

Reintroducing the INTRODUCTION: How to Write a Compelling Introduction for the ACS Sustainable Family of Journals



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Article Recommendations

In this editorial, we wish to share with the community some recommendations on the preparation of articles for submission to the ACS Sustainable family of journals.

The ACS Sustainable family of journals, *ACS Sustainable Chemistry & Engineering* (SCE) and *ACS Sustainable Resource Management* (SRM), are dedicated to publishing exciting, cutting-edge and high-quality research. As our readers and contributors will readily recognize, our journals provide a venue for sharing and discussing solutions to grand challenges of science and engineering while minimizing adverse impacts upon all planetary boundaries considered in the assessment of sustainability. Effective pursuit of this mission demands that our editorial teams periodically evaluate and refine the scope of our journals to embrace emerging topics, stimulate new ideas, and drive progress at the nexus of our core disciplinary strengths. This effort seeks to ensure that the ACS Sustainable family of journals remains a vibrant and leading forum to disseminate the latest discoveries and innovations in the constantly evolving fields of sustainable chemistry and engineering as well as resource management.

Our journals publish articles, letters, perspectives, and viewpoints on the discovery of novel molecules, materials, and/or processes. Published articles should clearly articulate how they significantly advance the state of the art in terms of understanding or insight and how they do so in a sustainable fashion. Simply claiming contribution or merit in the absence of substantiated benefits in sustainability must be avoided.

Toward this end, we offer guidance to prospective authors on a model that we feel promotes a well-crafted and scientifically balanced Introduction Section of a manuscript to be published in our ACS Sustainable journals. While we recognize that all parts of a manuscript must be meticulously prepared according to the respective journal guidelines, the introduction is an especially critical component to articulate the justification for publishing in our journal family. Readers, editors, and reviewers rely on the introduction to understand the context, novelty, significance, and scope of the work. The introduction also plays a key role in presenting the first impression and generating readers' interest in further exploring the article. Based on our collective experience as readers, editors, reviewers, and authors, we suggest a five-point structure for the introduction, presented in Figure 1, which effectively communicates the novelty and scope of the work and which is encountered in many of the most-cited articles

published in our journals. Fundamentally, this framework develops and reinforces a logical narrative able to highlight the presented research, while emphasizing its relevance to sustainability. It should be stressed that this framework is suggestive and shared here to provoke thought. As editors, we are open to alternative formats, as we fully recognize that each contribution is unique, and that diversity should be embraced and celebrated in every possible sense.

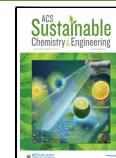
1. CONTEXT POSITIONING: WHERE ARE YOU?

Introductions typically start with a short preamble to provide broad context for the presented research. This is essential as our journals cover a vast space at the confluence of chemistry and engineering, exploring virtually all aspects of these disciplines through the sustainability lens. As such, our readership is broad in its interests and expertise. Authors must ensure that the research fits clearly within the published scope of the journal (SCE or SRM) to which the manuscript is being submitted. Authors are encouraged to set the scene for their research, anchoring it in contemporary societal, industrial, and/or scientific challenges. They should, however, be attentive to avoid elaborating on too many general concepts which are familiar to the readers. Instead, authors may cite key reviews in the field so that the interested readers can deepen their knowledge through accessing them.

2. STATE OF THE ART: WHAT WAS DONE?

Authors are expected to provide a succinct yet effective summary on the state of the art, which provides the necessary information for the readers to correctly understand current advances in the field. We expect authors to directly cite relevant literature, favoring original articles rather than reviews, being fair in pointing to relevant contributors in the field and refraining from excessive self-citation. Relevant literature includes seminal papers, especially for emerging fields, as well as appropriate examples of contemporary research. Published works using similar ideas or concepts must also be cited to

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Figure 1. Proposed framework for introduction to articles published in the *ACS Sustainable* journals.

enable the knowledge gap discussion and proper novelty evaluation. Failure to cite important precedent literature could be interpreted as a breach of the ACS Ethical Guidelines to Publication of Chemical Research and is a reason for rejection without external review.

