Scientific writing

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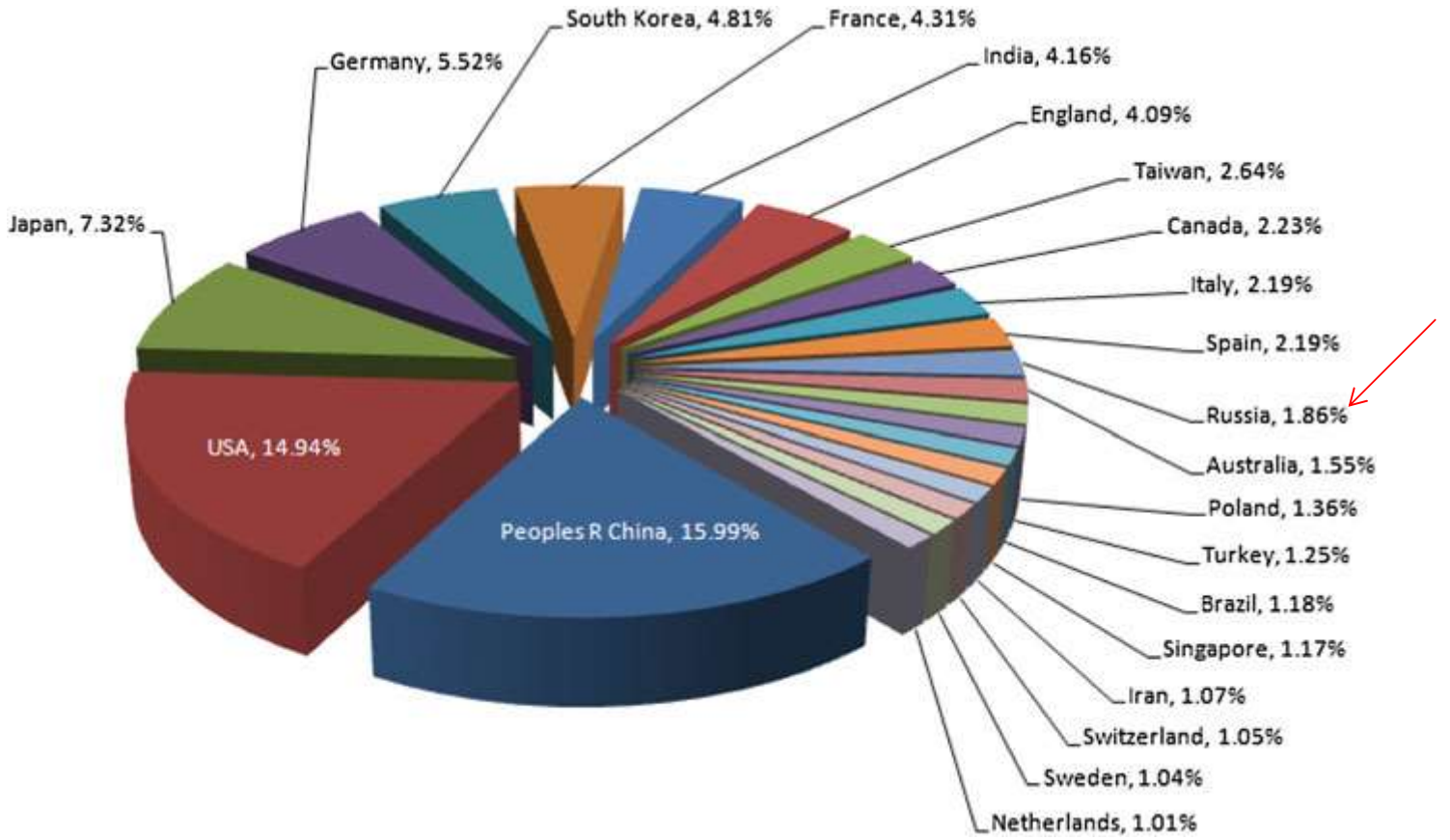
