

Last updated: December 29, 2023 [View the latest guidelines online](#)

Manuscript Submission Requirements Checklist

- Cover letter
- Title: Titles should be clear and concise; they must match between manuscript file and electronic submission.
- Author list with affiliations: must match between electronic entry and manuscript file
- Abstract
- Manuscript File: Clean with no highlighting or comments and all changes accepted.
- (Highly encouraged) Have a colleague in another field read as test for accessibility.
- Tables/Schemes/Figures: Text should be clear and legible, with fonts no smaller than 8 pt.
- Figures: must be labeled sequentially and match numbered references in article (manuscript and Supporting Information). Where appropriate, label all subsections by letter.
- Supporting Information (if any) must be included in the electronic submission.
- Table of Contents Graphic
- References: no specific format required, but must be sufficient to aid referees in their reviewing duties.

Correspondence to the Editor-in-Chief should be addressed to:

Professor Wonyong Choi, Editor-in-Chief, *ACS ES&T Engineering*

Email: EIC@estengg.acs.org

Scope of the Journal

[ACS ES&T Engineering](#) publishes high-impact research and review/perspective articles in all areas of environmental technology and engineering through a highly rigorous peer-review process. It is a specialist journal that aims to serve as an international forum for research and innovation around materials-, technologies-, processes-, data analytics- and engineering systems that: manage, protect and remediate air, water and soil quality; treat wastes; recover resources; support effective decision-making within complex engineered systems; and are informed by mechanistic science and analytics that describe complex environmental engineering systems. Papers that present novel, innovative advancements will be considered across the continuum from lab-based discovery to field-based application; case-studies will not be considered at this time. Papers containing experimental and/or theoretical methods and knowledge grounded in engineering principles that are integrated with core knowledge from other disciplines are welcome. Specific topics may include (but are not limited to) the following environmental engineering areas:

- Novel materials, technologies, processes, data analytical methods, and systems that: evaluate, protect and remediate air, water, and soil quality; solve or address multiple emerging environmental issues at various nexuses (e.g. energy, material, sustainability, public health)
- Novel separation, desalination, and resource recovery technologies
- Environmental nanotechnology and biotechnology
- Environmental catalysis for pollution abatement and cleaner sustainable processes
- Redox processes for engineering applications
- Waste management, treatment, valorization, and waste-to-energy
- Environmental technologies developed for monitoring, sensing, and assessing environmental exposure & hazards

- Macroscopic and microscopic mechanisms that inform environmental engineering systems
- Novel analytical and simulation methods (e.g. data-driven science, artificial intelligence, machine learning, data scraping) for environmental engineering applications

The Journal does NOT cover the following areas if they are presented as solitary topics and without making their connection to engineered systems or technological innovation clear:

- Environmental policy and regulation as a solitary focus (i.e. papers about the impact of engineered systems on the environment and health, and policy/regulation implications are considered within scope as long as outcomes link to advancements around the engineered system as a central theme of the paper)
- Characterization and monitoring of the environment as a solitary focus
- Fate and transport of contaminants and biogeochemical cycling
- Ecotoxicology and environmental health
- Atmospheric chemistry and processes, climate change
- Environmental chemistry as a primary focus (e.g. fundamental reaction mechanisms). However, studies involving environmental chemistry that is used to demonstrate or understand engineering technologies or engineered systems may be suitable.

Manuscript Types

ACS ES&T Engineering accepts the following manuscript types: Research Article, Review, Perspective, Viewpoint, Correspondence/Rebuttal and Additions and Corrections. A full description of each manuscript type is shown below:

Research Article (flexible length typically up to 8,000 and a maximum of 10,000 word-equivalents; shorter articles as short as 3,000 word-equivalents also accepted).

Research Articles report innovative advances grounded in environmental engineering research that contribute new insights and knowledge applicable to the environmental challenges and opportunities we face today and tomorrow. Article length is flexible and should be determined depending on the nature of the work. Shorter length articles may report on innovative and novel environmental engineering research that is at the proof-of-concept stage and where results reflect a significant advancement. Justification for submission and publication of initial results should be described in the author's cover letter.

