



A Guide for Scientific Writing: *Research Article Writing*

by

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(05 Mar 2020)*

Kami Memimpin We Lead





I-Talk by
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Associate Professor at INOR, USM

Title:
A Guide for Scientific Writing - Research Article Writing

Date: 5th March 2020 (Thursday)
Time: 11:00 am – 12:00 pm
Venue:
Auditorium B, Block C,
SAINS@USM, Bukit Jambul,
Penang



FREE ENTRY

For further information, please contact:
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Presentation Outline

- **What** is scientific writing?
 - **Why** writing/publish?
 - Types of publications
 - Types of manuscripts
 - Where to publish?
 - Indexed Journals & Impact factor
 - Dissertation vs research paper
 - Rules for writing
- Structure of the articles
 - Rules for writing
 - Where to begin?
 - Shape of the research article
 - Writing models
 - Explanation through an example
 - Final Step: Revision & Proofreading
 - Useful references and websites

What is scientific writing?

- A **scientific paper** is a **written report describing original research results whose format has been defined.**
 - it is a **technical writing by researchers/scientists with particular format.**
- Audiences include peers/scientists/general readers/layman.
- Usages: to communicate new scientific findings
 - ✓ As precisely as possible
 - ✓ Neither literature nor poetry
 - ✓ Clearly stated problem
 - ✓ Precise and accurate conclusion
 - ✓ New knowledge to be shared “for the first time”

Scientific Research

- The ultimate goal is:

PUBLICATION!!!

nature
International weekly journal of science



Structural and surface characterization of magnetron sputtered $\text{In}_{1-x}\text{Al}_x\text{N}$ films grown on GaAs substrates

Naveed Afzal*, Mutharasu Devarajan, Kamarulazizi Ibrahim

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ARTICLE INFO

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Keywords:

Sputtering

Nanocrystalline materials

Thin films

$\text{In}_{1-x}\text{Al}_x\text{N}$ alloys

GaAs substrate

Semiconductors



Pt-decorated GaN nanowires with significant improvement in H_2 gas-sensing performance at room temperature

Q.N. Abdullah^{a,b,*}, F.K. Yam^a, Z. Hassan^a, M. Bououdina^{a,d}

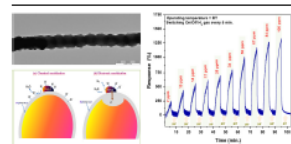
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^c Nanotechnology Centre, University of Adelaide, 5001 Australia

^d Department of Physics, College of Science, Umm Al-Qura University, Saudi Arabia

GRAPHICAL ABSTRACT



Alteration of structural and optical properties in quaternary $\text{Al}_{0.1}\text{In}_{0.3}\text{Ga}_{0.6}\text{N}$ films using ultraviolet assisted photo-electrochemical etching route

Way Foong Lim^{a,b}, Hock Jin Quah^{a,b,c}, Zainuniah Hassan^{a,b,c}, Rosfariza Radzali^{a,b,c}, Norzaini Zainal^a, Fong Kwong Yam^a

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Quaternary $\text{Al}_{0.1}\text{In}_{0.3}\text{Ga}_{0.6}\text{N}$

Photo-electrochemical etching

Photoluminescence

Band gap

Light emission

ABSTRACT

Structural and optical properties of quaternary $\text{Al}_{0.1}\text{In}_{0.3}\text{Ga}_{0.6}\text{N}$ films, subjected to photo-electrochemical etching at different concentrations of potassium hydroxide (KOH) solution under ultraviolet (UV) illumination have been investigated. A correlation between the structural and optical properties has been discussed in association with the pore formation mechanism. Results showed formation of vacancies as heaviest states in the porous films, which increased Urbach energy and decreased optical band gap (E_g). An optimum optical characteristic has been provided by the film etched in 40 KOH due to acquisition of the highest photoluminescence (PL) emission intensity, the largest E_g value, as well as the largest carrier and exciton relaxation in the film as compared to the non-porous film.