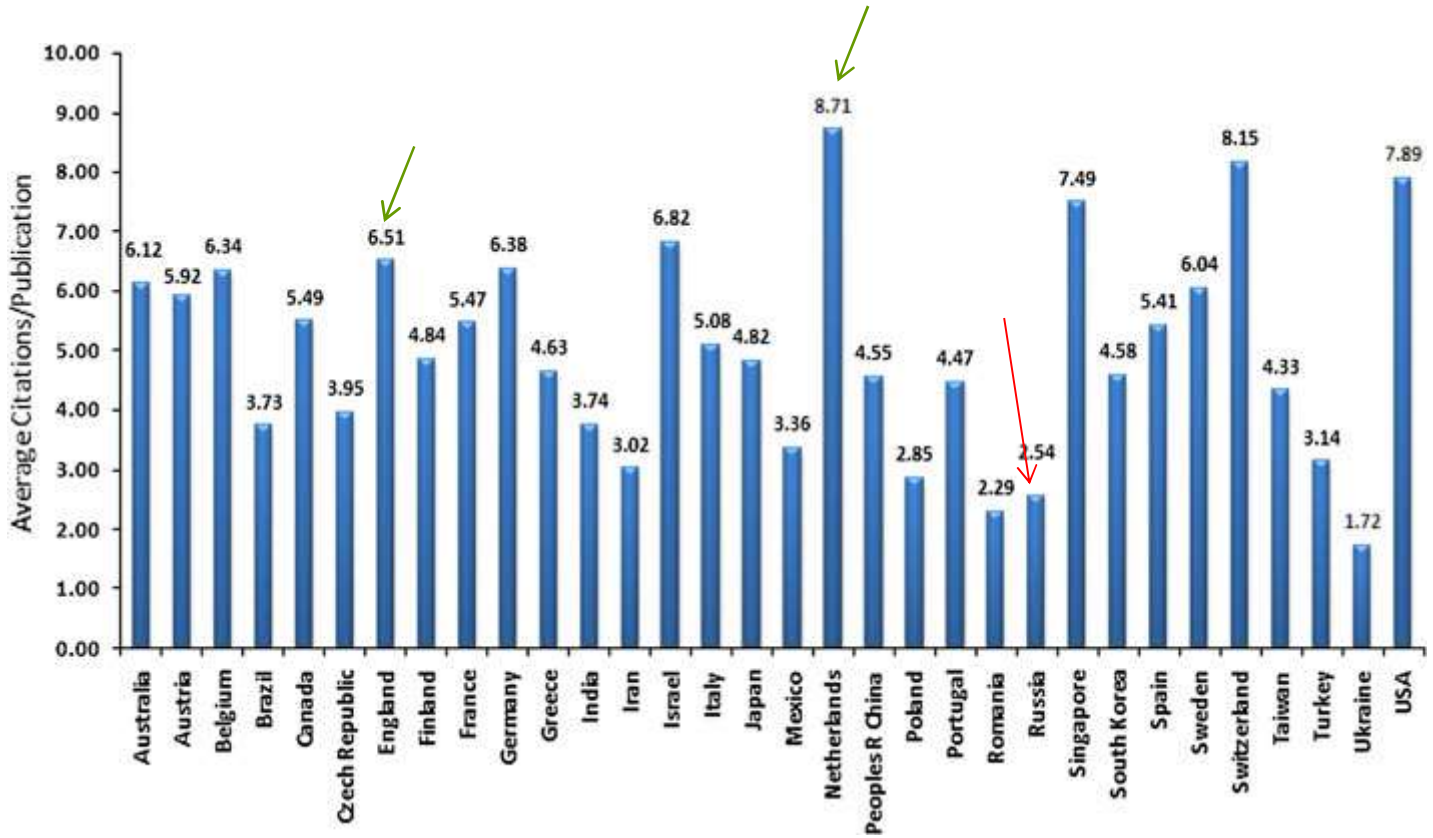
Materials science publications in perspective

