WRITING SCIENTIFIC PAPERS IN ENGLISH: TOP 10 PROBLEMS FOR 2011

W. A. Oates

December 6, 2011

A copy of a printable version of this .pdf file is available on the IMR web site.

http://www.imr.cas.cn/

Open the Prof. Alan Oates reference to this lecture and you will see the link to the .pdf file.

INTRODUCTION

- One of my responsibilities during my visits to IMR is to correct the English in manuscripts of papers to be submitted to overseas journals.
- The writing is usually done by the student who has done the work and I am sure that it is something which you do not look forward to.
- Each manuscript usually takes me between 2 and 5 hours to correct. Some have taken as long as 8 hours!
- I suspect that the most difficult ones for me is where the student has written the paper in Chinese and then used Bing or similar software to translate it. Disaster!
- I have made notes of some of the **most common problems** which I find and the purpose of this talk is to discuss these and suggest **some possible solutions**.

ONE – DEFINITE AND INDEFINITE ARTICLES

The failure to properly insert **Definite and Indefinite Articles** is by far and away the most common problem found in the manuscripts I receive.

It is not my job to discuss the rules of English grammar in detail.

But the most important things to remember are:

- Use the Definite Article when referring to a **specific item**, the Indefinite Article when referring to **general items**, e.g,

  The $\mathrm{Ti}_{0.5}\mathrm{Al}_{0.5}$ alloy is used for ...
  A Ti–based alloy can be used for ...

- The plural of the Indefinite is nothing

  The $\mathrm{Ti}_{0.5}\mathrm{Al}_{0.5}$ alloys are used for ...
  Ti–based alloys can be used for ...

ONE – DEFINITE AND INDEFINITE ARTICLES

For indefinite articles:

- The rule as usually learned: use **'a'** before a word beginning with a consonant and **'an'** before one beginning with a vowel (A,E,I,O,U).
- But it is the **sound** of the first letter and not the **written** first letter of the word which determines whether an 'a' or 'an' should be used in the paper.
- This is particularly important in scientific papers, where abbreviations are used a lot. This can even lead to using "an" before a consonant!:
  - **An** X-ray spectrometer was used. . . (phonetically, **e**x)
  - Fig. (1) shows **an** SEM micrograph of . . . (phonetically, **e**ss)
  - Fig. (1) shows **a** SEM micrograph of . . . is also correct.
  - Particles embedded in **an** fcc matrix . . . (phonetically, **e**ff)
  - Particles embedded in **a** fcc matrix . . . is also correct.

ONE – DEFINITE AND INDEFINITE ARTICLES

The major problem with the manuscripts I have to correct is that there are **too few Articles**.

In a scientific paper (or novel, newspaper article etc) written in English, it is found that:

- **Approximately 6-10% of the total number of words are "the".**
- Approximately 1-2% of the total number of words are "a" or "an".
- Many of the manuscripts given to me at IMR have only approximately 2% of "the"s.
- When this happens, I have to insert the word 'the' about 20 times in each page of typescript.

ONE – DEFINITE AND INDEFINITE ARTICLES

Abbreviations and Chemical Symbols are found frequently in scientific papers.

Many of the missing Articles occur before symbols and abbreviations.

"provided by Si_3N_4 balls" $\Longrightarrow$ "provided by <u>the</u> Si_3N_4 balls"

"from impurities in *TiAlV* alloy" $\Longrightarrow$ "from impurities in <u>the</u> *TiAlV* alloy"

"in $\langle 110 \rangle$ direction" $\Longrightarrow$ "in <u>the</u> $\langle 110 \rangle$ direction"

Because we use so many symbols and abbreviations, just watching out for this one point would help you increase the number of Definite Articles in your paper quite significantly.

ONE – DEFINITE AND INDEFINITE ARTICLES

Some possible ways of overcoming the Article problem are to:

1. Use Noun Parsing Software
2. Use Microsoft Word for counting

ONE – DEFINITE AND INDEFINITE ARTICLES

Noun Parsing Software will locate all the nouns in a manuscript.

