



Writing Articles in Energy
Online PhD Seminar
29 September 2023

WP4: Dissemination & Exploitation

Çukurova University

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Content

1. Background
2. Top-down approach to writing an article
 - Outline of an article
 - Content of different sections
3. Writing
 - Expressions and wording
 - Conventions
4. Submitting your article
 - Indexes and journals
5. Conclusions





Background

- Articles in energy science is increasing more and more
 - Increasing global energy problems
 - Climate crisis, energy security, sustainability, ...
 - Multi-disciplinarity of energy science
 - Intensive cooperation of energy scientists, industrial experts and policy makers
- Writing articles can present some challenges





Challenges

- Language barrier – English is not the mother tongue for many scientists
- Insufficient training on article writing at universities and research organizations
- Common mistakes – not only in energy science also in other fields
 - Not giving the scientific context in the abstract
 - Failing to define research question
 - Lack of showing novelty – what is beyond the state-of-the art?
 - Lack of interpretation of results
 - Defects in scientific arguments



Before Starting to Write

Ask yourself:

- Why are we writing this article?
 - Be crystal clear with your research question - objectives
- How can we trigger the curiosity of wider audience?
 - Be creative – addressing the current issues with creative examples
- How does our research connect to and extend established knowledge?
 - Be specific about your novelty – showing advancements and impacts



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Concise Writing

- Well-defined structure
- Careful wording



Top-down
Approach



Steps in Top-Down Approach

1. General outline

2. Defining content of each section

3. Structuring arguments

4. Concise wording

5. Conventions for presenting research



Outline of an Article

- Outline typically consists of the following sections:
 - Title
 - Abstract
 - Introduction
 - Methodology
 - Results and Discussion
 - Conclusions
 - Other sections
 - Acknowledgements, References, Appendices (if needed)





Title

- Title of an article is like a label: will be read first by wider audience
- Should describe the content of the article with adequate number of words
 - Should not be too short – too general
 - Should not be too long
- It is usually a sequence of words rather than a sentence
 - Could sometimes be a short question.
 - Order of words is very important
- Important keywords should be included in the title

Abstract

- Most important part of the article
 - Often the first and only section actually read by scientific world
 - Should be written with care
- How long?
 - Maximum length is usually around 300 words
 - Can be specified by the journal
- When to write it?
 - Can be written after completing the article
 - Preliminary abstract can be useful for focusing on the sections of the article
- Graphical abstract
 - Some journals can also accept graphical abstract – not compulsory
 - Use graphics that best represents your work
 - Graphics should be of high quality

Abstract - Do's and Dont's



YES

- Self-explanatory
- Summarize elements of article



NO

- Outline of research
- Equations and references
- Results not included in the article



Abstract – Structure*

1. one sentence of introduction comprehensible to a wide audience,
2. one sentence of more detailed background information comprehensible to scientists within energy science,
3. one sentence clearly defining the research question addressed by the article,
4. one sentence indicating the main approach chosen and, if applicable, the research hypothesis tested,
5. one sentence summarizing the main results,
6. one or two sentences presenting detailed quantitative results relevant for addressing the research question and explaining the meaning of the results compared to previous findings and established knowledge,
7. one or two sentences discussing the results from a more general perspective by presenting, e.g., conclusions or recommendations comprehensible to peers and non-peers alike.

* Weiss and Newman, 2011

Abstract – Example*

Protonic ceramic electrochemical cells (PCECs) can be employed for power generation and sustainable hydrogen production. Lowering the PCEC operating temperature can facilitate its scale-up and commercialization. However, achieving high energy efficiency and long-term durability at low operating temperatures is a long-standing challenge. Here, we report a simple and scalable approach for fabricating ultrathin, chemically homogeneous, and robust proton-conducting electrolytes and demonstrate an in situ formed composite positive electrode, $\text{Ba}_{0.62}\text{Sr}_{0.38}\text{CoO}_{3-\delta}-\text{Pr}_{1.44}\text{Ba}_{0.11}\text{Sr}_{0.45}\text{Co}_{1.32}\text{Fe}_{0.68}\text{O}_{6-\delta}$, which significantly reduces ohmic resistance, positive electrode–electrolyte contact resistance and electrode polarization resistance. The PCECs attain high power densities in fuel-cell mode ($\sim 0.75 \text{ W cm}^{-2}$ at 450°C and $\sim 0.10 \text{ W cm}^{-2}$ at 275°C) and exceptional current densities in steam electrolysis mode (-1.28 A cm^{-2} at 1.4 V and 450°C). At 600°C , the PCECs achieve a power density of $\sim 2 \text{ W cm}^{-2}$. Additionally, we demonstrate the direct utilization of methane and ammonia for power generation at $<450^\circ\text{C}$. Our PCECs are also stable for power generation and hydrogen production at 400°C .

