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V4 Seminars for Young Scientists on Publishing Techniques in the Field of Engineering Science

General structure of journal paper

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General Structure of the Journal Paper

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Bibliography
Journal name
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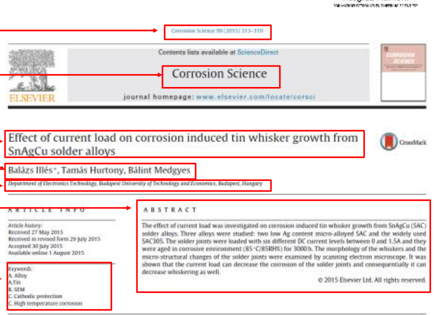

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ELSEVIER

Effect of current load on corrosion induced tin whisker growth from SnAgCu solder alloys

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ABSTRACT

The effect of current load was investigated on corrosion induced tin whisker growth from SnAgCu (SAC) solder alloys. Three alloys were studied: two low Ag content micro-alloyed SAC and the widely used SAC305. The solder joints were loaded with six different DC current levels between 0 and 1.5A and they were aged in corrosive environment (85 °C/85RH%) for 3000 h. The morphology of the whiskers and the micro-structural changes of the solder joints were examined by scanning electron microscope. It was shown that the current load can decrease the corrosion of the solder joints and consequentially it can decrease whiskering as well.

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1. Introduction

Citation

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1. Introductions

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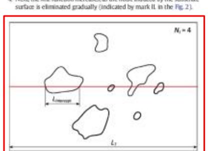
2. Materials & Methods (Experimental)

2. Materials and methods

2.1. Experimental



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2. Experimental

(Sometimes the experimental section contain physical or mathematical descriptions)

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3. Results

e ECM processes (which resulted in den-
tests were carried out on different lead-free
ontent soldered double comb patterns. The
according to the IPC-B-24 test board with
rameters; the line width of the conductor
a gap size of 0.5 mm on an FR4 (fibreglass
rate. The patterns were formed by conven-
and wet etching processes. The Cu base
by immersion Sn that is commonly used
ring processes. During this study, the fol-
alloyed low Ag content solders were inves-
of the elements are in weight%):

3. Results

In Figs. 4 and 5, STEM micrographs are shown with labelled EDS lines and spots. In both cases (SAC0307 and SAC0807), EDS lines (L1, L2 and L3, L4) were measured and each line has 5–5 measurement points.

The results of EDS points are shown in Tables 1 and 2. According to the EDS results, a micro-alloy element; antimony have participated in the electrochemical processes. The presence of Sb is an unexpected result, since there are no reports of it in the ECM literature. Therefore, the ECM behaviour of Sb will be discussed below.

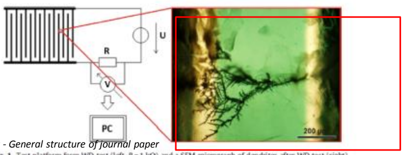

Fig. 1. Test platform form WD test (left, R = 1 kΩ) and a SEM micrograph of dendrites after WD test (right).

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4. Discussion

(Sometimes the Discussion has the common section with Results)

4. Discussion

In order to verify the conclusion of the STEM–EDS results presented in Tables 1 and 2, namely the presence of Sb in the dendrites, electron diffraction method was also applied. In Fig. 6, the diffraction pattern of SAC0807 dendrite is shown.

4.1. Oxides/hydroxides of antimony

SbO_2^+ is a species existing in solution under very acidic conditions, and $[Sb(OH)_6]^-$ (or SbO_3^-) are the species mainly present under mildly acidic, neutral, and alkaline conditions [27]. Only a few equilibrium studies exist on Sb(V) hydrolysis. Antimony

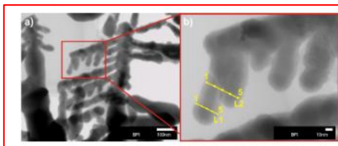

Fig. 4. (a) STEM picture of dendrites formed from SAC0307 solder and (b) place of EDS lines and spots.