In the following, all the Articles have been removed:

50 UNDERLINED NOUNS FOUND

In response to difficulties in understanding notion of chemical substance at issue in Gibbs' phase rule, there is long tradition of reformulating simple statement of rule. leading idea is to rewrite rule with term for number of substances actually present and to introduce additional terms making explicit various kinds of restrictions which in original formulation are taken to be incorporated into Gibbs' notion of number of independent substances. Although number of independent substances cannot in general be interpreted as number of substances actually present, it is not entirely derivative concept as authors of reformulations sometimes seem to presuppose. In particular, it is doubtful whether number of substances actually present is clearly delimited concept which can be determined prior to application of phase rule. In that case, phase rule provides useful source of information for determination of number and nature of substances actually present in mixture which should be properly reflected in adequate interpretation of Gibbs' notion of independent substances. For this purpose, I propose mereological interpretation of way independent substances are related to substances actually present which makes sense of fact that former are not uniquely fixed but can be chosen from latter in several ways.

ONE – DEFINITE AND INDEFINITE ARTICLES

Unfortunately, it seems that such wonderful Noun-Parsing Software is not yet available.

We have to look for another way to try and help you.

Nearly all of you write your papers using Microsoft Word and this can be used as follows:

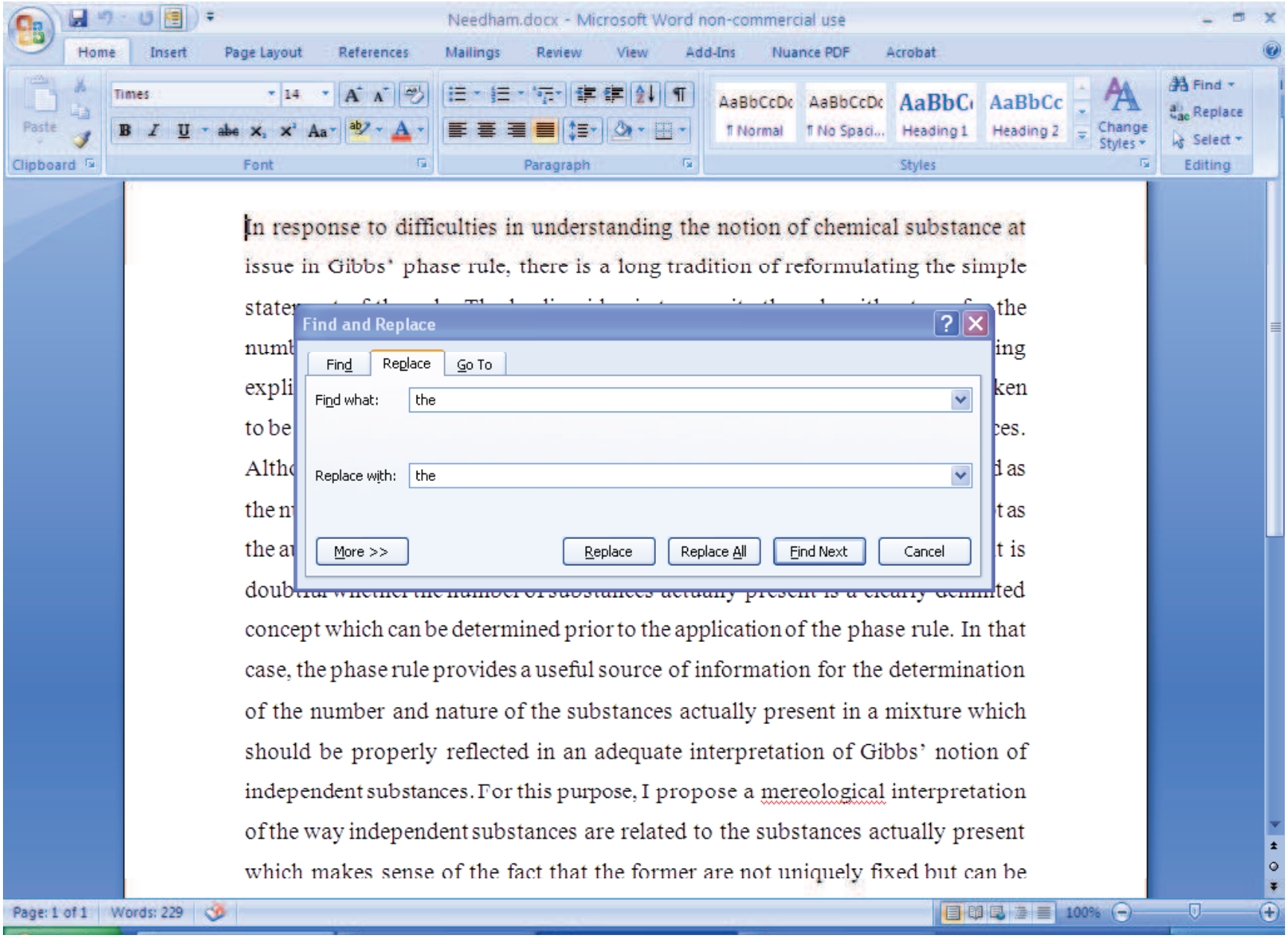
The **total word** count is given on the bottom bar.