General audience

Energy Scientists

Research Question (RQ)

Main Approach

Main Results

Results for more general perspective

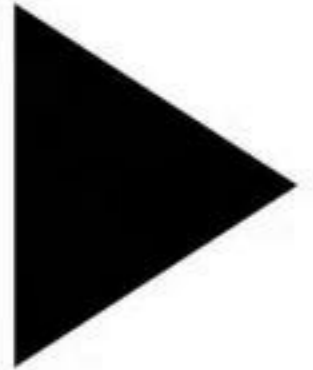
Results addressing RQ

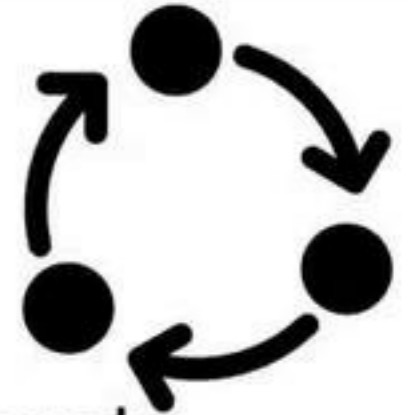
*Liu et al., 2023, Nature Energy,



Introduction

- Familiarize readers with the research
 - Explain content of the first three sentences of the abstract in greater detail.
- Establishing the scientific context of the research
 - Related references from previous work, in chronological order
- Guide the readers from general to more specific aspects of their research
 - explaining knowledge gaps
 - linking to clear definition of research question
- Justify the methods as well as the scope and assumptions of the research
- Last paragraph: Purpose of the paper
 - Research question
 - Emphasize the novelty
 - Brief outline of all subsequent sections (not required)
- Should be limited to a maximum of 600–700 words.





Methodology - Structure

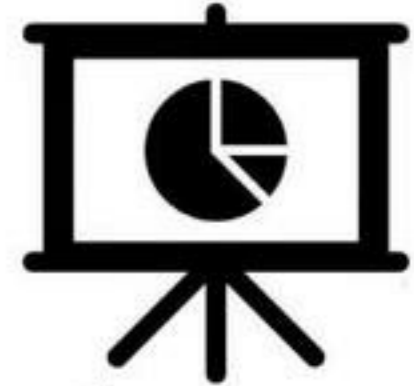
Explain in logical order the approached used to address the research question by providing:

- Detailed definitions of technical terms that enable readers to understand all subsequent concepts and methods,
- Explanation of methods, starting with the general and ending with the specific, thereby following the chronological order in which the analysis was conducted,
- Examples to illustrate complex approaches



Methodology

- Focus on novel methodologies and new data
- standard approaches should only be briefly mentioned, preferably by making reference to the scientific literature.
- The methodology section should:
 - (i) justify the chosen method, if multiple approaches are possible, and
 - (ii) clarify all calculations to allow peers to verify the research results [8].
- An extensive explanation of calculation procedures should only be presented if this is essential for understanding the research.
- Otherwise, authors may present this information together with, e.g., extensive input data used for modeling in an appendix.



Results

Qualitatively and quantitatively presents all findings relevant for answering the research question

- Start with the general and end with the specific results
- Use diagrams (graphics) to present results
- Tables should only be used if precise value of a parameter is critical
- Any numerical results should be accompanied by their uncertainty
- Extensive amount of data (if existing) can be included in an appendix
- Compare results with findings from other studies
- Avoid showing the same results in both tables and figures - choose one
- Avoid explaining methodology (should be done in methodology section)



Discussion - Structure

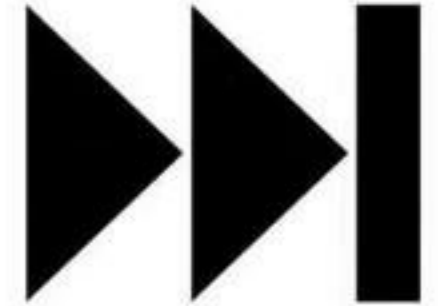
Interpretation of results – meaning and significance – suggested order of elements:

- one or two sentences repeating the principal results,
- several sentences explaining the strengths and weaknesses of the methodology, input data and results, in particular detailing potential sources of uncertainty,
- several sentences discussing the results in relation to other studies,
- several sentences describing the significance of the research in relation to established knowledge,
- a sentence or two outlining unanswered research questions and future research requirements.