Research articles consist of the following sections: Abstract; Introduction; Experimental/Methods; Results and Discussion; Conclusions; References. The Journal allows some flexibility in formatting and authors may add other sections or use alternative section titles (e.g. Environmental Implications, Engineering Significance instead of Conclusions) or may place the Experimental/Methods section after the Conclusions section. The Experimental/Methods section should include a level of detail that guides the reader on the experimental approach, and details should be placed in supporting information (SI). For example, it would be appropriate to state that analysis was conducted by GC/MS but the details of the protocol (solvent, flow conditions, temperature, etc.) would be in the SI. Research articles are reviewed initially by editors and then, if appropriate, sent for full peer review. The Editor-in-Chief and Associate Editors, listed in the *ACS ES&T Engineering* masthead, make final decisions about all research material published in *ACS ES&T Engineering*.

Review (length limit: up to a maximum of 15,000 word-equivalents). Reviews describe and discuss thoroughly documented developments and issues in environmental engineering research.

Reviews should summarize prior research and should also provide insights into the reviewed themes through new analysis and organization of the published literature. Review articles are primarily invited by the editors. Unsolicited review articles may be submitted with permission from the editors. Proposals for unsolicited review articles should be sent to the journal's editorial office (eic@estengg.acs.org) and include: (1) a brief outline (length limit: 2 pages), with section headings and a short discussion of the proposed content in each section; (2) a list of existing key review articles on the subject published in the past 10 years, with a justification statement describing the contribution of this new review article to the field; (3) a summary of the authors' academic background and research areas with Google Scholar, Web of Science, or Scopus profile; and (4) a list of the authors' publications related to the review topic. If the proposal is approved by the editors, the authors will be invited to submit a full review. All submitted review articles will undergo full peer review.

Perspective (length limit: typically 5,000 and up to 7,000 word-equivalents). These contributions are reviews of a field or area and are focused rather than comprehensive. Perspective papers will assess the current status of a chosen field with an emphasis toward identifying key progress being made and identifying future research that is needed to advance the field. Perspectives are invited only, and unsolicited perspectives are not considered. Perspective articles will undergo full peer review.

Viewpoint (length limit typically up to 1,000 to 1,500 word-equivalents + author affiliations + 5-10 references + 1 single-frame figure with 50-word caption OR a 350-word table). Viewpoints are short opinion-style manuscripts, written in the journalistic style of an opinion piece in a newspaper or magazine. They provide authors with a venue to comment on an issue of pressing importance to ACS ES&T Engineering's readership. Viewpoint articles should express an opinion of a clear scientific nature, based on rigorous scientific research in an environmental engineering discipline. They should not be wholly political or summary in nature. Viewpoints are not generally peer reviewed but are subject to editorial approval. Corresponding authors of accepted articles will also be requested to provide a short biography (up to 200 words) and headshot for inclusion at the end of the published article. Model release and copyright forms are required for author photographs and will be provided by the journal office.

Correspondence/Rebuttal (length limit: 1,000 word-equivalents each including citations). These manuscripts provide scholarly comment on papers appearing in the research section (Research Article, Review, Perspective, Correspondence/Rebuttal, and Additions and Corrections). Correspondence should be submitted within six months of the publication date of the original paper and must raise substantive scientific or technical questions. Correspondence that consists mainly of opinion will not be considered. The author(s) of the original paper will be given an opportunity to respond. Correspondence on previously published Correspondence will not be considered, and personal invective will not be tolerated. Correspondence/Rebuttal may undergo peer review under the direction of the assigned editor. The correspondence and the rebuttal will be published consecutively in the same issue.

Additions and Corrections (Errata). These contributions may be used by the authors of a paper to correct errors and omissions of consequence that are identified after publication. Readers who also detect errors of consequence in the work of others should contact the corresponding author of the paper in question. Additions and Corrections must be approved by all coauthors before submission. All Additions and Corrections are subject to editorial approval, and corrections of minor errors or omissions will not be published.

Special Issues *ACS ES&T Engineering* has a required template that must be completed for all

proposals for special issues. If you would like to propose a special issue, please contact the managing editor for more information (managing.editor@est.acs.org).