A **specific word** count can be obtained by using the "Replace" command:

- Replace "␣the␣" with "␣the␣". This will count the number of "the"s.
- Replace "␣a␣" with "␣a␣". This will count the number of "a"s.

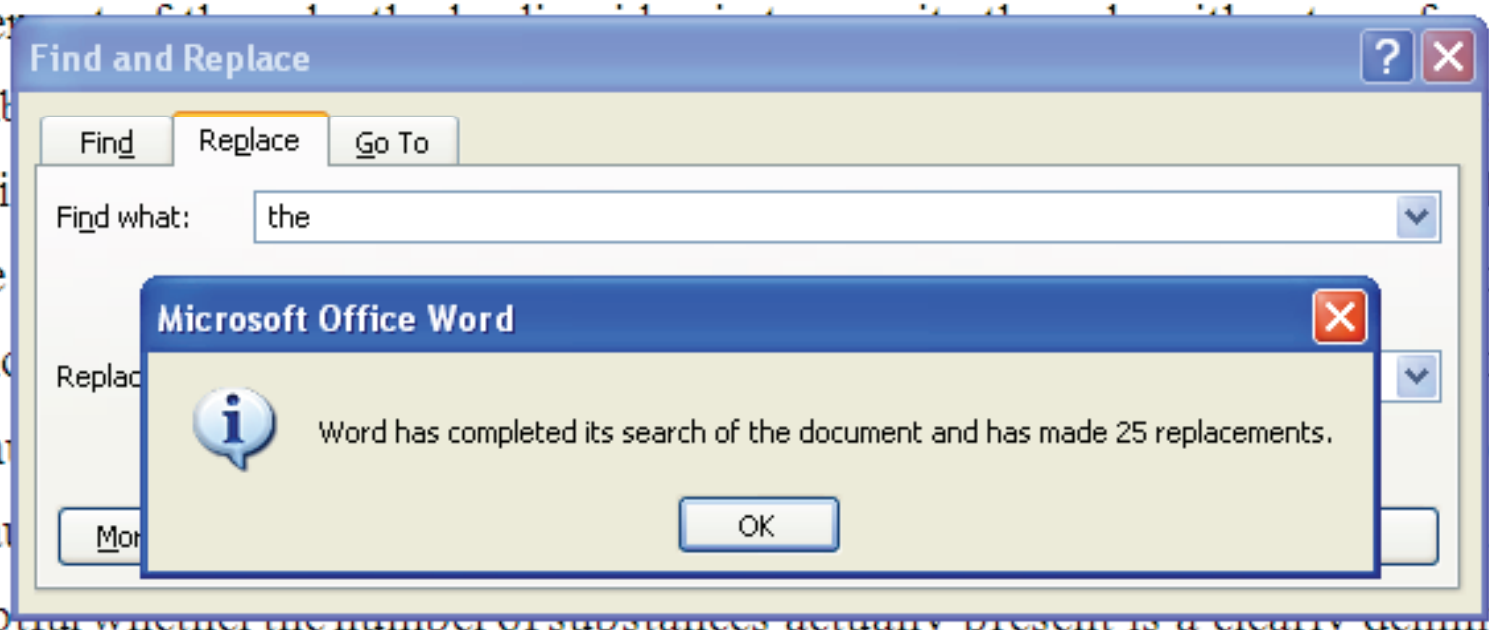
Make sure to put the spaces before and after the Article here.