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#1
most cited

Science
AAAS

Nanoscale

Volume 4 | Number 11 | 7 June 2012 | Pages 3257–3592

AIP
Applied Physics
Letters

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Lead

Why writing/Publish???

- To communicate new scientific findings.
- Disseminate and extends the knowledge base of a subject
- Publication in peer reviewed journals is evidence of the **quality** and **impact of the research work**.

More Realistic!!!

- **To enhance your CV and improve job opportunities.**
- **The number of publications is an indicator of your research quality.**
- Important indicator of your expertise when writing grant applications.
- Expected outcome of sponsored research projects.

Why writing/Publish???

- PhD and MSc (Research Mode):
 - One of the graduation requirements.

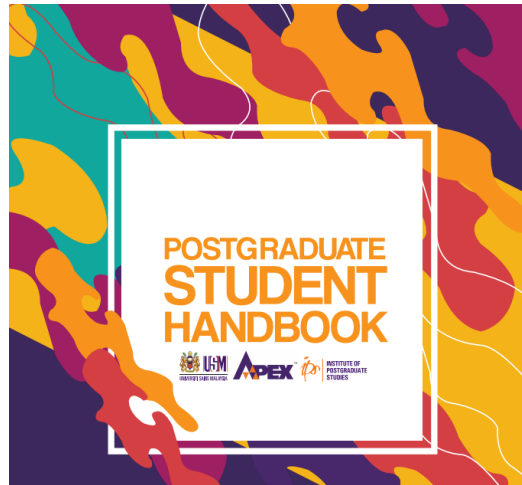


PhD

MSc

2 papers in journals
indexed by ISI / SCOPUS

1 paper in
journals/proceedings
indexed by ISI / SCOPUS



A Research Mode student must comply with the following graduation requirements:

- Fulfill the minimum duration of candidature.
- Pass the pre-requisite courses (if any) as determined by the School/Centre/Institute.
- The Bahasa Malaysia 1 (LKM 100) is compulsory for all international students. Minimum grade C must be obtained prior to graduation.
- Fulfilled the publication requirements as below;

CLUSTER	MASTER'S DEGREE	DOCTOR OF PHILOSOPHY
Sciences/ Engineering/ Health & Medical	At least one (1) article journal, accepted or published in journals/proceedings indexed by ISI / SCOPUS	At least two (2) articles journal accepted or published in journals indexed by ISI / SCOPUS
Arts	At least one (1) article journal, accepted or published in any categories listed below: i. Journals/proceeding indexed by ISI / SCOPUS / ERA ii. Journals by the University or listed in myJurnal (Malaysian Journal Management System) from MyCite (Malaysian Citation Centre) iii. Book chapters published by publishers listed in the Thomson Reuters Web of Science (WoS) Master Book List or Penerbit USM or MAPIM	At least one (1) article journal, accepted or published in journals indexed by ISI / SCOPUS / ERA or At least two (2) articles journal, accepted or published in any categories listed below:- i. Journals by the University or listed in myJurnal (Malaysian Journal Management System) from MyCite (Malaysian Citation Centre) ii. Book chapters published by publishers listed in the Thomson Reuters Web of Science (WoS) Master Book List or Penerbit USM or MAPIM
Authorship	Publications accepted must be published with the supervisor(s). The candidate must be the first student author. Only the first student author is allowed to use this article to fulfill his/her graduation requirement.	
Plagiarism	Plagiarized article will not be accepted for graduation requirement	
Topic of publications	Publications accepted must be related to his/her thesis/dissertation.	
Affiliation	Publications accepted must carry USM affiliation.	
Blacklisted journals	Publications in the following journals are NOT accepted: • List of blacklisted journal publishers by Ministry of Higher Education, Malaysia https://referencephusm.files.wordpress.com/2013/06/four-4-publishers-not-recognized-by-malaysia-ministry-of-education.pdf • Beall's List of Predatory Publishers https://clinicallibrarian.wordpress.com/2017/01/23/bealls-list-of-predatory-publishers/	