Discussion

- Provide an unbiased account of the research
- Avoid unnecessary speculation
- Pay attention to the discussion of uncertainties and demonstrate that these are justifiable and limited.
- If results refer to a specific system,(e.g., a product, economic sector, country, or time period) , indicate to what extent their findings have broader validity.
- Results should not be inflated
- No conclusions be drawn or speculation be made beyond what the empirical evidence supports



Conclusions - Structure

- Answer the research question and/or specify to what extent knowledge gaps could be addressed,
- Provide readers with a central message,
- Make recommendations and outline future research based on the results and discussions presented earlier
- Limited to fewer than 250 words



Other Sections - Acknowledgements

- Very important to add this section
- This section is only part that is proof of the support you received to realize your article
- Thanking to :
 - Those who have provided technical support
 - Special equipments, source of special materials etc.”
 - Funding agencies, organizations supporting your Project, scholarship, etc.



Other Sections - References

- Compile the list of references relevant to your research question
 - Write down ideas immediately even in rough form under relevant section
- Try to use only published references – pay attention to citations
- When webpages have to be used always give the last access date
- Cite references whenever necessary in the manuscript
 - Do not over use references
 - Avoid grouping a large number of references for the same citation
- Use journal's style guide for giving references
 - APA (American Psychological Association) Style
 - MLA (Modern Language Association) Style
 - Use softwares like EndNote to choose from journal lists and inserting the correct styles



Citing References

- Name – Year System
 - Example: (Paksoy, 2023)
- Number System
 - Alphabetical ordered reference list
 - Citation ordered reference list
 - Example: (1) or [1]
- Use journal's style guide for the choice of citing



Other Sections - Appendices

- It is added after the main sections of the article (not compulsory)
- Should be cited from the article where it is necessary
- There can be more than one appendix
- When do we need appendices?
 - Sharing abundant data that you may have.
 - Showing details of mathematical operations, modelling equations etc.



Writing – Be Consistent with Tenses

- There can be different conventions:
- Convention 1:
 - stating established knowledge and making reference to tables and figures in present tense
 - describing methods and results of one's own research as well as the recent findings of others in past tense
- Convention 2:
 - present tense throughout the entire article – limits the ambiguous use of tenses
- In any case, avoid to use future and present continuous tenses.



Writing – Prefer Using Active Voice

- Active voice is more direct than passive voice
- Reader can differentiate between author's work and others'
- Passive voice can be used when
 - A sentence primarily focuses on the object
 - If performer of the action is unknown or not important
- Example:
 - *"Fossil fuels are used for energy generation but also for so-called non-energy purposes, [...]."* – informs us about fossil fuels
 - *Suggestion: Both energy generation and non-energy use consume fossil fuels.* – informs us about energy generation and non-energy use

Writing – Use “we” in stead of “I”

- Using “we” is common practice in scientific literature – even if the article is written by a single author
- Avoids overemphasis of a single person’s contribution
- Precludes use of passive voice
- *Example: “Data for the supply chain has been collected reaching back three decades, enabling analysis of trends in production and consumption of iron and steel over the years.”*
- *Suggestion: We have collected data for the supply chain reaching back three decades, enabling us to analyze trends in the production and consumption of iron and steel. – clarifies that it is authors who collected the data.*



Writing – Put Statements in Positive Form

- Avoid using “not”
- Readers want to know what is in stead of what is not:
- *Example: “This situation may not persist in the future, [. . .]”*
- *Suggestion: This situation may change in the future, [. . .].*
- Authors can avoid using the word ‘not’ by:
- replacing ‘not’ with a proper prefix, for example ‘un-,’ ‘in-,’ or ‘im-’ attached to the respective adjective or adverb,
- altering negative statements such as ‘not increasing’ or ‘not very high’ into positive statements such as ‘remaining constant’ or ‘low’

Writing – Avoiding “not”

