Scientific Writing Workshop

November 29, 2021
IIT Gandhinagar
Attributes of a High-Quality Research Paper

- Not just a scientific report of empirical observations but a detailed analysis of the data and in-depth mechanistic insights
- The title and abstract are simple and attractive
- The figures and schemes are well drawn and self-explanatory
- The Experimental/Methods section provides sufficient details so that reproducible in another laboratory
- Compelling and exciting scientific story
Tell a Story!

• Make sure the paper has a main theme and punchline
• Avoid “data dumping”
• Provide context to prior literature, and cite the original work in the reference section
• Explain why the problem is important!
• Share experimental details that would allow a reasonably educated person in your field to re-perform the experiments
• Analyze the data accurately and objectively
• Provide a strong conclusion, describing how your work moves the field forward, but be realistic

Image: https://jasonfurnell.wordpress.com/
Key Steps in Composing a Scientifically Effective Paper

- Create an outline and identify major scientific advances
- Include highlights in the Abstract
- Compose figures & schemes
- Discuss results to support the claims
- Compose a scientifically effective paper keeping journal scope in mind

Anatomy of a Manuscript

Title

Abstract

Introduction

Graphics

Experimental Section

Results and Conclusion

References

Acknowledgement
What’s in a Name?

• First thing that draws attention
• Shorter titles often make a greater impact

✅ Make sure that your title is grammatically sound
✅ Craft a compelling title – describe your results/findings in as few words as possible, in an evocative and exciting way

✗ “Study”, “Investigation”, or “Demonstration” reflects routine scientific work
✗ Avoid asking a question in the title – be clear on what is accomplished
✗ Manuscript titles should not make claims of priority, originality, convenience, effectiveness, or value


http://pubs.acs.org/paragonplus/submission/joceah/joceah_authguide.pdf
Attract Readers with a Strong Title

“We strongly believe that the science should speak for itself and that the use of adjectives that sound too self-promoting can have adverse impact.”

FUNCTIONALITY

- Attract potential audience
- Aid retrieval and indexing

CONTENT

- Simple
- Effective
- Accurate

Overly Long Title:
Synthesis, Electrochemistry, Spectroscopic Characterization, and X-ray Crystal Structures of Ni(III) Complexes that can be Isolated and Promote Carbon–Carbon Bond-Forming Reductive Elimination

Shortened Title:
Carbon–Carbon Bond-Forming Reductive Elimination from Isolated Nickel(III) Complexes
Identification of Novel Urolithin Metabolites in Human Feces and Urine after the Intake of a Pomegranate Extract

Rocio García-Villalba, Maria V. Selma, Juan C. Espin, and Francisco A. Tomás-Barberán


Publication Date (Web): September 8, 2019
ACS Editors’ Choice Date: September 28, 2019

ABSTRACT

Realizing High Thermoelectric Performance in GeTe through Optimizing Ge Vacancies and Manipulating Ge Precipitates

Yang Jin, Yu Xiao, Dongyang Wang, Zhiwei Huang, Yuqing Qian, and Li-Dong Zhao

ACS Appl. Energy Mater. 2019, 2, 7694-7701 (Article)  ACS Editors’ Choice

Publication Date (Web): September 9, 2019
ACS Editors’ Choice Date: September 27, 2019

ABSTRACT
Table of Content (ToC)

• Typically the first glimpse a potential reader has of your published paper

• A good ToC image must, simultaneously:
  – Resonate with the title (to provide synergistic support)
  – Instantly provide a sense of what is to be learned

• Ensure that everything in the ToC image is comprehensible and lucid, and yet exciting

• A common mistake is simply to cut and paste a figure/reaction scheme from the paper to use as the ToC
Design Good TOC Graphics

• Recommended Reading: “Table of Contents Images: Science and Beauty = Clarity”, Chem. Mater., 2016, 28 (6), pp 1589–1590, DOI: 10.1021/acs.chemmater.6b00928

• Excessive use of cartoon images in any of the graphics are unadvised, the image should look professional.

• No logos from universities, government associations, or companies!
Water-Soluble Superparamagnetic Magnetite Nanoparticles with Biocompatible Coating for Enhanced Magnetic Resonance Imaging

✓ The ToC image here quickly outlines a synthesis of iron oxide nanoparticles, with the reagents clearly displayed.