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5. Conclusions

5. Conclusions

The novel lead-free micro-alloyed low Ag content solder alloys were tested for ECM behaviour. The dendrites (grown from the solder alloys) were investigated by STEM–EDS to get information about the micro- and nanostructures and their elemental composition. We have found the presence of antimony within the dendrites, which means that this element plays an important role during ECM processes – it also takes part in the migration. The first ECM model of Sb was established using the current STEM–EDS results and the existing chemistry literature of antimony. As a summary, it can be stated that the micro-alloy elements (e.g. Sb) take part during the ECM mechanism. Therefore, they can have a significant impact on ECM reliability as well.

Acknowledgements

(optional)

Acknowledgements

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Role of different parts and sections

Title:

- ***„Choose an appropriate and catchy title"***
- **The title will determine if the reader will „open" our article or not!**
- The title has strong effect on the article performance (number of citation)
- The title has to summarize the main topic of the paper
- Do not use to long neither to short title
  - Too short title: *„An indirect evaporative heat pump system"*
  - Too long title: *„Thermodynamic analysis of a cascaded compression – Absorption heat pump and comparison with three classes of conventional heat pumps for the waste heat recovery"*
- Do not use to general but neither to focused title
  - Too general title: *„Optimal heat pump integration in industrial processes"*
  - Too focused title: *„Simulation-based analysis of a ground source heat pump system using super-long flexible heat pipes coupled borehole heat exchanger during heating season"*

Role of different parts and sections

Keywords:

- Usually 3-6 world (world terms) have to be given in our article which ***describes the most the topic, investigated material, applied method, results, etc.***
- In some journals they have to be chosen from lists and from given categories about (e.g topic, investigated material, applied method, results)
- Keywords are/(*were*) ***applied by the searching algorithms*** in scientific data bases
- The application of ***general keywords*** (e.g soldering, reflow oven, intermetallic layer) are more beneficial (the article will be found more times)
- Recent algorithms are searching in the title and even in the article body therefore the importance of the keywords are less
- (Some journals do not use keywords any more)

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Role of different parts and sections

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Abstract:

- A paragraph at the beginning of the article, which summarize the article, usually 200-300 worlds.
- The **abstract** is the only part of the article which ***reachable for free*** in an case, therefore the abstract has a key role in the success of our article.
- Some journal has strict rules about the abstract (e.g. world limitations, mandatory content, structure etc.), ***always check the guide for authors!***

Abstract structure types:

- *Simple* (continuous) *abstract*: a paragraph fluently written
- *Structured abstract:* 4-6 small paragraph with dedicated contents

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Role of different parts and sections

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Simple abstract:

- An example from „Corrosion Science"

Topic

Material

A B S T R A C T

The effect of current load was investigated on corrosion induced tin whisker growth from SnAgCu (SAC) solder alloys. Three alloys were studied: two low Ag content micro-alloyed SAC and the widely used SAC305. The solder joints were loaded with six different DC current levels between 0 and 1.5A and they were aged in corrosive environment (85 °C/85RH%) for 3000 h. The morphology of the whiskers and the micro-structural changes of the solder joints were examined by scanning electron microscope. It was shown that the current load can decrease the corrosion of the solder joints and consequentially it can decrease whiskering as well.

Methods

Findings

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Role of different parts and sections

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Structured abstract:

- An example from „Soldering and Surface Mount Technology"

Abstract

Purpose – The purpose of this paper is to present a novel and alternative method for the characterization of isotropic conductive adhesive (ICA) joints' conductivity by the calculation of the mean intercept length of conductive flakes in the cured joint. ICAs are widely used in the field of hybrid electronics or special printed circuit board applications, such as temperature sensitive or flexible circuits. The main quality parameters of the ICA joints are the conductivity and the mechanical strength.

Design/methodology/approach – For the experiments, one-component Ag-filled thermoset ICA paste was used on FR4 printed circuit test board to join zero-ohm resistors. Six different curing temperatures were applied: 120, 150, 175, 210, 230 and 250°C. The conductivity of the joints was measured in situ during the curing process. Micrographs were taken from the cross-sectioned joints, and the mean intercept length was calculated on them after image processing steps.

Findings – Results of the measured conductivity and the mean intercept length were compared, and acceptable correlation was found for what can be used for characterizing the conductibility of ICA joints.

Research limitations/implications – Investigating and characterizing the conductivity of ICA joints by an image processing method.

