
Z. Ahmad, De Montfort University, Leicester, United Kingdom
K. Aifantis, University of Florida, Gainesville, Florida, United States of America
A. Bellosi, Institute of Science and Technology of Ceramic Materials National Research Council, Faenza, Italy
F. Berto, Norwegian University of Science and Technology, Trondheim, Norway
J. Blaker, The University of Manchester, Manchester, United Kingdom
B. Bokstein, National University of Science and Technology MISiS, Department of Physical Chemistry, Moscow, Russian Federation
R. H. R. Castro, University of California Davis, Davis, California, United States of America
X. Chatzistavrou, Michigan State University, East Lansing, Michigan, United States of America
Free Text

Materials Letters has an open access mirror journal, Materials Letters X

Aims and Scope

Materials Letters

An interdisciplinary journal devoted to rapid communications on the science, applications, and processing of materials.

Materials Letters has an open access mirror journal Materials Letters: X, sharing the same aims and scope, editorial team, submission system and rigorous peer review.

Materials Letters is dedicated to publishing novel, cutting edge reports of broad interest to the materials community. The journal provides a forum for materials scientists and engineers, physicists, and chemists to rapidly communicate on the most important topics in the field of materials.

Contributions include, but are not limited to, a variety of topics such as Materials - Metals and alloys, amorphous solids, ceramics, composites, polymers, semiconductors, biomaterials and biological materials, advanced materials, metamaterials, high-entropy alloys. Applications - Structural, opto-electronic, magnetic, medical, MEMS, sensors, smart materials, additive manufacturing, membranes, materials for energy systems. Characterization - Analytical, microphone, scanning probes, nanoscopic, optical, electrical, magnetic, acoustic, spectroscopic, diffraction. Novel Materials - Micro and nanostructures (nanowires, nanotubes, nanoparticles), nanocomposites, thin films, superlattices, quantum dots. Processing - Crystal growth, thin film processing, sol-gel processing, mechanical processing, assembly, nanocrystalline processing. Properties - Mechanical, magnetic, optical, electrical, ferroelectric, thermal, interfacial, transport, thermodynamic, photoelectrochemical, photocatalytic, thermoelectric, biological. Synthesis - Quenching, solid state, solidification, solution synthesis, vapor deposition, high pressure, explosive, MOVPE and LPE epitaxial processes, single crystal growth. Machine Learning/Artificial Intelligence - Applied to the discovery and design of materials.

Types of Contribution

Short Communications (Letters) are intended as brief reports of significant, original and timely research results on the science, applications and processing of materials which warrant rapid publication. In considering a manuscript for publication, particular attention will be given to the originality of the research, the desirability of speedy publication, the clarity of the presentation and the validity of the conclusions. There is a strict four-page limit to printed articles. Manuscripts must not exceed 2000 words plus three figures and one table. This includes everything: the title, authors, affiliations, abstract, keywords, body of the manuscript, acknowledgements, references, figure captions, etc. The maximum number of figures is strictly limited to five. If the maximum of 4 figures is used, then the total number of words must be reduced to 1800. If the maximum of 5 figures is used, then the total number of words must be reduced to 1600. If more than 5 figures are used, the manuscript will be rejected. The manuscript submitted for review should not exceed 8 pages (including title, abstract, references, figures, tables and figure captions). Short Communications need to report a concise but exhaustive Material and methods section included in the main text.

Featured Letters: A Call for Papers

Featured Letters are invited only contributions to Materials Letters. They are short but authoritative reports of the state-of-the-art in a scientific field, without becoming as exhaustive as classical review papers. These articles still maintain the rapid communication character of Materials Letters, 4 to 6 printed pages with emphasis on recent findings and breakthroughs, but they are intended to also provide a concise and critical overview of the scientific field. The authors’ recent work is highlighted (relevant important prior-contributions, by the authors or others, should be included and discussed in context). We are currently inviting Featured Letters from within the following fields: Organic electronics, Organic semiconductors Advanced Piezoelectrics/ferroelectrics Advanced Magnetic materials Nano-biomaterials Materials for Alternative Energy applications (nanomaterials, dielectrics, photocatalytic materials, PV, LEDs, etc.) Metamaterials Sustainable Materials Materials
with novel properties (ionic liquids, quantum and confined structures, etc.) Novel nanoscale carbonaceous materials (CNT, graphene, etc.) Evolution and stability of the microstructure of nanocrystalline materials

Featured Letters can include authors’ perspectives: i.e., unsolved problems and tentative conclusions are welcome, when properly identified, authors’ outlook on new opportunities and challenges, as appropriate, are also welcome in the conclusions, etc.