✓ The subsequent use of the magnetite nanoparticles in MRI is obvious from the gray scale plot on the right, and so the ToC suggests a complete body of work.
“Flash” Synthesis of CdSe/CdS Core–Shell Quantum Dots

- The title here projects that the concept of speed with respect to nanoparticle synthesis is the obvious focus of the paper.
- The use of the word “Flash” ties in well with the stopwatch in the ToC image, and hence makes the point that the nanocrystal synthesis is fast.
- The glowing vial suggests that the quality of the resulting nanoparticles is not compromised.
Think!
Are these suitable for TOC representation?
Abstract

A summary of the work being discussed in the paper

Written in such a way that any reader who is not familiar with the topic will be able to understand and appreciate the main points of the study

Avoid words “superb”, “excellent”, “exceptional”, “outstanding”, or other similar descriptive words unless rigorously supported by a thorough comparison with the state-of-the-art in the manuscript
Extra effort should be taken to compose an effective and concise abstract!*  

**FUNCTIONALITY**
- Allow readers to determine paper scope
- Aid retrieval and indexing

**CONTENT**
- Any reader who is not familiar with the topic will be able to understand and appreciate the main points
  - Concise
  - Self-contained/Separately
  - Informative
  - DO NOT supplement or evaluate the conclusions
  - DO NOT cite references, tables, figures

Interface stability in solid-state batteries

Development of high conductivity solid-state electrolytes for lithium ion batteries has proceeded rapidly in recent years, but incorporating these new materials into high-performing batteries has proven difficult. Interfacial resistance is now the limiting factor in many systems, but the exact mechanisms of this resistance have not been fully explained - in part because experimental evaluation of the interface can be very difficult. In this work, we develop a computational methodology to examine the thermodynamics of formation of resistive interfacial phases. The predicted interfacial phase formation is well correlated with experimental interfacial observations and battery performance. We calculate that thiophosphate electrolytes have especially high reactivity with high voltage cathodes and a narrow electrochemical stability window. We also find that a number of known electrolytes are not inherently stable but react in situ with the electrode to form passivating but ionically conducting barrier layers. As a reference for experimentalists, we tabulate the stability and expected decomposition products for a wide range of electrolyte, coating, and electrode materials including a number of high-performing combinations that have not yet been attempted experimentally.
Bismuth-based solar cells have exhibited some advantages over lead perovskite solar cells for nontoxicity and superior stability, which are currently two main concerns in the photovoltaic community. As for the perovskite-related compound (CH$_3$NH$_3$)$_3$Bi$_2$I$_9$ applied for solar cells, the conversion efficiency is severely restricted by the unsatisfactory photoactive film quality. Herein we report a novel two-step approach—high-vacuum BiI$_3$ deposition and low-vacuum homogeneous transformation of BiI$_3$ to (CH$_3$NH$_3$)$_3$Bi$_2$I$_9$—for highly compact, pinhole-free, large-grained films, which are characterized with absorption coefficient, trap density of states, and charge diffusion length comparable to those of some lead perovskite analogues. Accordingly, the solar cells have realized a record power conversion of efficiency of 1.64% and also a high external quantum efficiency approaching 60%. Our work demonstrates the potential of (CH$_3$NH$_3$)$_3$Bi$_2$I$_9$ for highly efficient and long-term stable solar cells.

Draw Graphics with Care

- Be clear and precise, simple but informative
- Graphics should complement the text and support your story
- Use color!
- Graphics must be original, unpublished artwork, created by an author
Accuracy of data presentation

Aesthetics of the figure

Visible Major and Minor Ticks

Legends to identify traces

Bold Axis Line

Visible Major and minor Tics

Analyzed data in the inset

Distinguishable, vibrant colors

Axis Title with units (Bold and Larger Font)
Prepare High Quality Graphics/Figures

• Be sure to check the PDF file you are about to upload to the submission system!

• You do not want your paper to look like this:
Construct a Well-written Cover Letter

“Cover Letter is a statement of why the paper is *appropriate* for the journal”*

**FUNCTIONALITY**

- Interest the editor enough to read your paper carefully and choose to send it out for peer review
- A chance for authors to persuade the editors of the significance of their work in a less formal manner

**CONTENT**

- Highlight your *most important* findings
- State *impact* to the community
- **DO NOT** copy Abstract!
- **DO NOT** simply state that your manuscript is “of interest to the field” or “novel.” Address *specific aspects* of the journal’s Aims & Scope statement

* ACS Nano 2010, 4, 2487
http://www.business2community.com/communications/avoid-embarrassing-marketing-gaffes-communicate-effectively-0897764
Dear Professor Bertozzi,

We wish to submit our manuscript “TITLE” for publication in *ACS Central Science*.