- Research paper in **peer-reviewed** journals
 - ✓ **High impact factor, or**
 - ✓ **High quartile (Q1/Q2)**
- Review articles (usually highly cited)
 - ✓ **Research expertise in the related fields**
- Conference proceedings (often not refereed, fewer citations)
 - ✓ **But ... it is good for ...**

Types of manuscripts



Full articles

- Substantial, complete and comprehensive pieces of research



Letters or short communications

- Quick and early communications



Review papers and Current Opinions

- Often submitted by invitation



Micro Articles- NEW!

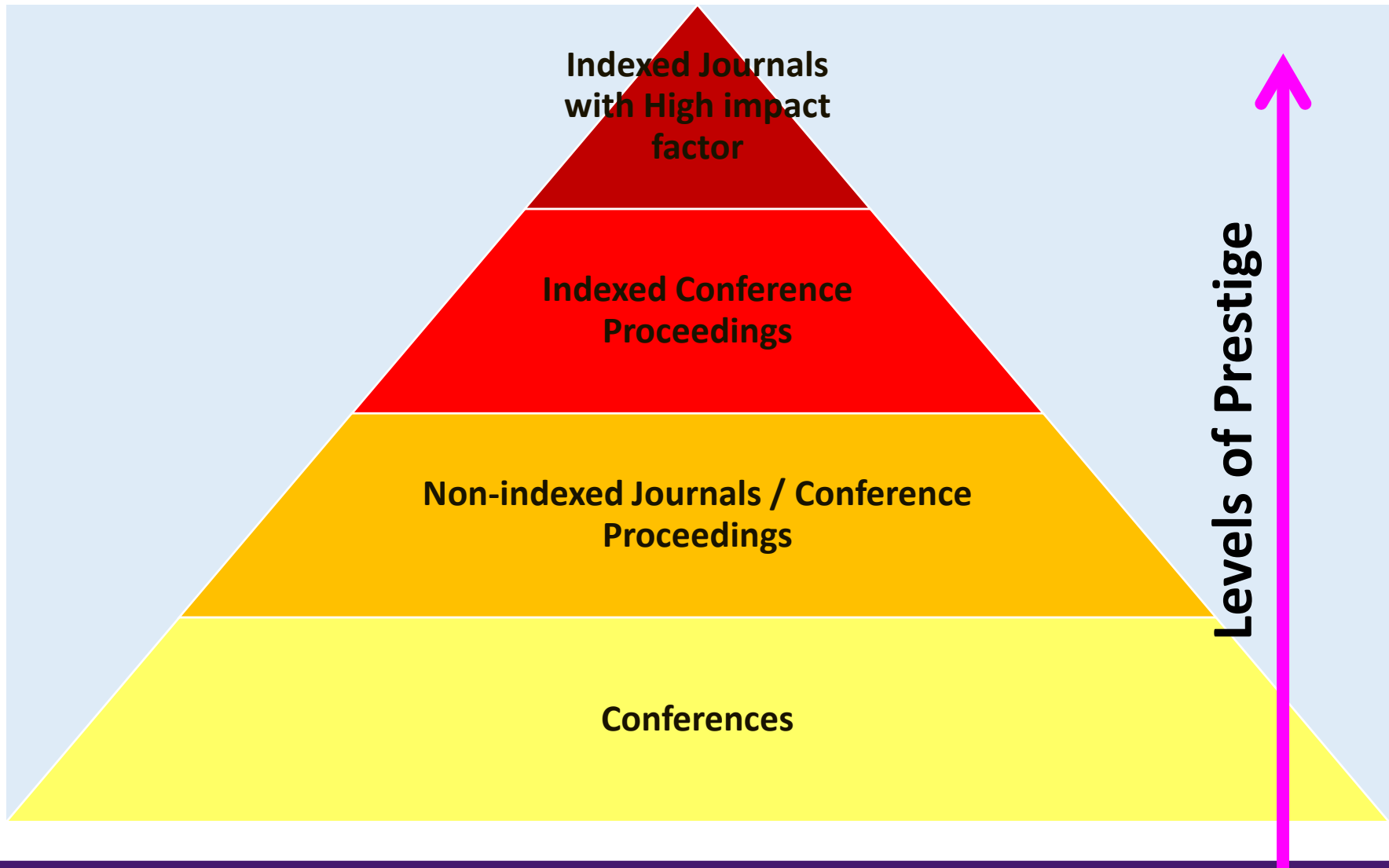
- SoftwareX, MethodsX, Data in Brief

- Micro articles are very short papers, no longer than 2 pages.
- Consist of well-described piece of information:
 - Data and/or a plot plus a description
 - Description of a new method or instrumentation
 - Negative results
 - Concept or design study



Microarticle

Where to publish?



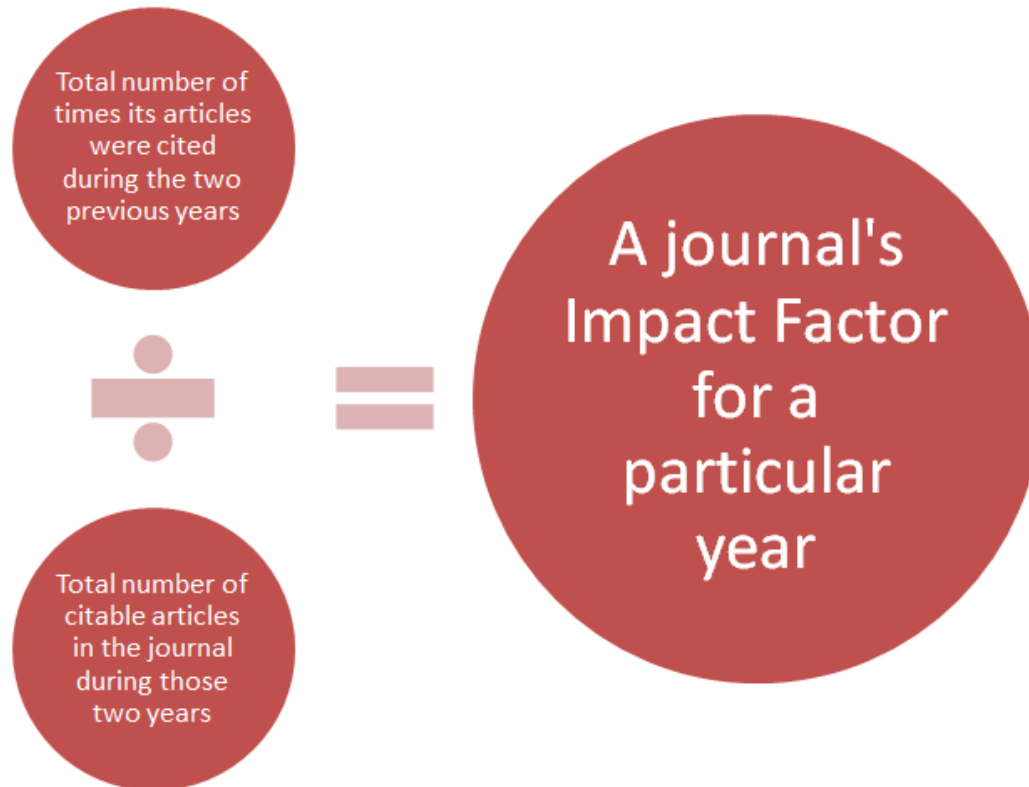
Indexed Journals

- Indexation of a journal → **a reflection of its quality.**
 - Indexed journals are considered to be of higher scientific quality as compared to non-indexed journals.