ACS Publishing Center

While these guidelines will provide basic information on how to prepare and submit the manuscript as well as other critical information about publishing, we also encourage authors to visit the [ACS Publishing Center](#) for additional information on everything that is needed to prepare (and review) manuscripts for ACS journals and partner journals, such as:

- [Mastering the Art of Scientific Publication](#), which shares editor tips about a variety of topics including making your paper scientifically effective, preparing excellent graphics, and writing cover letters.
- Resources on [how to prepare and submit a manuscript](#) to ACS Paragon Plus, ACS Publications' manuscript submission and peer review environment.
- [Sharing your research](#) with the public through the ACS Publications open access program.
- [ACS Reviewer Lab](#), a free online course covering best practices for peer review and related ethical considerations.
- [ACS Author Lab](#), a free online course that empowers authors to prepare and submit strong manuscripts, avoiding errors that could lead to delays in the publication process.

ACS ES&T Engineering - Quality Expectations

Clearly articulating the importance of your research and the quality of presentation of your manuscript will have an important impact on the ease with which it can undergo peer review and the impression it gives to reviewers of its overall quality. If your writing is rambling, fails to establish the purpose of the research, provides an incoherent discussion, puzzling figures, or inappropriate scales on graph axes, the technical merits of your research will be less easy to recognize. Please articulate clearly the purpose of your work, write concisely and with clarity, and provide well thought-out and clearly presented figures and tables with appropriate considerations of the magnitude of error. This will significantly increase the likelihood that we will publish your research.

Manuscript Preparation

Submit with Fast Format

All ACS journals and partner journals have simplified their formatting requirements in favor of a streamlined and standardized review-ready format for an initial manuscript submission. Read more about the requirements and the benefits these serve authors and reviewers [here](#).

Manuscripts submitted to *ACS ES&T Engineering* must follow these simple formatting standards:

- The preferred format for manuscript files is a Microsoft Word document with the text and all graphics, including Table of Content art (TOC art), embedded within that single Word file.
- Supporting Information should be submitted as a separate file(s).
- Submissions must be complete with clearly identified standard sections used to report original research, free of annotations or highlights, and include all numbered and labeled components.
- The text of all article types should be double-spaced in a single column with the lines numbered consecutively in a separate column at the margin.

- Figures, charts, tables, schemes, and equations should be embedded in the text. Separate graphics can be supplied at revision.
- References can be provided in any style, but they must be complete, including all authors and titles.

Document Templates and Format

The use of manuscript templates is not required for *ACS ES&T Engineering*, but may be useful to consult to approximate how an article will compose.

- [Microsoft Word 2011 Template](#) for Macintosh
- [Microsoft Word 2010 Template](#) for Windows | [README file](#) [PDF]

Additional generic instructions for submission of manuscripts and Supporting Information are available at the [ACS Publishing Center](#). General information on the preparation of manuscripts may also be found in the [ACS Guide to Scholarly Communication](#). For further support you can reach ACS via email at support@services.acs.org, or by phone at 1-800-227-9919 (USA and Canada) or 1-202-872-4357.

Length limits. The length limits for each article type are listed in the Article Types section. Article length can be determined by counting all text, excluding title page, references, and figure/table captions. Next, add 300 words for each small figure, scheme, or table that takes up part of a page. Large multipart figures, extensive tables, detailed maps or chemical pathways taking up a page or more should be counted as 600 words. At the discretion of the assigned editor, some figures or tables may be counted as more than 600 words.

Manuscripts that exceed the length limit will be un-submitted (returned to the Draft section in Paragon Plus) with a request to shorten, or they may be immediately rejected. To reduce length, make the Introduction and Discussion sections more concise. In addition make appropriate use of Supporting Information (SI; see below), which is also readily available to readers of the manuscripts on the *ACS ES&T Engineering* website.

Authors who believe that exceeding the length limit is essential must include a compelling argument in their cover letters. Ultimately, however, the decision about whether a manuscript that exceeds the recommended length is appropriate for review is made by the assigned editor.