Originality/value – The main advantage of this method compared to the electrical measurements is that the conductivity characterization is possible on any kind of component. Therefore, this method can be used in any appliances not only in test circuits.

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Role of different parts and sections

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Do not use in abstract:

- Figures
- References
- Abbreviations (only well known ones, like „SEM")
- Definitions and explanations

Typical abstract mistakes:

- The abstract is not a „mixture" of Introduction and the Conclusions sections!
- The abstract is not for to present the „state of the art"!
- The abstract has to contain some findings, but it is not necessary to tell everything there!
- The abstract should not be too wordy about the work which was done!

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Role of different parts and sections

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1. Introduction:

- The Introduction section is the place for presenting of the ***„back ground" of the work*** and define ***„what we did and why we did"***
- **Mandatory parts** and general structure of the Introduction section:
  - Description of the investigated topic, definition of the main terms
  - Presenting the „state of the art" with a literature survey with references!
  - Highlight the problems, missing, contradictions in the literature
  - Concluding the literature survey which confirm your aims (what you did and why you did)
- Figures are valid to use, but not too much!
- Typical length of the Introduction section is 600-1000 worlds

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Role of different parts and sections

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1. Introduction:

Typical problems with Introduction:

- The topic is not introduced or not enough deeply
- There is no literature survey in the introduction
- There are no references
- The Introduction is too wordy (over 1500 worlds) with a too long literature survey and/or a lot of figures (max. 1-2 figures)
- The Introduction is too short, (under 500 worlds) only like an abstract.
- The introduction contains part from the Experimental section (e.g. description of materials, test settings and measurement methods)
- There is no any conclusions from the literature and aims are not defined and/or confirmed
- Undefined abbreviations are used

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Role of different parts and sections

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2. Materials and Methods (Experimental):

- The Materials and Methods (sometimes called Experimental) section is the place for ***presenting the applied materials, test and measurement settings, models, algorithms*** etc.
- **Mandatory parts** of the Materials and Methods section:
  - Description of the ***investigated materials*** (e.g solder pastes, PCBs, components, etc.)
  - Description of the ***applied processing technologies and machines*** (e.g. screen printing, reflow soldering, etc.)
  - Description of the ***applied test and other settings of the experiments*** (e.g. aging methods, loading methods, etc.)
  - Description of the ***applied evaluation methods*** (e.g. measurements, data processing algorithms, statistical methods, etc.)

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Role of different parts and sections

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2. Materials and Methods (Experimental):

- Typical length of the Materials and Methods section is 300-600 worlds
- If the article is „less material" (like numerical simulations, information science) the applied models and algorithms are presented in the M&M section or in a separated section after the M&M.

Typical problems with Materials and Methods section:

- It contains parts from the Introduction (e.g. the definition of the aims)
- Settings of the measurements or the machines are not presented or not enough deeply ***(do not forget: your measurements has to be repeatable by other researchers!)***
- BUT it is not necessary to copy the manuals of the machines into the M&M section or it is not necessary to present the working principle of the measurement machines (only if they are unique)!

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Role of different parts and sections

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3. Results (and Discussion):

- The Results **(and Discussion)** section is the place for ***presenting our results and observations during the research*** (and discuss them).
- ***Usually it is allowed to combine the Results and Discussion into one section!*** (Applied when the obtained results can be explained „easily and shortly")
- **Mandatory parts** of the Results (and Discussion) section:
  - Presentation of our results and observations with clearly ***good quality and understandable figures and graphs***
  - (Discuss the results via scientific explanation of the observations and compare them with other results from the literature)
- Typical length of the Results (and Discussion) section is 500-1000 worlds

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Role of different parts and sections

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3. Results (and Discussion):

Typical problems with Results and Discussion section:

- It contains parts from the Materials and Methods section (e.g. the introduction of the measurement methods)
- The quality of the figures are bad or they are unclear
- In a combined Results and Discussion section:
  - there is no discussion at all
  - not enough deep discussion is presented
  - the statements are not justified (by references)
- In a simple Results section the results are discussed (or partially).
- The main findings are not or not enough highlighted („the paper points nowhere")

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Role of different parts and sections

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4. Discussion (separated):

- Separated Discussion is applied when the obtained results has to be discussed more deeply and long.
- Typical length of the Discussion section is 500-800 worlds