- **Malaysia Research Assessment (MyRA)** accepts the publications in the following indexed journals.
 - **WEB OF SCIENCE (WOS)**
 - **ISI journals indexed in WOS**
 - ISI = Institute for Scientific Information
 - SCOPUS
 - Excellence in Research for Australia (ERA)
 - MyCite ← **NEW!!!**
- **Blacklisted Journals and Publishers by MOE:**
 - List of blacklisted journals:
(<https://referencephsusm.files.wordpress.com/2013/06/four-4-publishers-not-recognized-by-malaysia-ministry-of-education.pdf>)
 - Academic Journal (www.academicjournals.org);
 - Eurojournal (www.eurojournals.com);
 - CG Publishing (www.commongroundpublishing.com); and
 - Africa World Press, Inc. (www.africaworldpressbooks.com).
 - List of Predator Publishers:
(<https://clinicallibrarian.wordpress.com/2017/01/23/bealls-list-of-predatory-publishers/>)

What is an Impact Factor?



MyRA ONLY recognized Journal Citation Reports (JCR) from WOS:

ISI Web of Knowledge

Journal Citation Reports®



THOMSON REUTERS

Published by Thomson Reuters



Smingo journal citation reports (JCR)



Journal X - 2014 Impact Factor

Cites in 2014 to articles published in Previous Two Years:

2012 = 1000

2013 = 850

Total = 1850

Number of articles published in Previous Two Years:

2012 = 270

2013 = 275

Total = 545

$$\begin{aligned} \text{IF}_{2014} &= \frac{\text{Total citation in 2014 to items published in previous two years}}{\text{Total publications in previous two years}} \\ &= \frac{1850}{545} \\ &= 3.4 \end{aligned}$$



Impact Factor

- Varies by subject area, journal (paper) type, journal size, citation window, and over time.

List of 2018 Journal Impact Factors (IF) - Materials Science

Journal Title	Total Citation	IF
CHEMICAL REVIEWS	174,920	52.613
Nature Reviews Materials	3,218	51.941
Nature Energy	5,072	46.859
SCIENCE	645,132	41.058
NATURE MATERIALS	92,291	39.235
Nature Nanotechnology	57,369	37.490
Nature Chemistry	29,548	26.201
PROGRESS IN ENERGY AND COMBUSTION SCIENCE	10,618	25.242
Materials Today	9,962	24.537
MATERIALS SCIENCE & ENGINEERING R-REPORTS	7119	24.48
PROGRESS IN MATERIALS SCIENCE	12,382	23.75
ADVANCED MATERIALS	190,542	21.950
Advanced Energy Materials	34,218	21.875
Annual Review of Condensed Matter Physics	2,349	21.853
ACCOUNTS OF CHEMICAL RESEARCH	67,004	20.955

Dissertation vs Research Paper



Undergraduate
dissertation: ~ 8,000 -
12,000 words (~ 50
pages).



MSc & PhD
dissertation: ~ 20,000 -
40,000 words (~120 –
200 pages).



Research Paper: ~
3000 – 5000 words (~
8 – 12 pages).

A research paper must be...

accurately, concisely, and comprehensively.



LET'S START
THE JOURNEY

The six golden rules of writing:

Read
Read
Read
Write
Write
Write

~ Ernest Gaines

Note:

- Before write, read some scientific papers that have been written in the format of the paper you plan to use.
 - In addition to the science, pay attention to the **writing style** and **format**.

Structure of the article

Section	Purpose
Title	<i>Clearly describes the contents</i>
Authors	<i>Ensures recognition for all the contributors</i>
Abstract	<i>Summaries the work and indicates its significance</i>
Introduction	<i>Reviews relevant literature and sets out the rationale for the work</i>
Methods	<i>Needs to provide sufficient detail so that the work can be repeated</i>
Results	<i>Presents and describes the findings</i>
Discussion	<i>Discusses the implications of the findings in the context of other work</i>
Acknowledgement	<i>Ensures those who helped in the research are recognized</i>
References	<i>Ensures previously published work is recognised</i>

But ...