Share of countries in materials science publications



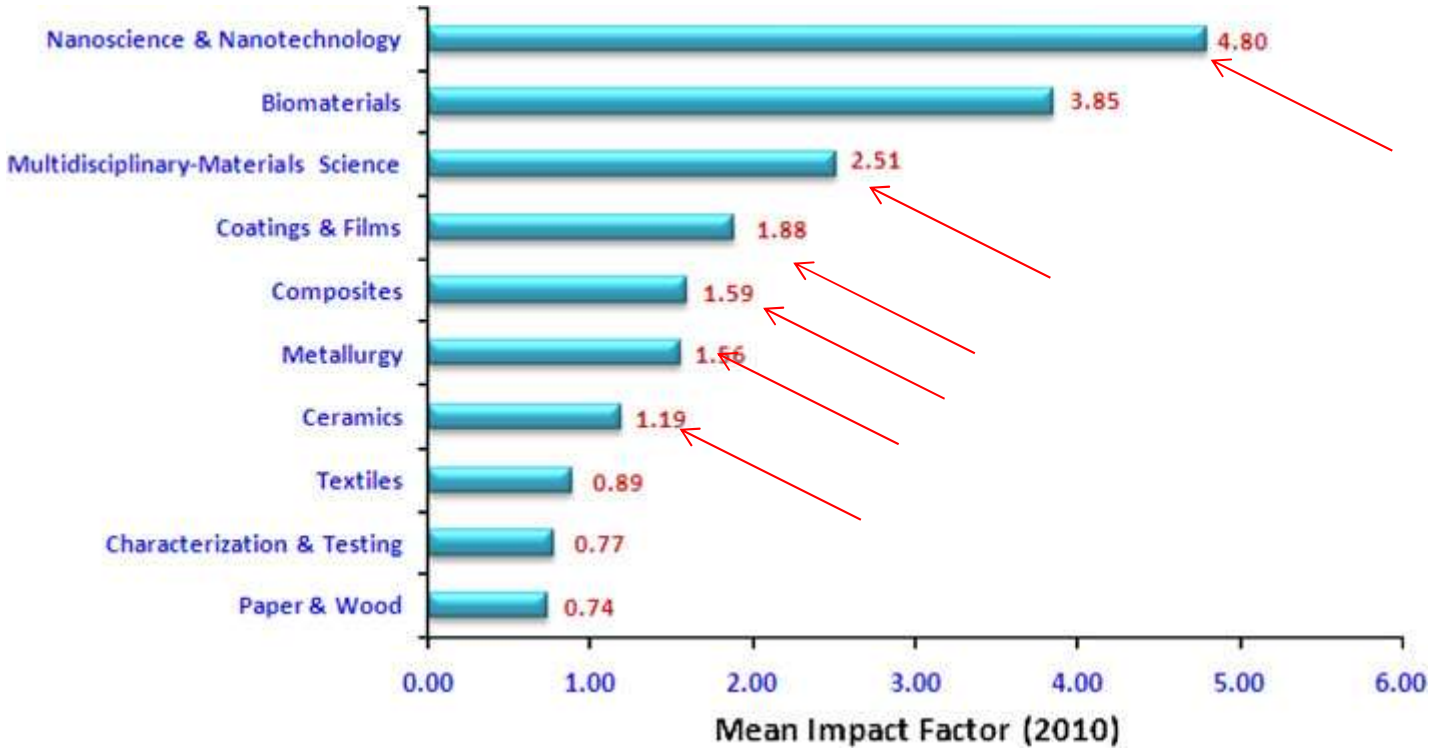
B. S. Kademani, A. Sagar, G. Surwase, K. Bhanumurthy: Publication trends in materials science: a global perspective, Scientometric, 2012.

Average citations per publication



B. S. Kademani, A. Sagar, G. Surwase, K. Bhanumurthy: Publication trends in materials science: a global perspective, Scientometric, 2012.