Acceptable Software, File Designations, and TeX/LaTeX

See the list of [Acceptable Software](#) and appropriate [File Designations](#) to be sure your file types are compatible with ACS Paragon Plus. Information for manuscripts generated from [TeX/LaTeX](#) is also available. Please also see [Appendix 3](#) for a list of copyright-compliant graphics programs and graphics websites for the creation of figures, TOC art, and front cover artwork.

Cover Letter

A cover letter must accompany every manuscript submission. During the submission process, you may type it or paste it into the submission system, or you may attach it as a file. The cover letter should list the authors and their affiliations, give the manuscript title, and provide complete contact information for all authors. If you have a non-preferred editor, you may explain your reason for making the request in your cover letter. The cover letter must also include a rationale for why your

manuscript is appropriate for publication in *ACS ES&T Engineering*. The environmental impact and/or engineering significance must be described in the letter. A substantial fraction of submissions to *ACS ES&T Engineering* are not sent out for review because an editor concludes that the manuscript does not meet the journal's standards for novelty, scientific merit, or environmental importance. The cover letter is your opportunity to convince the editor that this is not the case. Citations of previous related work published within *ACS ES&T Engineering* also can be useful to the reviewing editor.

Manuscript Text Components

Spell out all acronyms on first use in the abstract and in the body of the article. *ACS ES&T Engineering* does not allow footnotes, with the exception of an author information footnote on the title page and table detail/definition footnotes.

Elements of a Manuscript

The various sections of the manuscript are described in detail below:

- Title and Authorship
- Abstract and Keywords
- Graphic for Table of Contents (TOC)/Abstract Art
- Introduction
- Experimental/Methods
- Results and Discussion
- Conclusions
- Abbreviations
- Acknowledgment
- Funding Sources
- References
- Tables and Figures
- Formulae and Equations
- Chemical Structures
- Web Enhanced Objects (WEO)
- Supporting Information
- Front Cover Artwork

Title. Use a brief, specific, and informative title. Keywords in titles assist in effective literature retrieval. If trade names are used, give generic names in parentheses.

Authorship. List the full first name, middle initial(s), and last name of each author. Omit professional and official titles. An author's affiliation should be based on where they were when the work was performed. When the present address of an author is different, include the new information in a footnote. In a paper with more than one author, the name of the corresponding author, to whom post-publication inquiries should be addressed, carries an asterisk (*). Provide an email address for the corresponding author.

Many Funders and Institutions require that institutional affiliations are identified for all authors listed in the work being submitted. ACS facilitates this requirement by collecting institution information during the manuscript submission process in ACS Paragon Plus (Step 2 in Paragon Plus: Authors and Affiliations).

Include as co-authors all those who have made a substantial contribution to the work. Addition or deletion of an author (s) after submission of the manuscript requires justification from the corresponding author and is subject to editorial approval. Deceased persons who meet the criteria for inclusion as coauthors should be included, with an Author Information note indicating the date of death.

Abstract and Keywords.

Abstract. A 150–200-word clear and concise abstract must accompany Research Articles, Review, and Perspective manuscripts. As a one-paragraph summary, describe the purpose, methods or procedures, significant new results, and implications. Define any abbreviations or acronyms used in the abstract. Include major quantitative data if they can be stated briefly, but do not include background material. Do not include reference numbers in the abstract.

Keywords. List up to five keywords at the end of the abstract page. Authors are encouraged to include keywords that do not appear in the title.

Graphic for Table of Contents (TOC)/Abstract Art. This graphic, required for a Research Article, Review, and Perspective manuscript, appears next to the abstract online and in all versions of the article. It is also used in other situations in which a representative graphic is needed (e.g. social media). The selected image should give readers a quick visual representation of the essence of the paper. It should be simple and relatively free of text and technical characters, and make use of color for visual impact. Abstract art may include a photograph of a field site or a schematic portraying the central findings of the paper. Please consult a recent issue of the journal for examples. Guidelines for [TOC/Abstract Art](#) specifications are also available. Please also see [Appendix 3](#) for a list of approved graphics programs that have acceptable copyright agreements in place for the commercial use of graphics drawn by the author.