Where to begin???





Begin with the easiest sections!

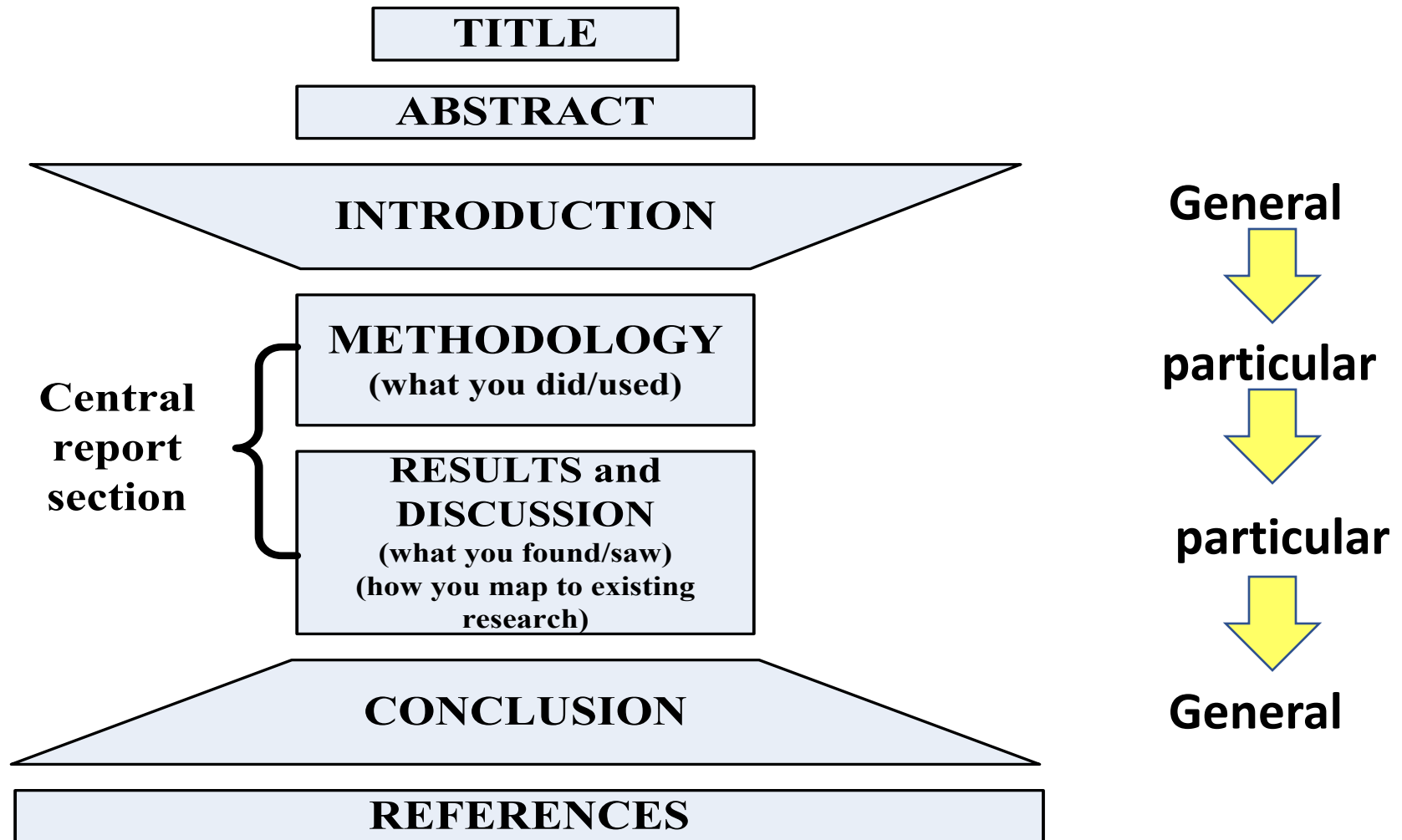
**Figures/Tables (Data) → Methods →
Results and discussion → Conclusion →
Introduction →
Title → Abstract.**

- But, ...