Featured Letters enjoy benefits, such as: Guarantee rapid publication, as soon as finalized in production Free color in print The new section will be promoted via Elsevier marketing channels

If you believe you can contribute such a manuscript, you can contact the editor, A.R. Boccaccini, to suggest a topic for a Featured Letter.

Note: Featured Letters manuscripts must not exceed 4000 words plus 5 figures/table. This includes the title, authors, affiliations, abstract, keywords, body of the manuscript, acknowledgements and references.

**Contact Details**
Authors should submit their article via the online submission system. Authors will be asked to choose the Editor whose subject area is most closely aligned to the subject of their article. Each Editor's specialties are given below. To expedite the review process, authors will also be prompted to nominate 3 potential referees, who are not at the same institute, to serve as potential referees. Contact details are helpful.

**Principal Editors**
- Prof. Aldo Boccaccini, Editor in chief - Biomaterials, Glasses and Ceramics, Materials Processing, Porous Materials, Biocomposites, Mechanical Properties
- Prof. Raymundo Arroyave - Computational Materials Science, Thermodynamics and Phase Stability, Kinetics, Data-enabled Materials Discovery and Design, Metals, Alloys, Ceramics
- Prof. Michal Carboni - Porous and Crystalline Materials, Polymers, Metal-Organic Frameworks, Biomaterials, Electrode Materials for Battery, Thin Films
- Prof. Flavio Leandro De Souza - Photocatalysis and Photoelectrocatalysis, Semiconductor, Interface and surface, electrochemical and electrical Characterization
- Prof. Olivia Graeve - Materials processing, Ceramics, Materials in Extreme Environments, Luminescent Materials, Sensors
- Prof. Junichi Hojo - Nano-composites, Composites, Sol-gel preparation
- Prof. Vladislav Kharton - Materials for Electrochemical Technologies, Ceramics, Oxide Materials, Diffusion, Electrical Properties, Phase Diagrams
- Prof. Iwan Kityk - Optoelectronic Materials, Laser materials, Photonic materials
- Prof. Sandra E. Rodil - Thin films synthesis, spectroscopic characterization of materials, Surface modification for biomedical applications, mechanical-tribological properties
- Prof. Boris Straumal - Grain boundaries, phase transformations, diffusion, thermodynamics
- Prof. Kyle Webber - Ferroelectrics/Piezoelectrics, Lead-Free Ferroelectrics, Electromechanical Properties, Fracture of Ceramics
- Prof. Arthur Willoughby - Semiconductor/Electronic Materials, Polymers
- Prof. Jenn-Ming Yang - Metallic Alloys, Ceramics, Composites, High Temperature Materials, Mechanical Behavior, Material Processing
- Prof. Yufeng Zheng - Metallic Biomaterials, Magnesium alloys, Fe alloys, Zinc alloys, Ti alloys, Shape Memory Alloys, Biodegradable Metals

**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

Online Submission
* Authors must submit their articles using the secure online submission system at https://www.editorialmanager.com/miblue/default.aspx.

To facilitate rapid publication, it is essential to precisely follow these instructions. Failure to do so can result in a delay or rejection of the manuscript for publication.

To ensure a timely review you will be required to answer the following questions before your paper will be considered for review.

• Has your paper, or part of your paper, been published before, or is it currently submitted for review to another journal?
  Yes / No
  (If yes, then do not submit your paper to Materials Letters.)

• Is the total number of words in the manuscript including the title, authors, affiliations, abstract, keywords, body of the manuscript, acknowledgements, references and figure captions less than 2000?
  Yes / No
  (If greater than 2000, please reduce the number of words.)

• Is the number of figures greater than 5?
  Yes / No
  (If yes, then the paper will automatically be rejected.)

• Are the x-ray diffraction patterns indexed?
  Yes / No
  X-ray diffraction patterns should be indexed. (If your x-ray patterns are not indexed, the paper will be rejected for publication.)

