

## Chemical Engineering & Technology - Decision on Manuscript ID ceat.202200055

Chemical Engineering & Technology <onbehalf@manuscriptcentral.com>

Thu 10/03/2022 18:30

To: Khairul Fikri b Tamrin <tkfikri@unimas.my>

 1 attachments (48 KB)

Attached standard file: \* Template-CET-Manuscript.docx;

10-Mar-2022

Dear Dr. Tamrin,

Manuscript ID ceat.202200055 entitled "Enhanced fluid mixing using reversed multi-staged Tesla micromixer" which you submitted to Chemical Engineering & Technology has been reviewed. The referee comments are included at the bottom of this letter.

A revised version of your manuscript that takes into account the comments of the referee(s) will be reconsidered for publication.

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Once again, thank you for submitting your manuscript to Chemical Engineering & Technology and we look forward to receiving your revision.

Sincerely,

Barbara Boeck

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Reviewer: 1

#### Comments to the Author

The authors investigated the effect of valve stages (from 1<sup>st</sup> to 10<sup>th</sup>) and Reynolds number in the range of 5 to 140 on fluid mixing performance of reversed 10-stage micro-Tesla valves. However, the quality of the paper needs to be improved and a major revision is needed. The following questions should be corrected.

1. The innovation of the paper is not outstanding.
2. The logic of the paper especially the introduction needs to be improved as well as the advantages and significance should be highlight.
3. Authors should state their results rather than the readers looking for results from figures or tables. E.g. the results in Table 2, Fig. 6, Table 4.....
4. Many descriptions in the manuscript are less rigorous. For example, I don't think the conclusion of "At increasing Reynolds number, the mixing performance increases" is correct. This conclusion only holds within a certain range of Reynolds numbers which also can be reflected in Table 2 and Table 3.....
5. A lot of text and results content in the manuscripts is repeated description which is pointless. For example, "A reversed micro-Tesla valve with 10-stage is illustrated in Fig. 2 and 3." and "Fig. 3 shows the actual reversed 10-stage Tesla micromixer" in 2.2. Fabrication of reversed 10-stage Tesla micromixer; Table 2, Table 3, Table 4 and Figure 6.....
6. The comparison of the mixing performance of the forward-flow and reverse-flow Tesla valve under the same conditions should be added to clarify the points of this paper.

Reviewer: 2

#### Comments to the Author

In this study, Buglie and colleagues have investigated the enhancement of micromixing in Tesla micromixers. The concept authors used to investigate the study and the results were presented well. However, the study requires further enrichment and modifications to fit the Chemical Engineering & Technology journal. To be more specific:

1. The abstract section of the article must be further enriched. Authors should write the abstract in a way that readers understand the current challenge and know how this article will address the channel and how it would help the micromixing field.

2. An expert in microfluidics and micromixing needs to revise the whole article. Several improvements and editing is required for the article; for instance,
  - a. In lines 6 and 7 page 2, "Microfluidics is about study of fluid motion in microchannels and microsystems having miniaturized widths and dimensions." The word "width" is actually redundant.
  - b. The transition between each paragraph is required, and authors should write the story in a way that all paragraphs are correctly connected. Also, so many similar sentences with the same meaning exist in each paragraph, for instance, in paragraph two, one sentence was just paraphrased two or three times.
  - c. Line 21 and 22, "Passive mixing systems and micromixers have no moving parts and rely solely on the aerodynamic behaviour of the channel for mixing" is it really "aerodynamic" or do you mean "hydrodynamic"?
  - d. In lines 28 and 29, "At low Reynolds number, the high mixing performance can be made possible by the effect of chaotic advection" this is not true. In low Re, the mixing mechanism is diffusion.
  - e. Also, the generation of chaotic advection is based on the channel geometry and units. Therefore, page 4 line 25 and 26, "Additionally, the suitable range of Reynolds number for observing fluid mixing is to be started at lower limit of 5 [14] until 100 [16-20]." This is not essentially true since Re changes based on different units.
  - f. And many more similar issues that require to be addressed properly.
  - g. Also, English editing is required for the current manuscript and many grammatical errors exist in the text.
3. Authors require to bring more explanations and justifications on the physics of the fluid within the channel.
4. It is recommended that authors provide more data like streamlines, velocities, or vorticities to justify the physics of the phenomena.
5. Many mixing units exist in the literature. What was the motivation of the authors to use the Tesla mixing unit?

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Please try to shorten your article. Please think about moving some details to the supporting information. For details see our Guidelines for Authors.

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