ONE – DEFINITE AND INDEFINITE ARTICLES



ONE – DEFINITE AND INDEFINITE ARTICLES

In response to difficulties in understanding the notion of chemical substance at issue in Gibbs' phase rule, there is a long tradition of reformulating the simple



concept which can be determined prior to the application of the phase rule. In that case, the phase rule provides a useful source of information for the determination

Note that there are more than 10% of Definite Articles in this short Abstract.

ONE – DEFINITE AND INDEFINITE ARTICLES

Example

An exercise that you should try using Microsoft Word:

1. Obtain a paper (it doesn't have to be a scientific paper) in MS Word format, written by someone whose mother tongue is English.
2. Remove all the Definite and Indefinite articles (Replace "␣the␣" with "␣" etc)
3. Make a note of the number of articles removed.
4. Print out the page which now contains no articles.
5. Attempt to re–insert the **original number** of missing articles in the printed document.

ONE – DEFINITE AND INDEFINITE ARTICLES

CONTAINING NO ARTICLES

In response to difficulties in understanding notion of chemical substance at issue in Gibbs' phase rule, there is long tradition of reformulating simple statement of rule. leading idea is to rewrite rule with term for number of substances actually present and to introduce additional terms making explicit various kinds of restrictions which in original formulation are taken to be incorporated into Gibbs' notion of number of independent substances. Although number of independent substances cannot in general be interpreted as number of substances actually present, it is not entirely derivative concept as authors of reformulations sometimes seem to presuppose. In particular, it is doubtful whether number of substances actually present is clearly delimited concept which can be determined prior to application of phase rule. In that case, phase rule provides useful source of information for determination of number and nature of substances actually present in mixture which should be properly reflected in adequate interpretation of Gibbs' notion of independent substances. For this purpose, I propose mereological interpretation of way independent substances are related to substances actually present which makes sense of fact that former are not uniquely fixed but can be chosen from latter in several ways.

ONE – DEFINITE AND INDEFINITE ARTICLES

WITH ARTICLES

In response to difficulties in understanding the notion of chemical substance at issue in Gibbs' phase rule, there is a long tradition of reformulating the simple statement of the rule. The leading idea is to rewrite the rule with a term for the number of substances actually present and to introduce additional terms making explicit the various kinds of restrictions which in the original formulation are taken to be incorporated into Gibbs' notion of the number of independent substances. Although the number of independent substances cannot in general be interpreted as the number of substances actually present, it is not an entirely derivative concept as the authors of the reformulations sometimes seem to presuppose. In particular, it is doubtful whether the number of substances actually present is a clearly delimited concept which can be determined prior to the application of the phase rule. In that case, the phase rule provides a useful source of information for the determination of the number and nature of the substances actually present in a mixture which should be properly reflected in an adequate interpretation of Gibbs' notion of independent substances. For this purpose, I propose a mereological interpretation of the way independent substances are related to the substances actually present which makes sense of the fact that the former are not uniquely fixed but can be chosen from the latter in several ways.

ONE – DEFINITE AND INDEFINITE ARTICLES

Remember that:

熟能生巧

TWO – NOUN/VERB MISMATCH

This is only a small point but I meet it very frequently.

I do not find things like "the result were" or "the results was".

The problem arises **when the noun and verb are separated in a sentence**.

There is no easy solution to this. I can only suggest to you, to carefully check for this very common error in your papers.

THREE – VOICES

Scientific papers are usually written using the **Passive Voice**, where the usual **predicate (object) of an action is made the subject of a sentence**.

ACTIVE: We have to revise **the concept of an equilibrium phase diagram (OBJECT)**.

PASSIVE: **The concept of an equilibrium phase diagram (SUBJECT)** has to be revised.

THREE – VOICES

The complete use of the passive voice can be boring and there is a trend towards using a mixture of Active and Passive, as the following Abstract shows.

THREE – VOICES

It has been shown

We make no assumptions

We show how a configurational lattice dynamics technique, in which the free energy of a number of configurations is determined directly by means of a fully dynamic structural minimization, can be used to calculate thermodynamic properties of solid solutions and phase diagrams. No assumptions are made as to the nature of the solution and *both* configurational *and* vibrational entropy contributions are determined directly. Only a small number of configurations are required. We illustrate the method using MnO/MgO, for which our results support the recent experiments of Wood, Hackler, and Dobson [Contrib. Mineral. Petrol. **115**, 438 (1994)] who, in contrast to previous workers, suggest the formation of a complete solid solution at temperatures only above 1100 K.