3. KNOWLEDGE GAP: WHAT IS MISSING?

Based on the state of the art, authors should articulate the limitations and challenges within existing literature. Of key importance is the requirement that the knowledge gap is framed in terms of significant advancements in sustainability. General qualitative characterizations such as “all past syntheses use large amounts of solvents, high temperatures, and extended reaction times” are not useful and should be replaced by more quantitative and precise assessments of the knowledge gap(s). To this end, we encourage the use of metrics, with relevant citations, as highlighted in the series of our prior editorials with guidance from our editorial team to our readers on this topic in diverse topical areas.^{1–6} Improvements should be clearly described, quantified, and compared to the most updated benchmark cases in the literature. For instance, if a certain synthesis always uses a toxic compound, the knowledge gap may be identification of a strategy to replace it with a more benign one. In another example, a specific process might have drawbacks because of the generation of waste, in which case the use of process mass intensity, the E-factor, or even just waste amounts could be useful to articulate the need for more research focusing on this. In this manner, authors should be able to identify knowledge gaps that their research addresses in a unique, clear, and concrete way.

4. ORIGINAL IDEA: WHAT DID YOU DO?

Usually, the original idea and implications (see point 5 below) of the work are summarized in the last paragraph of the introduction starting with a phrase such as “in this work”. As *SCE* and *SRM* are dedicated to publishing original ideas and new insights related to sustainable chemistry and engineering and resources management, articulating this point clearly assumes great importance. In this regard, an effective introduction to the state of the art and associated knowledge gaps (see points 2 and 3) should help authors make a strong case as to how their idea, approach, and solution are original, differ from past works, and represent a breakthrough in the field. It is important to remember that novelty here must be understood as being anchored in sustainability. Significant improvements in performance for any molecule, material, or process, where the sustainability aspect is not identified, do not meet the novelty threshold for *SCE* and *SRM*. It

must be noted that our journals are unable to publish either incremental advances, examples of which are noted in the cited previous editorials in our journals,⁷ or the mere juxtaposition of two already reported successful strategies.

5. IMPLICATIONS: WHY DOES IT MATTER?

Finally, it is good to end the introduction by stating the relevance and significance of the research. Based on the identified knowledge gap, authors can comment on how important their discovery or innovation is in the context of solving the identified problem.

In summary, points 1 through 5 describe the creation of an evidenced and logical argument that sets the scene for effective communication of new insight. The skeletal structure of the introduction can be augmented by the thoughtful addition of auxiliary content and comparative data sets that curate the discussion. As examples, authors are encouraged to consider summarizing past and present works in a concise table (that may be placed either in the main manuscript or in the Supporting Information). Tables should include topical performance data and whenever possible appropriate sustainability metrics which can be used to demonstrate progress or highlight opportunity. Similarly, the incorporation of a summary scheme that compares benchmark systems to newly proposed alternatives, while highlighting beneficial features, can be helpful to provide graphical support for discussion.

We would like to remind contributors to our journals that one of the tenets of Green Chemistry is the notion that a molecule, material, or process is never “green”, in the absolute sense of the term, but that it may be considered “greener”, when compared to what is already known. We suggest that, in the absence of comparative data, the inclusion of appropriate metrics or the presentation of an evidence-based narrative statement, the terms “clean”, “green”, or “sustainable” are avoided. In a similar sense, we also discourage the use of the terms “green” or “sustainable” in manuscript titles, as it is not a place conducive to the establishment of a comparative framework.

We hope that this suggested framework for constructing a compelling introduction is useful to the authors in articulating how their work incorporates the four foundational pillars of our journals, viz., *novelty, quality, scope, and metrics* (Figure 2).

In closing, we emphasize that a key differentiator associated with the ACS Sustainable family of journals (*ACS Sustainable Chemistry & Engineering* and *ACS Sustainable Resource Management*) remains our openly stated commitment to celebrate advances in sustainability



Novelty



Quality



Scope



Metrics

Figure 2. Four pillars of ACS Sustainable family of journals.

and highlight the realization of beneficial impacts which flow from papers that appear in our pages.

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Notes

Views expressed in this editorial are those of the authors and not necessarily the views of the ACS.

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