Impact factors of various research fields



B. S. Kademani, A. Sagar, G. Surwase, K. Bhanumurthy: Publication trends in materials science: a global perspective, Scientometric, 2012.

Main impact parameters

In a given year, the impact factor of a journal is the average number of citations received per paper published in that journal during the two preceding years.

The immediacy index is a measure of how topical and urgent work is; it is calculated based on the papers published in a journal in a single calendar year.

The Hirsch (*h*)-index is an index that attempts to measure both the productivity and impact of the published work of a scientist (also can be calculated for the discipline, topic or journal). *h*-index equals *h* papers each of which has been cited in other papers at least *h* times.

Impact factors of some materials science journals

	Title	Type	SJR	H index	Total Docs. (2013)	Total Docs. (3years)	Total Refs.	Total Cites (3years)	Citable Docs. (3years)	Cites / Doc. (2years)	Ref. / Doc.	Country
1	Surface Science Reports	j	Q1 8,627	81	10	27	2.938	459	26	21,81	293,80	
2	International Materials Reviews	j	Q1 4,205	60	16	41	3.783	386	40	7,28	236,44	
3	Acta Materialia	j	Q1 3,823	169	765	2.169	32.647	9.125	2.079	4,13	42,68	
4	Chemical Communications	j	Q1 2,918	197	3.188	9.074	104.890	60.876	9.008	6,77	32,90	
5	Journal of Constructional Steel Research	j	Q1 2,052	48	236	562	5.419	1.168	555	1,95	22,96	
6	Journal of Materials Processing Technology	j	Q1 1,875	94	253	819	5.192	2.322	810	2,63	20,52	
7	Intermetallics	j	Q1 1,696	70	274	984	7.753	2.159	977	2,24	28,30	
8	Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science	j	Q1 1,670	91	612	1.321	21.549	2.464	1.281	1,77	35,21	
9	Hydrometallurgy	j	Q1 1,657	58	166	529	4.870	1.555	526	2,60	29,34	
10	ISIJ International	j	Q1 1,519	68	287	912	7.220	1.307	895	1,32	25,16	
11	Sensors and Actuators, B: Chemical	j	Q1 1,312	116	1.357	2.725	49.616	11.437	2.689	3,96	36,56	
12	Metallurgical and Materials Transactions B: Process Metallurgy and Materials Processing Science	j	Q1 1,254	49	247	442	6.650	643	383	1,69	26,92	
13	Journal of Alloys and Compounds	j	Q1 1,181	104	2.411	5.998	73.665	16.295	5.880	2,83	30,55	
14	International Journal of Refractory Metals and Hard Materials	j	Q1 1,148	46	203	409	5.950	896	405	1,99	29,31	
15	Metallomics	j	Q1 1,097	26	167	373	9.349	1.357	345	3,99	55,98	
16	Journal of Biomedical Materials Research - Part A	j	Q1 1,079	87	592	1.361	25.944	4.079	1.266	2,93	43,82	
17	Oxidation of Metals	j	Q1 0,970	52	123	150	2.665	248	146	1,51	21,67	
18	Journal of Materials Science and Technology	j	Q1 0,943	27	212	539	5.885	1.023	539	1,81	27,76	
19	Ironmaking and Steelmaking	j	Q1 0,936	26	85	264	1.686	206	256	0,74	19,84	

www.scimagojr.com:
Journal citation reports

Why we write a paper and what is the difference with report?

Why?

- To tell the world about your exciting new results.
- To tell the world that you advanced the knowledge in your field.
- To announce that you exist and active.

Why paper, not report?

- Report is an account of what has been done: methods; materials; results
- Report is a technical document with details
- Report is written for a limited audience
- Paper is account of scientific advance, hence analysis, discussion and conclusions are very important
- Paper is written to a wide audience (peers).

What is important in writing a paper

IDEA: what is it about?