The method is illustrated

the

THREE– VOICES

I think, however, that this requires a very good command of English.

My advice to you would be to stick with the Passive Voice throughout your paper.

FOUR – TENSES

There are two tenses for describing past actions:

1. Present perfect tense – the action is completed but the result from that action is related to the present.

   An auxiliary verb plus a main verb is required.

   Ex: The door has been locked **(was locked and remains locked at present)**.

2. Past tense – the action is completed but the result from that action is not related to the present.

   Ex: The door was locked **(was locked but its present state is unknown)**.

How does this relate to using tenses in scientific papers?

FOUR – TENSES

The Sections in A Paper
A typical scientific paper usually has the following structure:

1. Title and Authors
2. Abstract
3. Introduction
4. Experimental
5. Results
6. Discussion
7. Conclusions

Different tenses should predominate in these different sections of the paper.

I find too much use of the Past Tense in the papers I am given to correct.

FOUR – TENSES

The Experimental (or Materials and Methods) Section should contain sufficient information that someone else can reproduce the results.

The tense to use is the easiest to understand and so we consider it first.

It is a record of what you actually did. The work is done, finished, completed, history.

Use the Past tense for what you did in this Section.

Ex: The data **were collected** by the XYZ method.

But there can be the occasional use of the Present Perfect or Present tenses in this Section:

Ex: The data **were collected** by the XYZ method (what you did). This method **has been** used previously by Smith [22] and **is** known to be the most reliable.

FOUR – TENSES

The Results and Discussion Sections
Although your experimental work has been completed in the past, the results and your discussion of them are relevant to the present and, hopefully, to the future.

A mixture of the Present and Present Perfect tenses should predominate in these Sections of the paper.

Again, this is not to say that there should not be the occasional use of the Past tense.

Ex: "the results which **are** shown in Fig. (2) **are seen** to be in good agreement with those which **were** shown earlier."

FOUR – TENSES

The Abstract and Conclusions Sections
These Sections are where you are summarizing your results and discussion of them.

Since they apply to the present and the future but were carried out in the past, we require the Present Perfect as the major tense in both these Sections.

I find an excessive use of the Past Tense in the manuscripts from IMR.

"A new Ti–Al alloy **was investigated** to study its mechanical properties" $\Longrightarrow$ "A new Ti–Al alloy **has been investigated** to study its mechanical properties".

Some use of the Present Tense is acceptable but **never** the Past tense.

FOUR – TENSES

Summary of Tenses in a Paper
We can summarize the above as follows:

1. Title and Authors – not relevant
2. Abstract – Mainly Present Perfect Tense; no Past Tense
3. Introduction – Mainly Present Perfect Tense
4. Experimental – Mainly Past Tense
5. Results – Mainly Present Perfect Tense; no Past Tense
6. Discussion – Mainly Present Perfect Tense; no Past Tense
7. Conclusions – Mainly Present Perfect; no Past Tense

FIVE – LONG SENTENCES

- I find sentences as long as I expect to find a paragraph.
- Use short sentences.
- In particular, restrict yourself to only one which per sentence.

Not like the following:

Fig. (2) shows a micrograph of a cast iron **which** contains *Cr*, **which** had been heat treated, **which** was carried out in a special furnace, **which** was supplied by Symantec, **which** is a German company.

SIX – LONG PAPERS

Are the Chinese a long–winded nation?

I find many papers are unnecessarily long because of **repetition**.

Do not discuss your results in the Results Section and then follow this with a repeat discussion in the Discussion Section.

The Results Section is for the presentation of results and, where relevant, of comments about the statistical errors.

There should be no theoretical development in this Section.

The Discussion Section is for the discussion of the results and their theoretical interpretation.

SEVEN – INFORMAL ENGLISH

I find too much **jargon** or too many **colloquisms**, a result, perhaps, from watching too many U.S. movies.

There is no place for informal English in a scientific paper.