All portions of the TOC graphic must have been created by the authors of the paper. Material not actually created by the authors cannot appear in TOC graphics even if the copyright owner of the material does not want credit.

Size requirement = 240-point width by 135-point height (3.25" x 1.75"; approx. 8.25 cm by 4.45 cm)

Additional specifications:

- Images must be original (not previously published) and created by one of the authors of the paper.
- No copyright, credit, permission, or attribution statements are allowed.
- No captions or legends are permitted.
- Photographs may not show any identifiable individuals unless a [model release](#) is provided for ALL identifiable individuals. Any photographs must have been taken by an author of the paper.
- No copyrighted, public domain, Creative Commons license, ClipArt, or stock photo material may be used.
- No postage stamps, currency, or trademarked items (company or institutional logos, images, and products) may appear in the graphic.
- No maps may be used.
- TOC art is subject to final approval by the assigned editor.
- **Authors must certify in their cover letters that they have complied with this TOC art**

policy and confirm that the submitted image was created by an author and has never been published.

Introduction.

The introduction should clearly and concisely explain the motivation for the work, its importance and originality, where it fits in the development of the field and why it should be of interest to *ACS ES&T Engineering* readers. Discuss relationships of the study to previously published work, but do not reiterate or provide a complete literature survey. Current findings should not be included or summarized in this section. Introduction sections are typically around 500 words in length.

Experimental/Methods. Describe pertinent and critical factors involved in the experimental work but avoid excessive description. Details not essential for understanding the paper can be placed in Supporting Information (SI). Specific experimental methods should be sufficiently detailed for others to repeat the experiments unequivocally. List devices of a specialized nature or instruments that may vary in performance or affect the quality of the data obtained (e.g. spectroscopic resolution), including the vendor. If the procedures are already published, provide citations to previous publications and expand only on differences in the current work. Authors must emphasize any unexpected, new, and/or significant hazards or risks associated with the reported work and this safety information must be included in the Experimental/Methods section. Authors of studies that include results that are compatible with open access data repositories (e.g., NCBI for genomic data) are expected to upload the data and give the accession information.

Results and Discussion. Be complete but concise. Discuss your findings, postulate explanations for the data, elucidate models and compare your results with those of others. Avoid irrelevant comparisons or contrasts, any speculation unsupported by the data presented and verbose discussion.

Conclusions. Concisely articulate the important findings of your work and their impact on the field of research, aiming for maximum brevity.

Abbreviations. Specialized abbreviations may be used provided they are placed in parentheses after the word(s) at first point of use. Do not include a separate Abbreviations list. Use SI units, and consult the [The ACS Style Guide](#) for lists of SI units and preferred forms of commonly used abbreviations.

Acknowledgment. Include only essential credits to acknowledge financial or professional assistance to the conduct of research. Sources of financial support must be acknowledged. Omit academic and social titles. Statements about author contributions to the work or equal contributions of work should be included as a separate statement.

Funding Sources. Authors are required to report ALL funding sources and grant/award numbers relevant to their manuscript. To meet this requirement, the submitting author must enter all sources of funding for ALL authors relevant to the submission in BOTH the Open Funder Registry tool in ACS Paragon Plus submission site, and in the manuscript under acknowledgments. See [this page](#) for complete instructions.

References. Literature references in *ACS ES&T Engineering* must be numbered in order of appearance, and the corresponding numbers placed at the appropriate locations in the text as superscripted numerals. The accuracy of the References is the responsibility of the authors, who are encouraged to avoid references to works that have not been peer reviewed. DOI numbers are

helpful but not mandatory unless they are the only identifying information available (e.g. for recently published articles). Excessive self-citation is not permitted. Any references in publications that would be difficult for most reviewers to obtain or are unpublished should be uploaded into the *ACS ES&T Engineering* Paragon Plus submission site as Information for 'Review Only'.

Examples of reference formats are available [here](#). Authors can also consult [The ACS Style Guide](#) for additional information on reference style and format.

Tables and Figures.