- **Mandatory parts** of the Discussion section:
  - Discuss the results via scientific explanation of the observatic and compare them with other results from the literature
  - Further figures and equations are usually applied for the explanations

Typical problems with the Discussion section:

- It is too short (only 200-300 worlds)
- Only presenting further results but not a real discussion

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Role of different parts and sections

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5. Conclusions:

- The Conclusions section is the place ***to briefly concluded your work, results and findings*** it is possible to point out further research possibilities in the topic (according to the results).
- Typical length of the Conclusions section is 150-250 worlds

- **Mandatory parts** of the Conclusions section:
  - A sentence about the research which was done
  - **THE CONCLUSIONS OF THE RESEARCH!**

Typical problems with the Conclusions section:

- Too wordy and not focused conclusions (over 400 worlds)
- Only repeating the main results and the findings without real conclusions

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Role of different parts and sections

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Acknowledgement:

- Acknowledge for organizations and/or people the financial or any kind of support which helped your research to reach the **PRESENTED** results!
- More grants or financial supports can be mentioned together

References:

- Listing the cited references with bibliography data
- Different reference formats (APA, MLA, Harward, Chicago, etc.) are existing (always check the „guide for authors")

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Optional parts

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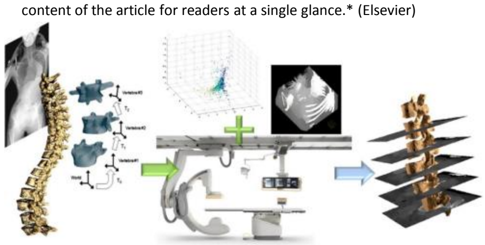
Graphical abstract:

- A single, concise, pictorial and visual summary of the main findings of the article. This could either be the concluding figure from the article or a figure that is specially designed for the purpose, which captures the content of the article for readers at a single glance.* (Elsevier)



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Optional parts

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Videos:

- publishers accept video material and animation sequences to support and enhance your scientific research. They usually embedded into the article with links. They can be referred on the same way as a figure or table
- Since video and animation cannot be embedded in the print version of the journal, text for both the electronic and the print version for the portions of the article has to be provide that refer to this content. * (Elsevier)

Audio Slides:

- gives the opportunity to summarize your research in your own words and to help readers understand what the paper is about. * (Elsevier)

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Optional parts

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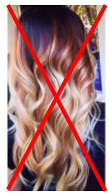
Highlights:

- Three to five result-oriented points that provide readers with an ***at-a-glance overview of the main findings***. Each Highlight must be ***85 characters or fewer***, and the Highlights together ***must clearly convey only the results of the stu***dy. Don't try to capture every piece of data or conclusion. Let the paper do the talking.
- Example:
  - Fading of a script alone does not foster domain-general strategy knowledge
  - Performance of the strategy declines during the fading of a script
  - Monitoring by a peer keeps performance of the strategy up during script fading
  - Performance of a strategy after fading fosters domain-general strategy knowledge
  - Fading and monitoring by a peer combined foster domain-general strategy knowledge



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Optional parts

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Appendix:

- contains information that is non-essential to understanding of the paper, but may present information that further clarifies a point and findings of the paper
- An appendix is an *optional* part of the paper, and rarely used.
- **Some examples of material that might be put in an appendix (not an exhaustive list)**:
  - raw data
  - maps (foldout type especially)
  - extra photographs
  - explanation of mathematical formulas, either already known ones, specialized computer programs for a particular procedure
  - full generic names of chemicals or compounds
  - program codes

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Optional parts

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Cover letter:

- The cover letter accompanying your journal submission is your chance to lobby on behalf of your manuscript (sometimes mandatory!)
- Parts:
  - The title of the manuscript and the names of the authors
  - Describe the rationale behind your study and the major findings from your research. (Refer to prior work that you have published if it is directly related!)
  - Explains why your manuscript would be a good fit for the journal
  - Close with a brief paragraph indicating the following:
    - The manuscript is original (i.e., you wrote it, not copied it)
    - No part of the manuscript has been published before, nor is any part of it under consideration for publication at another journal
    - There are no conflicts of interest to disclose
    - A list of potential reviewers (only if requested by the journal)
    - Any researchers who should NOT review your manuscript