Example	Preferred usage
Do not account for	Exclude/neglect
Do not allow	Prevent
Do not have much confidence in	Distrust
Do not meet the requirements	Insufficient
Not always straight forward	Complicated/difficult/ problematic
Not feasible/not the case	Infeasible
Not important	Unimportant/negligible
Not included in	Excluded from
Not economically viable	Uneconomical/unprofitable
Not sufficiently reliable	Unreliable
Not too distant	Close/near



Writing – Omit nominalizations

- Nominalizations turn a verb or an adjective into a noun
 - Make sentences less specific, more difficult to read, and promote wordiness.
- Omit nominalizations to the extent possible by using appropriate verbs or adjectives instead:
- *Example: “Many studies have been carried out on the subject of biological hydrogen production under heterotrophic, photoautotrophic and photo-heterotrophic conditions.”*
- *Suggestion: Biological hydrogen production under heterotrophic, photoautotrophic and photo-heterotrophic conditions has been studied frequently.*
- Check and potentially revise nominalizations in conjunction with ‘there is/are.’
- *Example: “Meanwhile, there is a growing trend towards distributed electricity production and supply in Europe.”*
- *Suggestion: Meanwhile, distributed electricity production and supply in Europe is growing.*



Writing – Omit Wordiness

- Clear writing makes every word relevant
- Omitting wordiness and inappropriate jargon makes writing concise and reduces the risk of misinterpretation.
- Rephrase expressions containing ‘the fact that,’ ‘one of the most,’ and ‘there are [. . .] which are [. . .],’
- Omit sentences starting with ‘needless to say.’
- Instead of explaining ‘It is interesting that,’ the statement itself should be made interesting.
- *Example: An additional complication is the fact that the costs of some parts of the fuel cell do not scale linearly with its capacity.*
- *Suggestion: An additional complication arises because the costs of some parts of the fuel cell do not scale linearly with its capacity.*

Writing – Omit Subjective Statements

- Avoid presenting subjective statements, such as opinions and value judgments, because these introduce ambiguity into an otherwise clear message.
- *Example: “The energy efficiency of an integrated pulp and paper mill is approximately 10-50% better, depending on the grade of paper produced, than in a stand alone mill.”*
 - The word ‘better’ should be replaced by ‘higher.’ The original sentence also separates the grammatical subject ‘energy efficiency’ from the grammatical object ‘stand-alone mill.’
- *Suggestion: The energy efficiency of an integrated pulp and paper mill is approximately 10-50% higher than that of a stand-alone mill, depending on the grade of paper produced.*

Writing – Be specific and definite

- *Try to refer to figures and tables in paranthesis:*
- *Example: Our model of the UK iron and steel cycle is shown in Fig. 2.*
- *Suggestion: Our model of the UK iron and steel cycle includes [insert important information here] (Fig. 2).*
- *Avoid the use of qualifiers like ‘rather,’ ‘very,’ ‘little’ – these dilute the message,*
- *Make quantitative instead of qualitative statements*
 - *Lack of understanding if they are only told a parameter is ‘larger’ or ‘higher’ than another one without knowing by how much, precisely.),*
- *Ensure consistency of terminology; always use the same technical term throughout*
 - *For example, choose one and use it in the entire article: latent heat, heat of fusion, enthalpy of melting*
- *Use ‘that’ and ‘which’ as follows:*
 - *choose ‘that’ to differentiate an object from other similar objects;*
 - *choose ‘which’ to add a fact about one particular object.*



Additional Conventions -1

1. Both title and keywords must precisely represent the content of the article to ensure that readers grasp the topic at a glance and that they find the article listed in databases and search engines .
2. Authors should use SI units (International System of units) to quantify parameters; authors should spell out unit abbreviations upon first use in lower case, e.g., kelvin, even if abbreviated in upper case, e.g., K.
3. Authors must explain any abbreviation (including SI units, country codes, and currencies) upon first occurrence. Authors should avoid overusing abbreviations, unless these are common to the general readership.



Additional Conventions -2

4. Authors should abbreviate country names in tables and figures by using two-letter ISO codes. Monetary quantities should be denoted by three-letter ISO codes; authors should specify current or constant currency and, if applicable, the base year of deflation.
5. Authors should round numbers to significant digits.
6. Authors should always reference tables and figures in the text before displaying them.