Some examples which I have noted:

get $\Longrightarrow$ obtain

keeps $\Longrightarrow$ remains

super $\Longrightarrow$ extremely

tiny $\Longrightarrow$ very small

happens $\Longrightarrow$ occurs

lots $\Longrightarrow$ many

isn't $\Longrightarrow$ is not

Besides $\Longrightarrow$ Additionally

So $\Longrightarrow$ Consequently

done $\Longrightarrow$ carried out

hard $\Longrightarrow$ difficult

get to $\Longrightarrow$ reaches

likely $\Longrightarrow$ probable

owned $\Longrightarrow$ possessed

didn't $\Longrightarrow$ did not

doesn't $\Longrightarrow$ does not

What's more $\Longrightarrow$ Furthermore

EIGHT – HYPHENS AND APOSTROPHES

Reasons for hyphens:

1. Sometimes **essential for clarity**

   A unionised workforce; an un-ionised liquid

   A man-eating shark; a man eating shark

   Twenty–odd students; twenty odd students

   He is recovering; he is re-covering it

2. Sometimes for **joining a prefix**.

   An Nb–bearing steel (or a Nb–bearing steel)

   Solver is an add–in for Microsoft Excel

EIGHT – HYPHENS AND APOSTROPHES

The trend is towards de–hyphenation when there is no loss of clarity. Either use two separate words or join them into one word:

$$\text{rubbing–pair} \Longrightarrow \text{rubbing pair}$$

$$\text{micro–structure} \Longrightarrow \text{microstructure}$$

$$\text{meta–stable} \Longrightarrow \text{metastable}$$

EIGHT – HYPHENS AND APOSTROPHES

Note the spelling of this plural. Normally, with the single word apostrophy, we would expect the plural to be apostrophies.

Apostrophes are used in two ways:

1. Contraction (shortening)
2. Possessive (belongs to)

It is this latter feature which is the more difficult to grasp.

EIGHT– HYPHENS AND APOSTROPHES

Like hyphens, they are essential for **clarity** when used in the possessive sense.

Fe, Ni, Cr	Ni, Al, Cr	Al, Si, Mg
Alloy A	Alloy B	Alloy C

1. Ni in alloy A:

   The alloy's element's concentration is...
2. Ni in alloys A & B:

   The alloys' element's concentrations are...
3. Ni and Cr in alloy A:

   The alloy's elements' concentrations are...
4. Several elements in several alloys:

   The alloys' elements' concentrations are...

EIGHT – HYPHENS AND APOSTROPHES

Names ending in ‘s’: Burgers, Gibbs, Oates

Possessive:

Burgers’ vector **not** Burger’s vector

Gibbs’ Phase Rule **not** Gibb’s Phase Rule

Oates’ lecture **not** Oate’s lecture

NINE – ABBREVIATIONS

Most of you are familiar with and use the following Latin abbreviations:

etc	et cetera	and other things
a.m.	Ante Meridiem	before midday
p.m.	Post Meridiem	after midday
et al.	et alii	and others

But there seems to be a reluctance to use others. The most useful in scientific papers are:

e.g.	exempli gratia	for example
i.e.	id est	that is, in other words
viz.	videlicet	namely, that is to say

Rarely start a new sentence with "That is" or "For example" or "Namely".

Use an abbreviation, i.e., continue the sentence.

Note the use of commas and spaces here.

TEN – ODDS AND ENDS

A few other things worth mentioning:

1. Do **not** give first names or initials in citations, e.g.,

   John Smith [22] or J. Smith [22] $\Longrightarrow$ Smith [22]

TEN– ODDS AND ENDS

And some more:

1. y does not increase **monotonously** with x, it increases **monotonically**.
2. "y increases obviously" $\Longrightarrow$ "y increases significantly"
3. "behaviors" $\Longrightarrow$ "behavior"
4. "In this manuscript we found ..." $\Longrightarrow$ "In the work reported in this manuscript we have found ..."
5. "In Fig. (4) X is joined to Y" $\Longrightarrow$ "Fig. (4) **shows** how X is joined to Y".
6. "to research ..." $\Longrightarrow$ "to investigate..."
7. different to $\Longrightarrow$ different from
   compared to $\Longrightarrow$ compared with

That's It.

Good Luck with the Writing of Your Papers