Tables and figures should be carefully designed to maximize presentation and comprehension of the experimental data with superfluous information excluded. Please see [Appendix 3](#) for a list of approved graphics programs and websites that have acceptable copyright agreements in place for commercial use of graphics and images.

Tables. Tables should be simple, concise, and supplement, not duplicate, information presented in the text and figures. Tables should be embedded in the text at the point of relevance, and be furnished with appropriate titles of one phrase or sentence. The title should be understandable without reference to the text. Details or definitions should be placed at the bottom as footnotes. Tables should be numbered consecutively with Arabic numbers (i.e. 1, 2, ...). Double-space them with wide margins, ensure that each data entry is placed in its own cell, and prepare tables in a consistent format, preferably using a word processor's table format feature.

Figures. Please see [Appendix 2](#) for further details on how to prepare your figure graphics or [Appendix 3](#) for a list of approved graphics programs and websites that have acceptable copyright agreements in place for the commercial use of drawn graphics and copied images. All figure graphics must be prepared and submitted in digital format and preferably embedded in the text at the point of relevance. Graphics should be numbered consecutively with Arabic numbers (i.e. 1, 2,) and accompanied by a caption. It is also acceptable to submit separate TIFF, PDF, EPS (vector artwork), or CDX (ChemDraw file) files. If separate graphic files are submitted, they should be named in a manner clearly identifying their function (e.g. Scheme 1, Figure 1). Each separate graphic file must also include the caption for the respective graphic in the manuscript itself.

Each figure graphic should have good resolution, be clear, concise, and complete and use legible font. Colors may be used to enhance graphics. Graphics must meet the journal's minimum quality standards or will be returned to authors for improvement. Any graphic (figure, chart, scheme or equation) that has appeared in an earlier publication should include a [credit line](#) citing the original source. Authors are responsible for obtaining [written permission](#) to re-use this material.

Special requirements for EPS and TIFF files graphics (both when embedded in a Word file and when submitted separately):

- EPS files: All fonts must be converted to outlines or embedded in the graphic file. The document settings should be in RGB mode.
- TIFF files: Black & white line art must have a resolution of 1200 dpi; grayscale art (a monochromatic image containing shades of gray) must have a resolution of 600 dpi; and color art (RGB color mode) must have a resolution of 300 dpi.

In addition, [ACS Authoring Services](#) can prepare your figures, tables and illustrations to the exact specifications of the journal on your behalf. This includes changes to file type, resolution, color, space, font, scale, line weights and layout (to improve readability and professional appearance).

Formulae and Equations. Chemical formulas should be embedded in the text at the point of relevance and should correspond to the [The ACS Style Guide](#). Chemical equations should be balanced and numbered consecutively along with mathematical equations. Mathematical arguments should be as brief as possible.

Chemical Structures. Chemical structures should be produced with the use of a drawing program such as ChemDraw.

Web Enhanced Objects (WEO)

The web editions of ACS journals allow readers to review multimedia attachments such as animations and movies that complement understanding of the research being reported. WEOs should be uploaded in ACS Paragon Plus with 'Web Enhanced Object' selected as the file designation. Consult the list of compatible [WEO](#) formats.

Supporting Information. Ancillary data and material of interest mainly to specialists is placed in Supporting Information to shorten the length of text in research manuscripts. Please see the section on Supporting Information (SI) (Optional) for further details below.

Front Cover Artwork. *ACS ES&T Engineering* features a different image on the front cover of each issue. The cover art image is usually related to work that is published in that particular issue of the journal. Authors are encouraged to submit images to be considered for use on future front covers at the time of submission of their revised manuscript.

Images to be considered for the cover should be eye-catching, imaginative and original. Unpublished images are encouraged. Covers should be submitted as an electronic file in eps, tif, jpg, or png format (not pdf or ppt), and be approximately 8 inches wide and 11 inches high, with a minimum resolution of 300 dpi (color) (2400 x 3300 pixels). The file should be sent as a layered file to enable art enhancement of individual elements. The top 3 inches of the cover image will be obscured by the journal logo, and the bottom 1 inch will be obscured by the ACS Publications bar. Authors should also include a 5-10 word caption that will appear on the front cover, and a short (less than 50 words) description of the cover that will be published alongside the image. Examples of previous *ACS ES&T Engineering* covers can be seen at <https://pubs.acs.org/loi/aeecco>.