- New **results**.
- New explanation or **interpretation**.
- New point of view.
- **Review** of a field.
- **Discussion**

EXPRESSION:
why and how do I express the idea

- Background and state of the art: **Introduction.**
- Reason for doing the research and writing a paper: **Introduction.**
- Thorough and clear description of
  - ✓ Technique, **methods, materials**;
  - ✓ **Results**;
  - ✓ **Highlight** what is new.
- Detailed **discussion** using your own ideas and references.
- Clear **conclusions** relevant to the aims and the text.

IMPRESSION:
how do I impress the reader (reviewer, editor)

- **Clear and logical** writing
  - ✓ Good English
  - ✓ Short sentences
  - ✓ Logical and clear structure of the paper;
  - ✓ Understanding and explaining of what is done and why;
  - ✓ Fluent transitions and connections of paragraphs and sections
- Each result should be commented on, **no loose ends**
- Clear, good quality figures with clear captions
- Good, up to date and adequate **references**, incl. to "fathers-founders"
- Brief but comprehensive writing showing the **respect to the reader**
- There are no "small" things (abbreviations, units, punctuation, scale bars, error bars, references, unified style etc.)!

Scientific paper step by step

Title

- This is the most read part of your paper: the decision to read or not your paper depends on the title.
- Clear message – what is the paper about.
- Brief – right to the point.
- Attractive – attracts the eye and the mind

Tensile testing of aluminium alloys with nanoparticles

Improvement of mechanical properties of aluminium alloys with nanoparticles

Effect of nanoparticles on mechanical properties of aluminium alloys

Mechanisms of nanoparticles influence on aluminium alloys: structure and mechanical properties

Abstract

- An abstract is a summary of completed work. In a minute or less a reader can learn the rationale behind the study, general approach to the problem, new, and important conclusions or new questions.
- Write (or review) your summary after the rest of the paper is completed.
- An abstract should stand on its own so do not refer to any other part of the paper such as a figure or table.
- Focus on summarizing results - limit background information to a sentence or two, if absolutely necessary.
- Abstract must be consistent with what you reported in the paper.
- Correct spelling, clarity of sentences and phrases, and proper reporting of quantities (proper units, significant figures) are just as important in an abstract as they are anywhere else.

Introduction

- Describe the importance (significance) of the study - why was this worth doing in the first place? Provide a broad context (literature review, state-of-the-art).
- Identify the gap in knowledge – this is your objective!
- State your specific hypothesis(es) or objective(s), and describe the reasoning that led you to select them.
- Describe how you plan to bridge this gap – reach the objective.
- Be specific.
- Avoid too broad a review: The reader does not want to read everything you know about a subject.
- Do not write: "nobody did this before". Almost for sure – somebody did this before! Use "to the best of out knowledge.." or "only few references exist….".

Methods and Materials

- A key concept is to keep this section as concise as you possibly can.
- The objective is to document all materials and general procedures, so that another individual may use some or all of the methods in another study, reproduce your results or judge the scientific merit of your work.
- It is not a step by step description of everything you did, nor is a set of instructions. In particular, it is not supposed to tell a story.
- Report the methodology (not details of each procedure that employed the same methodology) Describe the experiment completely, including such specifics as temperatures, volumes, processing time, cooling rate, etc.
- Refer to standard procedures whenever possible.
- Report how procedures were done, not how they were specifically performed on a particular day, e.g. do not describe the paper that you used for grinding and how long you polished the sample.
- Omit all explanatory information – save it for the results and discussion.

Results

- Summarize your findings in text and illustrate them, if appropriate, with figures and tables. A photo or graph may say more than text – use this!
- In text, describe each of your results, pointing the reader to observations that are most relevant.
- Describe how the results is relevant for reaching the objectives.
- Arrange the data in a logical way NOT the way or sequence how you got them.
- All data should be supplied with error analysis, use SI units, use clear and same denominations.
- Do not discuss or interpret your results (discussion), report background information (introduction, discussion), or attempt to explain anything (unless you write Results AND Discussion).
- Never include raw data or intermediate calculations in a research paper.
- Do not present the same data more than once, do not duplicate Table by Figure and vice versa.
- Text should complement any figures or tables, not repeat the same information.