• Do the micrographs have professional quality scale markers?
  Yes / No
  Professional scale bars should be added to micrographs; the bar included in the micrograph printout is not sufficient.
  (Please replace the black bar on SEM & TEM micrographs with a professional quality scale marker.)
**Ethics in publishing**
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

**Studies in humans and animals**
If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The manuscript should be in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals and aim for the inclusion of representative human populations (sex, age and ethnicity) as per those recommendations. The terms sex and gender should be used correctly.

Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.

All animal experiments should comply with the ARRIVE guidelines and should be carried out in accordance with the U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, EU Directive 2010/63/EU for animal experiments, or the National Institutes of Health guide for the care and use of Laboratory animals (NIH Publications No. 8023, revised 1978) and the authors should clearly indicate in the manuscript that such guidelines have been followed. The sex of animals must be indicated, and where appropriate, the influence (or association) of sex on the results of the study.

**Declaration of competing interest**
All authors 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. Authors should complete the declaration of competing interest statement using this template and upload to the submission system at the Attach/Upload Files step. Note: Please do not convert the .docx template to another file type. Author signatures are not required. If there are no interests to declare, please choose the first option in the template. This statement will be published within the article if accepted. More information.

**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 originality, your article may be checked by the originality detection service Crossref Similarity Check.

**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. 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;
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 is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal.

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.

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.

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**
Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

**Referees**
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.

**PREPARATION**

**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.

**Use of word processing software**
It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. 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.

**Article structure**
Follow this order when submitting manuscripts: Title, Authors, Affiliations, Abstract, Keywords, Main text, Acknowledgements, Appendix, References, Figure Captions and then Tables. For submission via the website you are requested to import low-resolution images into the article at the approximate location you wish them to appear. Thus the PDF which is created for refereeing purposes will contain all necessary information. In addition you will be asked to separately upload high quality images. Collate acknowledgements in a separate section at the end of the article and do not include them on the title page, as a footnote to the title or otherwise.

**Text Layout**
Use double spacing and wide (3 cm) margins. (Avoid full justification, i.e., do not use a constant right-hand margin.) Ensure that each new paragraph is clearly indicated. Present tables, figures and figure legends at the point they will appear in the manuscript. If possible, consult a recent issue of the journal to become familiar with layout and conventions. Number all pages consecutively, use 12 or 10 pt font size and standard fonts.

**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.

**Theory/calculation**
A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

**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.

**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.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. 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. This responsibility includes answering any future queries about Methodology and Materials. Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.
- **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 self-contained abstract of 100 to 200 words, outlining in a single paragraph the aims, scope and conclusions of the paper must be supplied. Do not list the analytical equipment (e.g. SEM, XRD, TEM) used unless it is critical to the meaning. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separate from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential,
they must be cited in full, without reference to the reference list. 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. Authors can make use of Elsevier's Illustration Services to ensure the best presentation of their images and in accordance with all technical requirements.

**Keywords**
Immediately after the abstract, provide a maximum of 6 keywords, using 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.

**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, please 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 IUGS: Nomenclature for geological time scales/rock names for further information.

**Math formulae**
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

**Artwork**

*Electronic artwork*

**General points**
- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
• Provide captions to illustrations separately.
• Size the illustrations close to the desired dimensions of the published version.
• Submit each illustration as a separate file.
• Ensure that color images are accessible to all, including those with impaired color vision.

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
If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format.

Regardless of the application used other than Microsoft Office, 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 all used fonts.
- TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
- TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
- TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.

Please do not:
• Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
• 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) in addition to color reproduction in print. Further information on the preparation of electronic artwork.

Figure captions
Ensure that each illustration has a caption. Supply captions separately, not attached to the figure. 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.

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.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/materials-letters

When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

Reference style
Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
Example: '..... as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....'
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.
Examples:
Reference to a journal publication:
Reference to a journal publication with an article number:
Reference to a book:
Reference to a chapter in an edited book:
Reference to a website:
Reference to a dataset:

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

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 for the portions of the article that refer to this content.

**Supplementary data**

Figures and text submitted as supplementary material must contain only material that is supportive of the main text, and not material that is inherent to the essential meaning of the article. Papers with reference to supplementary material, which the Editors find necessary to include as main text, will be sent back to authors. 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](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 [https://www.elsevier.com/artworkinstructions](https://www.elsevier.com/artworkinstructions).