If the image has been previously published, authors should include a signed permission form from the publisher to reprint the image in all media formats (print and electronic). See [Copyright and Permissions](#) on the ACS Paragon Plus website for more information. If your art is selected for front cover, ACS will send you information about how to request one complimentary 18" by 24" printed poster featuring your work.

ACS ES&T Engineering also offers authors a great way to promote their work through [Supplementary Covers](#). Submit your cover idea, artwork, and caption when submitting your manuscript revision in ACS Paragon Plus. If your article is accepted for publication, your suggestion may be selected for use on one of the journal's supplementary covers.

Disclosures

The corresponding author must reveal any potential and/or relevant competing financial or other interest (of all authors) that might be affected by publication of the results contained in the

manuscript. Potential conflicts of interest and sources of funding of the research reported must be clearly stated at the time of manuscript submission and included in the Acknowledgments. If no potential for a conflict of interest is declared, the following statement will be published in the article: “The authors declare no competing financial interest.” See the [ACS Ethical Guidelines](#) for additional details.

Supporting Information

This information is provided to the reviewers during the peer-review process (for Review Only) and is available to readers of the published work (for Publication). Supporting Information must be submitted at the same time as the manuscript. See the list of [Acceptable Software by File Designation](#) and confirm that your Supporting Information is [viewable](#).

If the manuscript is accompanied by any supporting information files for publication, these files will be made available free of charge to readers. A brief, nonsentence description of the actual contents of each file, including the file type extension, is required. This description should be labeled Supporting Information and should appear before the Acknowledgement and Reference sections. Examples of sufficient and insufficient descriptions are as follows:

Examples of sufficient descriptions: “Supporting Information: ^1H NMR spectra for all compounds (PDF)” or “Additional experimental details, materials, and methods, including photographs of experimental setup (DOC)”.

Examples of insufficient descriptions: “Supporting Information: Figures S1-S3” or “Additional figures as mentioned in the text”.

When including supporting information for review only, include copies of references that are unpublished or in-press. These files are available only to editors and reviewers.

Research Data Policy

All ACS journals strongly encourage authors to make the research data underlying their articles publicly available at the time of publication.

Research data is defined as materials and information used in the experiments that enable the validation of the conclusions drawn in the article, including primary data produced by the authors for the study being reported, secondary data reused or analyzed by the authors for the study, and any other materials necessary to reproduce or replicate the results.

The [ACS Research Data Policy](#) provides additional information on Data Availability Statements, Data Citation, and Data Repositories.

Data Requirements

Nomenclature.

Use abbreviations and acronyms sparingly, and all usage should be defined at the first occurrence in the text. Whenever possible, use systematic nomenclature as recommended by IUPAC and IUBMB for chemical compounds and biomolecules. Names of organisms should comply with genetic conventions, with genus and species names written in italics and spelled out in full on first appearance.

Database Deposition.

Advancing scientific discoveries can be enhanced when data and materials are made available and readily exchanged. *ACS ES&T Engineering* requires for all published articles that authors make materials, data, and protocols available to readers through deposition in a public database. In addition, ACS Publications' figshare houses all Supporting Information within the HTML presentation of the paper and at acs.figshare.com. Authors may want to further investigate [Dryad](#) or institutional repositories for depositing data. Authors also agree to make available to interested academic researchers for their own use any materials reported in the manuscript that are not otherwise obtainable. Any restrictions to the availability of materials or information must be stated at the time of submission. The [ACS Math Style Sheet](#) and [NMR Guidelines](#) are available on the ACS Publishing Center.

Use of Human Subjects or Animals in Research.

The American Chemical Society Publications rules and ethical guidelines provide mandatory standards of practice in experimental studies performed using biological samples obtained from animals or human subjects. Studies submitted for publication approval must present evidence that the described experimental activities have undergone local institutional review assessing safety and humane usage of study subject animals. In the case of human subjects authors must also provide a statement that study samples were obtained through the informed consent of the donors, or in lieu of that evidence, by the authority of the institutional board that licensed the use of such material. The institution's name and approved IRB number must be listed in the paper. Papers that include any aspect of Community-Based Participatory Research (CBPR) or citizen science must include information on practices employed protects vulnerable populations.