Discussion

- The objective is to provide an interpretation of **all** your results and support for **all** of your conclusions, using evidence from your experiment, new ideas and generally accepted knowledge (references). The significance and novelty of findings should be clearly described.
- Explain **all** of your observations as much as possible, *focusing on mechanisms*.
- Decide if each your initial hypothesis is supported, rejected, or if you cannot make a decision with confidence. Do not simply dismiss a study or part of a study as "inconclusive."
- Try to offer alternative explanations if reasonable alternatives exist. Use references and general knowledge. Do not speculate or just list possibilities.
- When you refer to information, distinguish data generated by your own studies from published information.
- Do not repeat the results and do not describe them in Discussion.
- Research papers are not accepted if the work is incomplete. Draw the conclusions based upon the results that you have.
- You may suggest future directions, such as how the experiment might be modified to accomplish another objective.
- Specify where to go next? The best studies open up new avenues of research. What questions remain?

Conclusion

- **Conclusion is not a summary** of your work, hence not an abstract.
- Each of the conclusions should be based on the results and on the discussion: hence, has routes in your paper.
- You may suggest further direction of research in conclusions if this is based on your discussion.
-
- Conclusions can be bulleted (numbered) or presented as concluding remarks as plain text.

Acknowledgement

- Acknowledge **funding** (in many cases – a contractual requirement)
- Acknowledge **discussions** with industrial partners and external experts
- Acknowledge **contribution** of technical staff if essential

- Individuals who contributed essentially to the results, to the analysis of the results and to writing or editing the paper are usually included as co-authors

What happens after?

Internal and external review

- Have I covered all bases?
- Have I get the agreement of all co-authors?
- Would I refer to the paper like mine?
- Which journal shall I target: scope, format, ranking, quality of the paper?
- Have I complied with all requirements of the journal?
- Whom may I recommend as reviewers?

Peer reviewing process

- Initial screening by Editor for compliance with journal scope and scientific quality (about 30% rejected)
- Paper is sent to 1-3 reviewers
- Reviewers assess the paper based on criteria and give comments and recommendations (50% reject; 40% major revision)
- Editor takes decision (50% reject)

Reviewing criteria (example)

A. Is the paper:
[ ] Suitable for publication without alteration?
[ ] Suitable for publication subject to minor revision?
[ ] Suitable for publication after extensive re-writing?
[ ] Unsuitable for publication?
[ ] Unsuitable for that particular journal/proceedings
B. If suitable for publication, would you **classify the scientific content as**:
[ ] Innovative/Outstanding?
[ ] Good?
[ ] Worthy/Acceptable?
C. Is the paper of special topicality and/or quality such as to **merit publication in a higher ranked journal**?
D. Do the **title, abstract and summary/conclusions** give a sufficiently balanced picture of the contents of the paper?
E. Are all the **figures and tables** necessary for the understanding of the text? Please state those which may be omitted if any.
F. Assess the **quality of figures/tables**. Are there any changes required?
G. Is this paper **likely to be cited**?

H. Specific remarks (please give here a brief conclusion on the quality of the paper):

Importance of novelty and proper conduct

- Novelty statement – important part of modern submission, helps you to briefly summarize achieved advance in knowledge
- References and permissions – use whenever appropriate, it costs you almost nothing but may cost you a lot!
- Never take somebody's material and use it without proper permission – you may be blacklisted.

Final remark

- Write clear, brief and logically.
- Use reviewer(s) even before you submit: supervisor, co-authors, colleagues.
- The flaws (exp. in style) are best seen from outside.
- Do not argue with the reviewers (unless it is really a matter of scientific principle), use their remarks to the benefit.

Final remark