Dear Editor

**JoVE59376**

“Accumulation and Analysis Methods of Copper Ion in Copper Sulfate Plating Solution”

Toshiaki Koga, Yoshitaro Sakata, and Nao Terasaki

We thank Editor for careful reading our manuscript and for giving useful comments. We appreciate that you are interested in our report. We have revised the manuscript JoVE59376 on the base of the editor comments.

We look forward to a publication of our manuscript in Journal of Visualized Experiments.

Sincerely

Toshiaki Koga

Our responses to the reviewew comments are as follows. The correction is described in red in the text.

1. Please take this opportunity to thoroughly proofread the manuscript to ensure that there are no spelling or grammar issues.

**Reply:**

I reviewed the spelling and grammar.

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1. Figure 1: Please include a space between numerical values and their corresponding units (e.g., 1 A, 62.5 mA/cm2).

**Reply:**

We modified the new Figure 2.

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3. Please define all abbreviations before use.

**Reply:**

We have defined SEM.

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4. Please expand the Short Abstract to briefly describe the applications of this protocol.

**Reply:**

Short abstract was expanded.

Accumulation of cuprous ion in copper sulfate plating solution in model experiment and analysis based on quantitative measurement are described. This experiment reproduces the accumulation process of cuprous ion in the plating bath, which contributes to the elucidation of its mechanism and prediction of the quality of the plating film.

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5. Please expand the Short Abstract to briefly describe the applications of this protocol.

**Reply:**

Introduction was expanded.

Conventionally, it has been claimed that Cu(I) in a plating solution is instantly oxidized to cupric ions (Cu(II)). We have confirmed that there are several millimoles (mmol/L) of Cu(I) in the plating bath of the production line12. According to this experiment method, the accumulation of Cu(I) similar to the plating bath can be reproduced even in the beaker of the laboratory. This is a fundamental technology to elucidate Cu(I) production and accumulation process in copper sulfate electroplating solution which was unknown14. Furthermore, by controlling Cu(I) in the plating solution, it is also possible to predict the effect of Cu(I) on the quality of the plating film15.

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6. Please remove commercial language from the manuscript text: JASCO.

**Reply:**

I excluded JASCO.

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7. Please remove commercial language from the manuscript text: JASCO.

**Reply:**

I excluded JASCO.

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7. Please remove commercial language from the manuscript text: JASCO.

**Reply:**

We reviewed the protocol.

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8. Please revise the protocol text to avoid the use of any personal pronouns (e.g., "we", "you", "our" etc.).

9. Please move the discussion about the protocol to the Discussion.

10. Please add more details to your protocol steps.

**Reply:**

We reviewed the protocol.

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11. Please provide the concentration of sulfuric acid.

**Reply:**

We filled in the concentration of sulfuric acid and copper sulfate.

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12. Please specify the temperature that is appropriate for storing the plating solution.

**Reply:**

I entered the storage conditions.

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13. Please specify the current value and predetermined time used in this step.

**Reply:**

I specified the current value and time.

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14. Please list an approximate volume of BCS solution to prepare.

**Reply:**

The BCS solution (10-2 mol / L) is prepared by dissolving 0.36 g of the molecule in 100 mL of pure water.

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15. Please describe how to obtain the reaction curve and how to perform a numerical analysis.

16. Please describe how to perform curve fitting.

**Reply:**

Curve fitting was removed from the PROTOCOL and inserted into RESULTS.

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17. Please expand to explain the Representative Results in the context of the technique you have described.

**Reply:**

I expanded REPRESENTATIVE RESULTS and made FIGURE LEGENDS.

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18. Please revise the Discussion to explicitly cover the following.

**Reply:**

DISCUSSION was revised and added in red.

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18. Please revise the Discussion to explicitly cover the following.

**Reply:**

DISCUSSION was revised and added in red.

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19. Please include an Acknowledgements section.

**Reply:**

Added acknowledgment.

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20. References: Please do not abbreviate journal titles. Please do not apply superscript formatting to reference numbers in this section.

**Reply:**

The items pointed out was revised.

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21. Table of Materials: Please sort the items in alphabetical order according to the name of material/equipment.

**Reply:**

They are arranged in alphabetical order.