The main thing is to begin writing.



Shape of a research article



- Fact:
 - *Many more people will read the title than the Abstract, and many more will read the Abstract than the whole paper.*
- The title tells readers whether or not the research article will be useful for them.
 - *Good title will attract readers and, hence will attract the appropriate readers.*
- **Good title:**
 - Short & concise

- Hint: from your research aim or the question you were trying to answer.
- The title should:
 - ✓ as short as possible
 - ✓ predict and describe the content of the paper as accurately as possible.
 - ✓ include keywords that make the paper retrievable easily on search engines.

- Are used by indexing and abstracting services
- Are the labels of the manuscript
- Should complement the keywords in the title
- Use only established abbreviations (e.g. DNA)



- Its function was mainly to encourage the reader to continue reading the article and to facilitate that reading by providing a brief review.
- Abstract databases allow scientists to search and scan the scientific literature.
- The abstract needs to persuade them to obtain a copy of it, not just encourage them to keep reading a paper they have already accessed.

- *Many more people will read the title than the Abstract, and many more will read the Abstract than the whole paper.*
- **Good abstract should:**
 - make sense as a standalone, self-contained description of the research article, and readers should be able to understand the key points and results of the research even if they never see the whole article.

Abstract is a representation of the research article.

- The content of the abstract is derived from the rest of the article.
 - But should not simply cut and paste whole sentences from the body of the article.
- The abstract does not contain material which is not already in the paper.
 - No need to create completely new sentence.

- It is based on the guide for Authors of the journal where you want to publish your research.
- It is determined by the journal rather than the author.
- This normally made after the writing process, i.e., after finished writing paper.



- Usually has a strict word limit.
- Usually written in a single paragraph.
- It is sometimes written in a slightly less technical way in order to attract audience.
- Readers do not know a particular technical term or acronym.
- Can use acronym, abbreviation or technical term in the abstract but should first say what it means or stands for.



Writing model for abstract

1	Background. Aim. Problem. What the paper does.
2	Methodology/materials.
3	Results. Achievement/contribution. Implications.
4	Applications.
5	Limitations. Future work.

- Provides general background information for the reader.
- To attract wider audience, starts with more general background information.
 - The background facts may come from research, then includes the research references where necessary.
- Start with the most general one, then move on to more specific information.

1	<p>Establish the importance of your field.</p> <p>Provide background facts/information (possibly from research).</p> <p>Define the terminology in the title/key words.</p> <p>Present the problem area/current research focus.</p>
2	<p>Previous and/or current research and contributions.</p>
3	<p>Locate a gap in the research.</p> <p>Describe the problem you will address.</p> <p>Present a prediction to be tested.</p>
4	<p>Describe the present paper.</p>

1	<p>Provide a general introduction and overview of the materials/methods.</p> <p>Restate the purpose of the work.</p> <p>Give the source of materials/equipment used.</p> <p>Supply essential background information.</p>
2	<p>Provide specific and precise details about materials and methods (i.e., quantities, temperatures, duration, sequence, conditions, locations, sizes).</p> <p>Justify choices made.</p> <p>Indicate that appropriate care was taken.</p>
3	<p>Relate materials/methods to other studies.</p>
4	<p>Indicate where problems occurred.</p>

1	<p>Revisiting the research aim/existing research.</p> <p>Revisiting/expanding methodology.</p> <p>General overview of results.</p>
2	<p>Invitation to view results.</p> <p>Specific/key results in detail, with or without explanations.</p> <p>Comparisons with results in other research.</p> <p>Comparison/s with model predictions.</p> <p>Mapping (relationship to existing research).</p>
3	<p>Problems with results.</p>
4	<p>Possible implications of results.</p>

Writing model for Conclusion

1	Revisiting previous sections Summarising/revisiting general or key results.
2	Mapping (relationship to existing research).
3	Achievement/contribution. Refining the implications.
4	Limitations. Current and future work. Applications.