**Research data**

This journal encourages 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. If you are sharing data in one of these ways, you are encouraged 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).

**Mendeley Data**

This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. Before submitting your article, you can deposit the relevant datasets to Mendeley Data. Please include the DOI of the deposited dataset(s) in your main manuscript file. The datasets will be listed and directly accessible to readers next to your published article online.
For more information, visit the Mendeley Data for journals page.

Data in Brief
You have the option of converting any or all parts of your supplementary or additional raw data into a data article published in Data in Brief. A data article is a new kind of article that ensures that your data are actively reviewed, curated, formatted, indexed, given a DOI and made publicly available to all upon publication (watch this video describing the benefits of publishing your data in Data in Brief). You are encouraged to submit your data article for Data in Brief as an additional item directly alongside the revised version of your manuscript. If your research article is accepted, your data article will automatically be transferred over to Data in Brief where it will be editorially reviewed, published open access and linked to your research article on ScienceDirect. Please note an open access fee is payable for publication in Data in Brief. Full details can be found on the Data in Brief website. Please use this template to write your Data in Brief data article.

MethodsX
You have the option of converting relevant protocols and methods into one or multiple MethodsX articles, a new kind of article that describes the details of customized research methods. Many researchers spend a significant amount of time on developing methods to fit their specific needs or setting, but often without getting credit for this part of their work. MethodsX, an open access journal, now publishes this information in order to make it searchable, peer reviewed, citable and reproducible. Authors are encouraged to submit their MethodsX article as an additional item directly alongside the revised version of their manuscript. If your research article is accepted, your methods article will automatically be transferred over to MethodsX where it will be editorially reviewed. Please note an open access fee is payable for publication in MethodsX. Full details can be found on the MethodsX website. Please use this template to prepare your MethodsX article.

Data statement
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. 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.

Keyword List
Adhesion
Amorphous materials
Atom probe
Atomic force microscopy
Biomaterials
Biomimetic
Carbon materials
Carbon nanotubes
Nanoparticles
Cast
Ceramics
Bioceramics
Functional
Structural
Colloidal processing
Composite materials
Ceramic composites
Metallurgical composites
Polymeric composites
Corrosion
Creep
Crystal growth
Crystal structure
Defects
Deformation and fracture
Deposition
Chemical vapour deposition
Electrodeposition
Physical vapour deposition
Sputtering
Dielectrics
Diffusion
Elastic properties
Electrical properties
Electroceramics
Electron microscopy
Electronic materials
Contacts
Organic
Semiconductors
Energy storage and conversion
Epitaxial growth
Fatigue
Ferroelectrics
Fibre technology
Fullerenes
Grain boundaries
Grain boundary junctions
Indentation and hardness
Interfaces
Intermetallic alloys and compounds
Ion beam technology
Laminates
Langmuir-Blodgett films
Laser processing
Luminescence
Magnetic materials
Metal forming and shaping
Metallurgy
Metals and alloys
Multilayer structure
Microstructure
Nanocomposites
Nanocrystalline materials
Functional
Structural
Neutron diffraction and scattering
Nuclear materials
Optical materials and properties
Oxidation
Particles, nanosize
Phase diagrams
Phase transformation
Phosphors
Piezoelectric materials
Polymers
Powder technology
Porous materials
Psitron annihilation
Radiation damage
Recrystallization
Scanning tunnelling microscopy
Segregation
Sensors
Shape memory materials
Simulation and modelling
Sintering
Solar energy materials
Sol-gel preparation
Solidification
Spectroscopy
FTIR
Mossbauer
Raman
XPS
Superconductors
Surfaces
Texture
Thermal analysis
Thermal properties
Thermodynamics and kinetics of processes in materials
Thick films
Thin films
Varistors
Viscoelasticity
Wear and tribology
Welding
X-ray techniques
additive manufacturing
3D printing
hydrogels
Artificial Intelligence
Machine Learning

**AUTHOR INQUIRIES**
Visit the [Elsevier Support Center](https://www.elsevier.com/support) 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](https://www.elsevier.com/support) or find out when your accepted article will be published.