We describe a new, non-natural enzyme-catalyzed reaction, aziridination of olefins via intermolecular nitrene transfer. We discovered that a variant of cytochrome P450BM3 used in our previous studies of intermolecular sulfimidation also catalyzes aziridination. We were able to improve this activity more than 50-fold and the enantioselectivity of enzyme-catalyzed aziridination was improved to 99% ee for a range of styrenyl substrates.

This work should be of interest to the broad audience that *ACS Central Science* wishes to reach. It touches on evolution—how new enzyme activities can appear and be improved through evolution—as well as inorganic catalysis, biocatalysis, and chemical synthesis.

Permission from Professor Frances Arnold received
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The Peer Review Process

An author submitting a manuscript to a journal is taken through a process that includes providing relevant information and uploading required files. Authors are also asked to answer a series of questions that assist the editorial office in screening the submission. These questions cover such items as conflict of interest disclosures, previous, or duplicate submissions, and acknowledgment of the publisher's ethical guidelines.

The submission is then assigned to the main editorial office (Editor-in-Chief), where an administrative screening is performed to ensure that the manuscript is ready for peer review.
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For successfully completing the online course ACS Reviewer Lab, demonstrating their understanding of the principles of high quality of peer review including reviewer ethics, instructions for reviewers, and tools and components for writing a constructive review.

May 19, 2019

DATE GRANTED

Sarah Tegen, PhD
Vice President, Global Journals Development

American Chemical Society
Ethics & Plagiarism
10 Tips for Ethical Authorship

1. Be Accurate and Truthful
2. Share Your Data with Other Authors
3. Cite All Sources
4. Report All Safety Concerns
5. Avoid Fragmentation
6. Don’t Double-Dip Submissions
7. Constructive Criticism Only
8. Disclose Authorship and Potential Conflicts
9. Do NOT Plagiarize
10. Provide Accurate Visuals

https://axial.acs.org/2017/07/31/10-tips-ethical-authorship/
Most Common Ethical Violations

- **Self-plagiarism** – reusing your own content
- **Prior publication** – journals have policies about what they consider to be published content
- **Concurrent submissions** – submitting the same manuscript to multiple journals at the same time
- **Data fabrication or falsification** – deliberately or unintentionally changing the data to fit the conclusions
Most common types of image duplications

- Western blot images
- Microscopic images

Image duplication by multiplication of same western blot image

Image duplication by magnification of single microscopic image section

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Ethical Guidelines at ACS

Ethical Guidelines to Publication of Chemical Research

The Editors of journals published by the American Chemical Society provide a set of ethical guidelines for persons engaged in the publication of chemical research, specifically for editors, authors, and manuscript reviewers. These guidelines were developed by the Editors of the journals published by the Publications Division of the ACS and are reviewed regularly to ensure their clarity.

The ACS Journals’ Ethical Guidelines are offered from a conviction that the observance of high ethical standards is so vital to the whole scientific enterprise that a definition of those standards should be brought to the attention of all concerned.

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https://pubs.acs.org/page/policy/ethics/index.html
ACS Author Lab is an online course that empowers authors to prepare and submit strong manuscripts, avoiding errors that could lead to delays in the publication process.

- Select the Right Journal
- Showcase the Significance of Your Work
- Effectively Describe Your Research
- Create Publication-Ready Visuals
- Finalize Your Manuscript and Prepare for Submission
- Navigate the Revision Process
- Adhere to Ethical Guidelines
## ACS Author Lab Module 7

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Image Manipulation

Processing an image can be seen as falsification if you:

- Crop out important information.
- Apply effects to only part of an image.
- Apply effects to the extent that it changes the meaning.
- Reuse an image in multiple figures without explanation.

State in your manuscript how and why you processed any images and keep all original files.
ACS in India

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Upcoming Events

DST & ACS Workshop 2021: Master the Publishing Process
Date: 22 Oct 2021
Time: 18:00 - 20:30 Hours (IST)
Location: Online

Register Now

ACS India Webinar: Careers in Science and Engineering - Everything that You Need to Know.
Date: 10 Nov 2021
Time: 18:00 - 19:00 Hours (IST)
Location: Online

Register Now

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18 Skill building events during 2019-2022

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Tiruchirappalli

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UCOST Uttarakhand

Aligarh Muslim University (UP)

CSIR – CSMCRI Bhavnagar

Five on-site & Five PAN India Virtual workshops from Nov 2019 to October 2021 attracted ~ 15k registrations >4500 attendees ~1500 Offered complementary ACS Membership

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https://www.acs.org/content/acs/en/international/india/events/acs-science-talks.html
ACS Science Talks: Virtual Library

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