Explanation through an example



- **Read the paper again** and circulate to all co-authors. Be critical yourself and accept criticism from others.
- Try to be in the position of a reader/reviewer.
- If possible, have someone else you trust to comment on the paper.
- **If you need to explain something verbally, then you probably need to rewrite that part.**
- Show it to your advisors/supervisors.



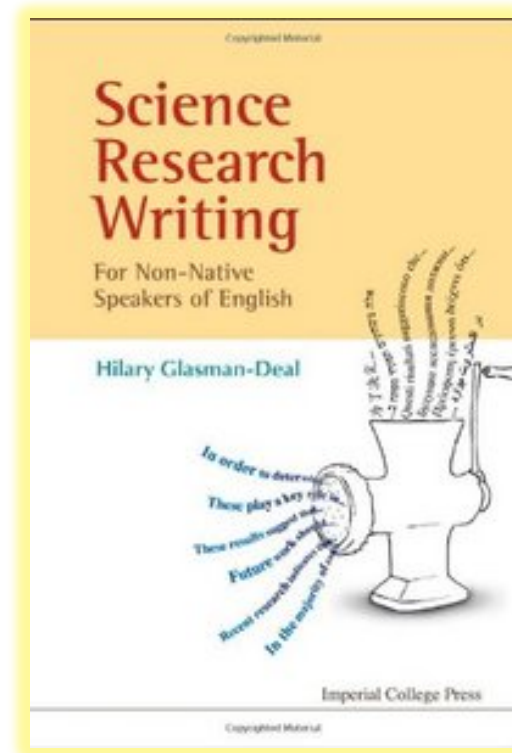
Knowledge is lost without written records

Science writing is much easier than it looks

DON'T WAIT
FOR
INSPIRATION!
JUST
WRITE!



- Hilary, G. D. (2009), “**Science Research Writing for Non-native Speakers of English**”, Imperial College London, *UK*.
- Dean, E., and Abdul Latif, A. (2016), “A Publisher’s Guide to Writing and Publishing Scientific Manuscripts”, Elsevier.
http://serc.eng.usm.my/images/phocadownload/Elsevier_2016.pdf



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e-learning

CE
g open access

How open access works and how you can benefit from it.

1 h
SOCIAL IMPACT

How to write a lay summary

Journal articles are written with researchers in mind, so the content isn't always easy to follow for people outside academia...or even that field of research.

1 h
JOB SEARCH

Job search strategies for early career researchers

Researchers at the start of their career don't often know where or how to search for jobs - academic or otherwise. This course will help you.

1 h
RESEARCH DATA MANAGEMENT

How to manage your research data

The need for sharing research data expands beyond its original purpose, promoting transparency and reproducibility.

Useful websites

- [Elsevier](https://researcheracademy.elsevier.com/) – Researcher Academy
 - <https://researcheracademy.elsevier.com/>

Author Services

With you every step of the way

AUTHORS

REVIEWERS

EDITORS



Wish to publish your work?



Want to be a great reviewer?

Want to improve your editing skills?

Useful websites

- Wiley online Library
 - <http://onlinelibrary.wiley.com/>

Inspiring Minds with Dr. Mark Richards

Useful websites

- San Francisco Edit: Newsletters
 - <https://sfedit.net/newsletters/>

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Thank you



Kami Memimpin We Lead

Thank You

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multidisciplinary research field of nanotechnology and
optoelectronics"*

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