Contributor Roles Taxonomy (CRediT)

[CRediT](#) is a high-level taxonomy used to identify and acknowledge the roles played by contributors to scientific scholarly output. During original submission and/or revision, there are 14 standard roles from which the submitting author can select to describe the specific contributions of each author. At this time, CRediT is optional for authors. Please note that author CRediT information will not transfer if the manuscript is transferred to a non-pilot journal. [Click here to learn more about the ACS CRediT pilot.](#)

Language and Editing Services

A well-written paper helps share your results most clearly. The English in all submissions must meet the journal's minimum standards for publication. Manuscripts containing numerous errors in grammar and word choice can frustrate reviewers and make the review process challenging. ACS Publications' [English Editing Service](#) is designed to help scientists communicate their research effectively. Although using such a service does not guarantee acceptance of a manuscript, they may help in clarifying the significance of your research as well as editing your manuscript for grammar, spelling and other language errors to your ideas are presented at their best.

Preparing Graphics

The quality of illustrations in ACS journals and partner journals depends on the quality of the original files provided by the authors. Figures are not modified or enhanced by journal production

staff. All graphics must be prepared and submitted in digital format.

Graphics should be inserted into the main body whenever possible. Please see Appendix 2 for additional information.

Any graphic (figure chart, scheme, or equation) that has appeared in an earlier publication should include a [credit line](#) citing the original source. Authors are responsible for [obtaining written permission](#) to re-use this material.

Figure and Illustration Services

The impact of your research is not limited to what you can express with words. Tables and figures such as graphs, photographs, illustrations, diagrams, and other visuals can play a significant role in effectively communicating your findings. Our [Artwork Editing](#) and [Graphical Abstract](#) services generate publication-ready figures and Table of Contents (TOC) graphics that conform to your chosen journal's specifications. For figures, this includes changes to file type, resolution, color space, font, scale, line weights, and layout (to improve readability and professional appearance). For TOC graphics, our illustrators can work with a rough sketch or concept or help extract the key findings of your manuscript directly for use as a visual summary of your paper.

Preparing for Submission

Manuscripts, graphics, supporting information, and required forms, as well as manuscript revisions, must all be submitted in digital format through [ACS Paragon Plus](#), which requires an ACS ID to log in. Registering for an ACS ID is fast, free, and does not require an ACS membership. Please refer to Appendix 1 for additional information on preparing your submission

Prior Publication Policy

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Resolution

Digital graphics pasted into manuscripts should have the following minimum resolutions:

- Black and white line art, 1200 dpi
- Grayscale art, 600 dpi
- Color art, 300 dpi

Size

Graphics must fit a one- or two-column format. Single-column graphics can be sized up to 240 points wide (3.33 in.) and double-column graphics must be sized between 300 and 504 points (4.167 in. and 7 in.). The maximum depth for all graphics is 660 points (9.167 in.) including the caption (allow 12 pts. For each line of caption text). Lettering should be no smaller than 4.5 points in the final published format. The text should be legible when the graphic is viewed full-size. Helvetica or Arial fonts work well for lettering. Lines should be no thinner than 0.5 point.

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A caption giving the figure number and a brief description must be included below each figure. The caption should be understandable without reference to the text. It is preferable to place any key symbols used in the artwork itself, not in the caption. Ensure that any symbols and abbreviations

used in the text agree with those in the artwork.

Charts

Charts (groups of structures that do not show reactions) may have a brief caption describing their contents.

Tables

Each table must have a brief (one phrase or sentence) title that describes the contents. The title should be understandable without reference to the text. Details should be put in footnotes, not in the title. Tables should be used when the data cannot be presented clearly in the narrative, when many numbers must be presented, or when more meaningful inter-relationships can be conveyed by the tabular format. Tables should supplement, not duplicate, information presented in the text and figures. Tables should be simple and concise.

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