Additional Conventions -3

7. Authors should always reference scientific statements individually and avoid references to secondary literature to allow readers to locate the primary sources of information.
8. Authors should pay attention to: (i) punctuation, e.g., all sentences that end with expressions in parentheses must be punctuated outside of the closing parenthesis; and (ii) spelling, e.g., 'cannot' is one word, and 'its' is a possessive pronoun while 'it's' is a contraction for 'it is'.
9. Authors should chose one type of English, e.g., UK (United Kingdom) or US (United States) English, and follow its rules throughout the article.



Submitting the Article - Respectable Journals

Factors affecting respectability of journals:

- What are the contributions of the journal to the specific topic?
- How many citations the published articles in this journal receive?
How often?
- How many of these citations are self-citations?
- How often journal had to withdraw the published articles?
-



Predatory Journals

- False or fake journals
- Journals publishing very poor quality articles
- No serious editorial review process
- Wants to get profit from publications
- Beware and avoid such journals
- A qualified scientific literate can tell the difference between respectable and predatory journals.



Be a qualified reader of energy science:
Read, read, read...



Submitting Articles – Indexed Journals

- A journal index, also called a 'bibliographic index' or 'bibliographic database', is a list of journals organized by discipline, subject, region or other factors.
 - Journal indexes can be used to search for studies and data on certain topics.
- Some indexes relevant to energy science
 - Science Citation Index (SCI) is a quarterly journal that publishes papers and articles in all fields of research.
 - SCIE is the updated version of SCI which is an accumulation of more than 8500 highly reputed journals across 150 different disciplines.
 - [Scopus](#)
 - Web of Science (WOS): is an online subscription-based Scientific Citation Indexing (SCI) service originally produced by the Institute for Scientific Information (ISI) during 1964.



Submitting Articles – Some Numbers Showing Quality of Journals

- The impact factor (IF) or journal impact factor (JIF) of an academic journal is a scientometric index calculated by Clarivate that reflects the yearly mean number of citations of articles (citable documents) published in the last two years in a given journal, as indexed by Clarivate's Web of Science.
- CiteScore is the number of citations received by a journal in one year to documents published in the three previous years, divided by the number of all types of documents indexed in Scopus published in those same three years.
- Quartiles: Each subject category of journals is divided into four quartiles: Q1, Q2, Q3, Q4.
 - Q1 is occupied by the top 25% of journals in the list;
 - Q2 is occupied by journals in the 25 to 50% group;
 - Q3 is occupied by journals in the 50 to 75% group;
 - Q4 is occupied by journals in the 75 to 100% group.

Submitting Articles –Top 10 Journals in Energy Science*

#	Title	Cite Score	Field
1	Nature Reviews Materials	103.1	Materials Chemistry
2	Nature Energy	81.6	Energy Engineering and Power Technology
3	Joule	60.6	General Energy
4	Progress in Energy and Combustion Science	59.0	General Chemical Eng.
5	Energy and Environmental Science	54.4	Pollution
6	EnergyChem	46.2	General Chemistry
7	Electrochemical Energy Reviews	42.8	Material Science
8	Advanced Energy Materials	42.6	Renewable Energy, Sustainability and Environment
9	Nature Sustainability	40.2	Planning and development
10	ACS Energy Letters	32.3	Chemistry

*<https://www.scopus.com/sources.uri>: Total of 863 journals in energy science (general)

Submitting Articles – More Journals in Energy Science*

#	Title	Cite Score	Field
11	Energy Storage Materials	30.4	Energy Eng and Power Tech
14	Renewable and Sustainable Energy Reviews	26.3	Renewable Energy, Sustainability and the Environment
15	Biofuel Research Journal	24.6	Environmental Engineering
21	Applied Energy	21.1	Building and Construction
23	Energy Conversion and Management	19.1	Nuclear Energy and Engineering
28	Sustainable Cities and Society	18.4	Civil and Structural Eng
33	Renewable Energy	16.1	Renewable Energy, Sustainability and the Environment
35	Journal of Power Sources	15.9	Material Science
52	Solar Energy	13.1	General Materials Science

*<https://www.scopus.com/sources.uri>



Conclusions

- Energy scientists need to communicate their research effectively to solve vast current energy problems
- Writing articles with well-defined structure in energy science is the key to success
- Pay attention to wording, use common terminology in energy sciences
- Follow additional conventions for presenting research should be followed

Recommendations

- Write an interesting story
- Practice makes perfect: Write, write, write... Don't give-up
- Improve your English
- Get professional help in revision of English



Some Useful References

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Thank you
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